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VODA WATER

VODNIK PO RAZSTAVI / EXHIBITION GUIDE

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Foto M. Paternoster

Foto / Photo M. Paternoster

Voda za prihodnost

Muzeji ohranjajo predmete, stvari, zgodbe za prihodnost. Naše osnovno poslanstvo je torej zbiranje vseh pomembnih predmetov, ki zaznamujejo naše bivanje, življenje, našo umetelnost, ki priča, zakaj delamo, ustvarjamo, živimo. Simbolni pomen našega dela pa je tudi naša družbena odgovornost. Z njo kažemo odnos do sveta, do okolja, v katerem živimo.

VODA je ena izmed stvari, do katerih moramo imeti poseben odnos. Zaradi njenega pomena za življenje na Zemlji je nujno, da ta pomembni življenjski vir obravnavamo posebej tenkočutno, s pravo zavzetostjo za ohranitev vseh vrednot, ki jih VODA kot vir življenja pooseblja. V času, ko spremljamo naraščajoči pomen vode za vse oblike našega obstoja, je borba za čisto, dostopno pitno vodo postala ena izmed glavnih strateških kategorij. Trajnostnega razvoja si ni mogoče zamisliti, če dostopa do vode ne bomo omogočili vsem prebivalcem našega planeta. Govorimo o bitki za preživetje, o tisti kategoriji, ki na prvo točko razmisleka o našem humanem ustroju postavlja našo pripravljenost, da delimo naše skupne, osnovne planetarne surovine. Poleg zraka je to ta edinstveni, čudoviti, neponovljivi, če hočete, tudi mistični element – VODA.

V Mestnem muzeju Ljubljana smo se prav zaradi teh razmislekov lotili široko postavljene akcije, ki pomen vode obravnava na različne načine. Gre za odgovornost in priložnost za vse nas, ki smo odvisni od vode in zaradi nje živimo. Razstava o VODI v Mestnem muzeju, akcije in razstave v urbanem prostoru, pogovori in spremljevalne razstave bodo razprli pogled na to, s kako pomembnim elementom imamo opravka. Zakaj VODA ostaja in bo tudi v prihodnje

Water for the Future

Museums are tasked with preserving objects and narratives for the future. Our primary mission is thus the collecting of all relevant objects that have a bearing on our existence, our individual lives and our art, the objects that testify to why we work, create and live. Our work also has a symbolic aspect, called ‘social responsibility’. It is through this responsibility that we show our attitude to the environment in which we live.

Water is something that requires a special attitude. Given its impact on the life on Earth, it is necessary that this crucial resource be treated very prudently, with a strong commitment for the preservation of all the good water brings as a source of life. In times when water is increasingly important for all aspects of our existence, the struggle for pure and accessible drinking water has become essential. Sustainable development is inconceivable unless access to water is made possible for all the inhabitants of our planet. What is concerned here is the struggle for survival, a category that, however, makes our willingness to share our common planetary resources one of the top priorities of any reflection on our humanity. Apart from the air, these resources include the unique, irreplaceable and even mystic element that is water.

Based on such considerations, the City Museum of Ljubljana has embarked on an extensive project aimed at shedding light on the importance of water from several perspectives. What is in play here is the responsibility and an opportunity for all of us who are dependent on water. The exhibition about water to be put on by the City Museum, the related actions and other shows to be are all aimed at demonstrating how important the element of water is, to show

eno izmed glavnih poslanstev človekove vizije, kreativnosti, razmisleka o tem, kako živimo in kako razmišljamo.

Zakaj razstava in različni projekti na to temo prav v Ljubljani? Z našim mestom ima voda prav poseben odnos. Od prazgodovine do danes je to prav poseben splet okoliščin, simbolov, človeških ravnanj, zaradi katerih Ljubljana ostaja mesto, ki je z vodo v nenehnem dvogovoru. Reka Ljubljanica, Ljubljansko barje, Robbov vodnjak, Plečnikovi mostovi, poplave, žled – vse to so samo nekatere izmed asociacij, na katere pomislimo, ko izrečemo besedo voda, in ki so nenehno, vsak dan našega bivanja v tem mestu, povezane z vodo, ki to mesto objema, ga oblikuje in mu daje smiseln okvir. Ljubljana bo prihodnje leto »evropska zelena prestolnica 2016«. Brez naše skupne skrbi za vodo tega naziva prav gotovo ne bi dobila. Projekt VODA je most k zeleni prestolnici v prihodnjem letu. V povezavi z različnimi partnerji v mestu smo spletli zgodbo, ki definira vodo kot enega od osnovnih postulatov, branikov naše skupne zelene orientacije. Ta ne pomeni samo ekološke kategorije, temveč v povezavi s turizmom in ostalimi panogami nosi s seboj tudi možnost ekonomskega razvoja, ki bo v prihodnje nedvomno temeljil prav na ohranitvi primarnih virov, virov za življenje.

Prav zaradi vpetosti našega življenja v globalno okolje moramo poiskati razlage in spoznanja, ki umeščajo pomen vode na svetovni zemljevid. Nekatera področja našega planeta vode nimajo, marsikje vojne nastajajo prav zaradi bitke za vodo. Pomen vode je ali bo nadomestil pomembnost nafte, kmalu bomo živeli v času hidrogenske ekonomije (Jeremy Rifkin), svet kmalu ne bo več tak, kot je bil. Prav borba proti privatizaciji vodnih virov je ena izmed glavnih barikad, kjer umika ni več. Ali bomo to dopustili, je ključno vprašanje našega bodočega skupnega obstoja.

Prav zaradi razmisleka o pomenu čiste pitne vode smo se odločili, da skupaj z našim ljubljanskim podjetjem Vodovod – Kanalizacija izdelamo tudi posebno steklenico, ki se imenuje MUZEJSKA VODA – VODA ZA PRIHODNOST.

why water has been and will continue to be intrinsically connected with the principal aspects of humanity's vision and creativity, its reflection on how we humans live, and what our mindset is.

Why are this exhibition and various projects focusing around this theme being organised in Ljubljana? Our city's relation to water is a special one. From prehistory up until today, a unique mixture of conditions, symbols, and human actions have all made Ljubljana a city engaged in a never-ending dialogue with water. The Ljubljanica River, the Ljubljana Marsh, the Robba Fountain, Plečnik's bridges, as well as floods and sleet are just a few associations usually brought up by the word 'water'. They are all connected with water every single moment of our living in the city, which, in turn, is embraced, shaped and instilled with meaning by water. Ljubljana has been awarded the title of the 2016 European Green Capital. Had it not been for our joint commitment to water stewardship, this title would have been out of reach. Thus, the Water Project is aimed at building a bridge leading to the Green Capital of 2016. In co-operation with several partners in the city, a narrative was created that defines water as one of the principal bases underlying our common 'green' orientation. Being far more than merely an ecological category, this orientation, together with tourism and other industries, carries with it apt opportunities for sound economic development. In the future, this development will undoubtedly be based on the preservation of primary resources, i.e. resources of life.

Because our lives today are so closely integrated with the global environment, we are obliged to find explanations and insights that will make water stewardship a global priority. Some areas of our planet have no water resources, which is why many wars are fought over it. The significance of water will supersede (or has already done so) that of oil: we will soon be living in the hydrogen economy (Jeremy Rifkin) and the world will cease to be what it once was. That is why the struggle against the privatisation of water resources has become one of the last battles, which allows no withdrawal. Whether

Tako bomo domači in tuji javnosti posredovali sporočilo, da je Ljubljana mesto, kjer je tekoča pitna voda temeljna javna dobrina. Borba proti vodi iz plastenke in čista tekoča pitna voda postajata izkaznica mest, ki skrbijo za svoje prebivalce in obiskovalce. Ob tem je na steklenici še odtis prstov prebivalca Afrike – Yunana, ki mu dostop do tekoče pitne vode ni omogočen. Nujno je, da razumemo, da je voda dobrina, ki si jo moramo deliti. Dobrina, ki kaže, ali smo humana bitja in ali želimo, da planet, na katerem živimo, ne postane plen peščice tistih, ki mu vladajo s pomočjo vpliva, denarja in želje po oblasti.

Pri steklenici MUZEJSKA VODA gre za sporočilo, ki presega moč simbolnega pomena, gre za akcijo, ki nagovarja vsakega izmed nas, da deluje kot človek, ki razume, zakaj je treba to dobrino čuvati za naše zanamce in kakšna je naša osebna družbena odgovornost.

Zakaj smo se prav v muzeju odločili, da bo v prihodnjem enoletnem obdobju naše glavno gonilo VODA? Naša strateška usmeritev je borba za interpretacijo, za razlago vsebin, ki nosijo sporočilo o našem boljšem razumevanju okolja, v katerem živimo. Vse to ustvarjamo z vami, našimi obiskovalci, in prav VODA pomeni skrb za interpretacijo, ki želi, da bi imelo naše življenje smisel – postati boljši človek.

Blaž Peršin

privatisation of water resources will be permitted is the crucial question of our future common existence.

A realisation about the importance of pure drinking water made us decide to launch, in co-operation with Ljubljana's public company Vodovod-kanalizacija, a special bottle called MUSEUM WATER–WATER FOR THE FUTURE. Thus, a message will be sent to the local public and beyond that Ljubljana is a city where flowing drinking water is a fundamental public good. Both the efforts to avoid water in plastic bottles and the availability of pure drinking water count among those aspects that characterise cities with a strong commitment to look after their inhabitants and visitors. The bottle carries a unique handprint of Yunan, a man from Africa who has no access to flowing drinking water. It is absolutely necessary to understand that water is a good that must be shared, a good indicator as to whether we are being humane to other, whether we truly want the planet we live on to become a prey of a handful of those ruling it with influence, money and desire for power.

The Museum water bottle brings a message reaching beyond its symbolic meaning; it is an action encouraging each and every one of us to act as a human being who understands the importance of preserving water resources for our posterity and is aware of our shared personal and social responsibility.

Why is it, exactly, that a museum gives water the role of a prime mover behind its activities of the year ahead? It is because our fundamental strategy is aimed at interpreting the content that will help us better understand the environment in which we live. It is you, our visitors, on whom we crucially depend in this process. Moreover, it is water that can help us arrive at an interpretation that will bestow meaning to our lives, helping us to become better human beings.

Blaž Peršin

DANE ZAJC

Besede v dež

Dež, obvaruj me pred mano.
Naj ne pridem k meni opotekav
in s cunjasto kožo.
Ne s kletvinami pod opuhnjenim
jezikom. Ne z lažmi
in ne z medenimi sladkostmi.
Ne s potoglavimi smehljaji.
Ne z obljubami. Ne z upanji
lažnimi. Dež, ne.
Ne pusti me več k meni.
Ne razhojenega. Ne razgrabljenega.
Ne, ki grabi, dež.
Si razmislek. Me vklepaš
v tihoto kapelj. Kapelj.
Z vodo zalivaš poti.
Prehode delaš neprehodne.
Zgrabi ga, o katerem govoriva,
drži ga pod vodo, ne spusti ga.
Trešči njegovo dušo ob katedralo Škednjovca.
Naj umre. Naj mu voda zalije oči.
Hudournik odplakne besede.
Naj ga ptiči in miši raznesejo.
Za razdaljo življenja stran od mene.
Mejnik med nama smrt.
Dež, obdrži me v vodi.
Pokrij me s klobukom vode.
A ne daj mi govoriti.
Zakleni me pred mano, dež.

DANE ZAJC

Words Into Rain

Rain, protect me from myself.
Let me not come to myself staggering,
with tattered skin.
With curses under my swollen
tongue, lies,
honeyed sweetnesses.
With smiles of my head's journey,
promises, false
hopes. Rain, do not.
Do not let me near myself.
Not the trodden one. Not the harrowed one.
Not the grabbing one, rain.
You are thoughtfulness. Immuring me
into the quietude of drops. Drops.
Flooding pathways with water.
Making crossings impassable.
Grab him we talk about,
hold him under water, don't let go.
Crush his soul at the Skednjovec cathedral.
Let him die. Let water inundate his eyes.
A torrent wash his words away.
Let birds and mice scatter him around.
Keep him away from me with a distance of life.
The cornerstone between us - death.
Rain, keep me in the water.
Cover me with water.
Keep me from speaking.
Lock me out of myself, rain.

Voda

Naš planet se pravzaprav ne bi smel imenovati Zemlja, saj je ta beseda v različnih jezikih običajno sopomenka za kopno. Naš modri planet bi moral nositi ime planet Ocean, ali pa še bolje – planet Voda. Med seboj povezana morja na planetu prekrivajo več kot sedem desetin zemeljske površine, po drugi strani pa glavni zaklad našega planeta s stališča človeka ni zlato ali nafta, temveč tekoča voda. Življenje se je začelo v vodi in se le z njo nadaljuje. Voda je čudovita snov z mnogoterimi enkratnimi lastnostmi. Je najbolj uporabna in uporabljana snov na svetu, saj je odlično hladilo, topilo, razredčilo, hranilo, zdravilo, transportni medij in transportno sredstvo. Je temelj obstoja praktično vseh ekosistemov na planetu, zraven pa še ustvarja vreme in v veliki meri odloča o našem podnebju.

A voda ni povezana z življenjem le v biološkem pogledu, pač pa tudi v družbenem, kulturnem, verskem in gospodarskem. Kulturna izročila prepoznavajo pomen vode kot človekove vsakodnevne spremljevalke, ki mu daje pijačo, hrano, ki ga očisti in ga spremlja ob vseh veselih in žalostnih dogodkih v življenju. Verstva sveta vidijo v vodi sveto prinašalko življenja, ponovnega rojstva, in ji priznavajo tudi uničujočo moč. Umetnikom je voda navdih, medij ali celo prizorišče, športnikom pa daje možnost dokazovanja zmožnosti človekovega telesa. Voda sproža tudi tekmovalnost, zaslužkarstvo in spore med ljudmi in narodi, saj njeno pomanjkanje rodi revščino in trpljenje. To je še zlasti pomembno, ker bodo prihodnost vodnega kroga zaznamovale podnebne in demografske spremembe in bo čista pitna voda morda postala najbolj iskan naravni vir na planetu.

Water

Our planet should not actually be called the Earth, for this word (in various languages) usually denotes land. It would be more appropriate for our blue planet to be called the Ocean or – even more simply – the Water. The interconnected seas and oceans cover over 70% of the earth's surface. Moreover, the Earth's most valuable asset, at least from humanity's vantage point, is neither gold nor oil, but flowing water. Having started in water, life can only continue with it. Water is a marvellous substance with a plethora of unique characteristics. It is the most useful and used substance in the world, serving as an excellent refrigerant, solvent, diluent, nutrient, medication, transport medium and means of transport.
It provides the basis for existence for virtually all ecosystems on the planet and, moreover, creates weather, thereby being essential to the climate in which we live.

However, water is not only related to life in biological terms, but also in social, cultural, religious and economic terms. Various cultural traditions recognise water's significance as an everyday beverage, food and the purifying agent accompanying every happy or sad event of a person's life. Many religions of the world consider water to be a giver of life and of rebirth, whilst simultaneously recognising its destructive power. For artists, water can be an inspiration, a medium or even a setting, whereas athletes can prove the capabilities of the human body in it. Water also encourages rivalry, profiteering and disputes among both people and nations, when its scarcity causes poverty and distress. This is of particular importance, as the future of the water cycle will be increasingly dependent on the climate and demographic

Prehranjevalna veriga oziroma prehranjevalni odnosi med organizmi bi brez vode zastali. Kmetijstvo brez vode ni mogoče, svetovni oceani so vir morske hrane za najmanj milijardo zemljanov, ribolov pa je pomemben vir hrane tudi v sladkih vodah. Voda je ključna za pridobivanje vseh energentov, pa naj gre za les, nafto, plin, premog, uranovo rudo ali biogoriva. Voda je tudi pomemben obnovljiv vir hidroenergije. Človeku reke, jezera in morja ne dajejo samo hrane, temveč lahko po njih potuje in trguje. Pomorski promet je danes ena izmed najpomembnejših oblik transporta, saj je poleg letalskega edina možna oblika transporta med celinami.

Čeprav ima voda toliko uporabnih vidikov, je za človeka vseeno najpomembnejša čista pitna voda. Količina te je na svetu zelo omejena. Danes si enako količino vode, kot jo je imel svet na voljo v času prvih civilizacij, ko je na planetu živelo le kakih sto milijonov ljudi, z ostalimi živimi bitji deli že skoraj sedem milijard in pol ljudi. Če bi sladko vodo enakomerno razdelili mednje, bi je bilo za slehernika na leto na voljo več kot 16 tisoč litrov na dan. A sladkovodni viri in prebivalstvo so razporejeni zelo neenakomerno, in milijarda in pol ljudi mora preživeti z manj kot 50 litri vode dnevno. Le vsak sedmi Zemljan živi v relativnem obilju vode. Med njimi tudi mi v Sloveniji.

Problem pitne vode je iz dneva v dan večji. Naše potrebe po vodi pa so danes tudi mnogo večje, kot so bile kadarkoli v zgodovini človeške vrste. Povprečni Evropejec potrebuje na dan skoraj pet tisoč litrov vode, večino za vsakodnevno prehrano. To je mnogo več kot pred desetletji, saj pojemo danes več hrane živalskega izvora, poleg tega je tudi za izdelavo vseh dobrin potrebna voda, ki pa je očem skrita. Ob tem je zaradi nepremišljenih človekovih posegov v okolje v dvajsetem stoletju izginila polovica svetovnih mokrišč in danes številne reke ne pridejo več do morja. Podtalnica je marsikje onesnažena do te mere, da ni več varen vir pitne vode. Do leta 2030 se bodo z resno krizo pri dostopu do vode soočale štiri milijarde ljudi, a ta ocena niti ne upošteva podnebnih sprememb, ki bodo večino kopnega potisnile v sušnejše razmere. Utegne se zgoditi, da vode kmalu ne bo dovolj za vse, če ne bomo spremenili svojega odnosa do vira, ki podpira življenje.

Vsak človek pozna vodo, saj z njo živi od spočetja do smrti. A čeprav jo poznamo, o njej mnogo premalo vemo in jo zato premalo cenimo. In v 21. stoletju je to največja strateška napaka. Samo dokler bomo imeli dovolj vode, bomo imeli tudi zdravje, varnost, hrano, gozd, energijo in zmerno blaginjo.

Lučka Kajfež Bogataj

changes, and pure drinking water might become one of the most sought after natural resources on the planet.

Without water, the food chain, i.e. the sequence of connections among the organisms in terms of the food they eat, would come to an end. Agriculture is impossible without water, at least one billion of people depend directly on the oceans for their food, with fishing accounting for a significant source of food also in fresh water. Water plays a crucial role in generating energy products, regardless of whether these include wood, oil, gas, coal, uranium ore or biofuel. Along with that, water also serves as a significant renewable source of hydropower. Rivers, lakes and seas not only serve as a source of food, but also support travel and trade. Thus, maritime transport today accounts for one of the most important means of transport: apart from air transport, it is the only possible way to travel between continents.

Among the countless useful aspects of water in general, pure drinking water is the most important. There is a very limited quantity of drinking water in the world. Today, almost seven and a half billion people, along with the other living beings, share the same amount of water as it was available at the time of the first civilisations when only several millions of people inhabited the world. If fresh water were evenly distributed among all inhabitants of the world, each would have over 16,000 litres of water a day at their disposal. However, as both freshwater resources and inhabitants are unevenly distributed, one and a half billion people are forced to survive on less than 50 litres of water a day. Only one in seven earth inhabitants lives in a relative abundance of water. The inhabitants of Slovenia can be counted among them.

The problem of drinking water is becoming increasingly acute. Our demand for water is much more significant than at any point in human history. Each day, an average European needs almost 5,000 litres of water, mainly for daily nutrition. This is much more than decades ago, because people presently consume more food of animal origin. Moreover, water is also

indispensable (albeit hidden) in the production of all goods. As a result of humanity's careless interventions in the environment, one half of the world's wetlands were lost in the course of the 20th century, with many rivers ceasing to reach the sea. In many places, groundwater is polluted to such an extent that it is no longer a safe source of drinking water. By 2030, four billion people will be facing severe problems relating to access to water. In making such estimates, one must also add climate change, which is expected to create dryer conditions for a major part of land throughout the world. If humanity is unable to alter its attitude to life-supporting water, it might soon have to face a situation in which not everyone will have access to it.

We live with water from conception to death and are therefore quite familiar with it. Notwithstanding this familiarity, we do not know many things about it and, accordingly, fail to value it appropriately. However, this would be a major strategic mistake to make in the 21st century. Only as long as we have sufficient water, will we also be able to enjoy good health, safety, food, forests, energy and moderate prosperity.

Lučka Kajfež Bogataj

VENO TAUFER

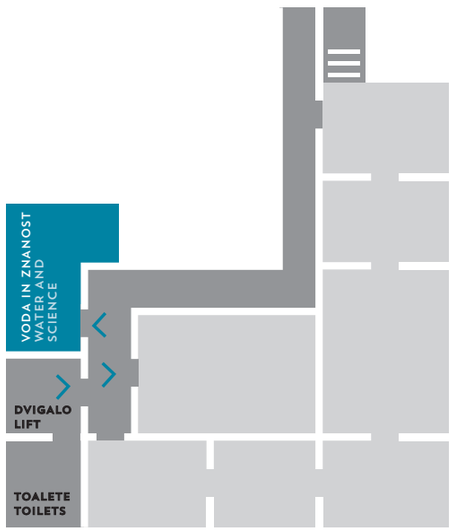
***

voda je odnesla
mater in očeta
po vodi smo spustili
svoje otroke
našo ljubezen smo
zalili z vodo
vse naše ognje
z neba popije voda
voda lista liste
napih knjig
vsi naši upi
plavajo na vodi
čakamo potopa
voda pridi
pridi nam do grla

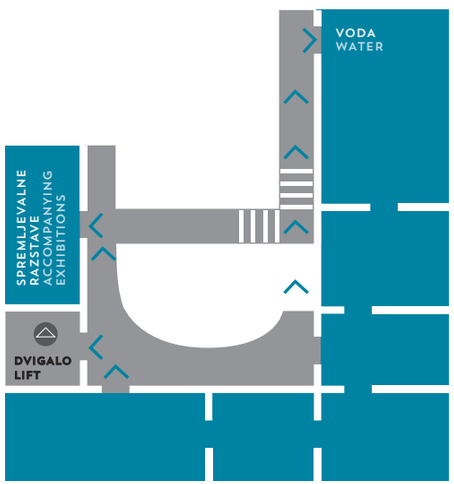
VENO TAUFER

***

the water has borne away
my mother and my father
we have left our children
drifting downstream
we have flooded our love
with water
the sky drinks up
all our fires
water turns the pages
of our books
all our hopes
are washed away
we await the flood
come, water,
flow up to our throats



II. NADSTROPJE FLOOR



I. NADSTROPJE FLOOR

KAZALO / INDEX

MILJANA CUNTA

Morje

Zadnjič sva gledala morje
skoraj ves dan.
Nisva hotela premikati nog,
nisva hotela spuščati vek,
sonce je obviselo visoko.
Proti večeru sva komaj lahko
vdihnila mesečino, voda
nama je prilezla do vratu.
Pogled vstran.
A sva si vseeno postlala na bregu
za še en dan.

MILJANA CUNTA

Sea

The other day we watched the sea
almost all day through.
We wouldn't move our legs,
we wouldn't drop our eyelids,
the sun was left suspended.
Come evening, we could barely
draw in a breath of moonlight, water
came creeping up to our throats.
A glance aside.
But still we made our beds upon the shore
for one more day.

TRANSLATED BY NADA GROŠELJ

EN PLANET, ENA VODA
ONE PLANET, ONE WATER

Irena Šinkovec v sodelovanju s Tomom in Bojano Križnar
Irena Šinkovec in collaboration with Tomo and Bojana Križnar

Kje začeti razstavo o vodi? O tej neprecenljivi snovi, ki prebiva v nas in kroži vse okrog nas. Njeno kroženje je neskončno, tako kot naša sebičnost ob njeni samoumevnosti. Že milijarde let ista tekočina, plin, trdna snov; eden od prvinskih elementov, iz katerih je zgrajen ves svet.

En atom kisika in dva atoma vodika; spojina življenja, ki bi lahko omogočila preživetje milijonom otrok, ki umirajo zaradi pomanjkanja čiste pitne vode. Ki ni več samoumevna in nič več temeljna pravica vsakega živega bitja. Neizmeren pohlep, množična poraba in vseprisotna brezbrižnost se nagibajo v smrdljivo cono odpadne vode, ki jo je treba očistiti, preden se nam spet vrne v isti najljubši kozarec.

Dušenje v plastični vodi, ki smo ga v imenu napredne visoke civilizacije prostovoljno, morda nezavedno prevzeli, nas je pripeljalo do skrajne meje zdrave pameti, ki si jo prisvajamo v imenu razumnega bitja, ki je pred milijoni let prispelo v naše kraje prav iz dežel, kjer danes vsaka kaplja šteje. Denar, življenje, vojne, posilstva, razčlovečenje, … Kje je meja? Zapiranje pipe ob umivanju zob preprosto ni več dovolj!

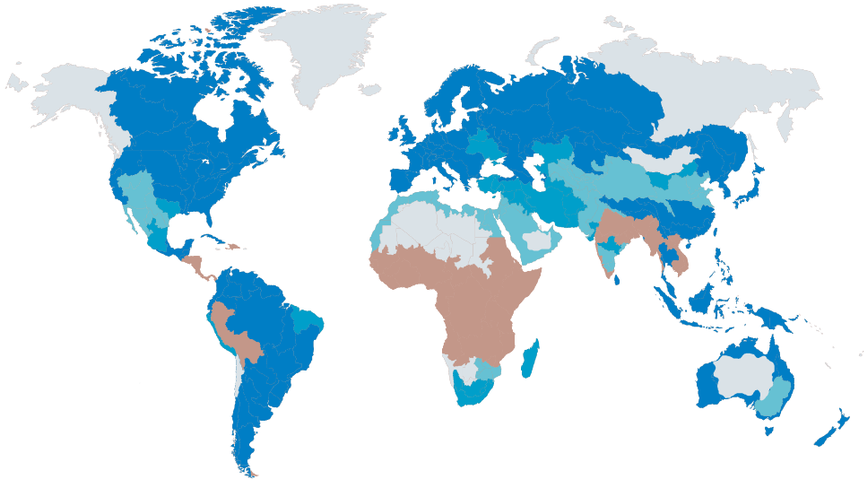
Po poročanju Organizacije za gospodarsko sodelovanje in razvoj se bo do leta 2030 s pomanjkanjem pitne vode soočalo že štiri milijarde ljudi. Na območjih pomanjkanja ženske vsak dan prehodijo več kilometrov, da pridejo do sveže vode. Bolezni zaradi nečiste vode so glavni vzrok umrljivosti majhnih otrok. V podsaharski Afriki ljudje v povprečju preživijo z 10 litri vode na dan, v razvitem svetu je pogosto tudi 350

Where should one start an exhibition on Water, the invaluable substance that dwells within us and is circling all around us? Its circulation is infinite, as is our selfishness in taking it for granted. The same liquid, gas, or solid for billions of years; one of the basic elements that make the world.

One atom of oxygen and two atoms of hydrogen: a life-giving substance that could ensure the survival of millions of children who die because of the scarcity of drinking water, which is no longer a given and no longer a fundamental right of every living being. Boundless greed, mass consumption and ubiquitous indifference are tending to a noxious zone of waste water that has to be treated before returning to our favourite glass.

Suffocation in plastic water that we have adopted in the name of advanced civilization, voluntarily or perhaps unconsciously, has led us to the very edge of common sense that we claim for ourselves in the name of the wise being that had come to our area millions of years ago from the lands where each drop of water is precious. Money, lives, wars, rapes, and dehumanization. Where does it end? Closing the tap while washing our teeth is simply not enough any more!

According to reports by the Organization for Economic Cooperation and Development, as many as four billion people will be facing drinking water scarcity by 2030. In areas of scarcity, women walk miles every day just to get drinking water. Illnesses due to impure water are the main cause of mortality for small children. In Sub-Saharan Africa, an average person survives on 10 litres of water, while even 350 litres is sometimes not enough for us in the developed world. The UN recommends at least 50 litres of drinking water per day, however, in light of the population explosion in the most



Globalno fizikalno in ekonomsko pomanjkanje vode

- **Ni pomanjkanja vode oziroma je pomanjkanje neproblematično**
  Vodni viri za porabo povsem zadoščajo, pri čemer se za človeške potrebe namenja manj kot 25 % vode iz rek.
- **Fizikalno pomanjkanje vode**
  Razvoj vodnih virov se približuje ali pa je že dosegel mejo trajnostnega izkoriščanja. Za kmetijstvo, industrijo in gospodinjske potrebe se namenja več kot 75 % vode iz rek (všteto tudi recikliranje vode, ki se vrača v naravo). Ta opredelitev – ki primerja razpoložljivost vode s povpraševanjem po vodi – pomeni, da sušna območja ne trpijo nujno pomanjkanja vode.
- **Približevanje fizikalnemu pomanjkanju vode**
  Porablja se več kot 60 % vode it rek. Ta povodja se bodo v bližnji prihodnosti spopadala s fizikalnim pomanjkanjem vode.
- **Ekonomsko pomanjkanje vode**
  Človeški, institucionalni in finančni kapital omejujejo dostop do vode, čeprav je vode v naravi dovolj, da bi lahko zadovoljila povpraševanje. Vodni viri za porabo povsem zadoščajo, pri čemer se za človeške potrebe namenja manj kot 25 % vode iz rek, kljub temu pa prihaja do nezadostne prehranjenosti.
- **Ni ocene**

Vir: International Water Management Institute, 2007

Global physical and economic water scarcity

- **Little or no water scarcity**
  Abundant water resources relative to use, with less than 25% of water withdrawn from rivers for human purposes.
- **Physical water scarcity**
  Water resources development is approaching or has exceeded the sustainable limits. More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of the return flows). This definition –relating water availability to water demand –implies that dry areas are not necessarily water scarce.
- **Approaching physical water scarcity**
  More than 60% of river flows are withdrawn. These basins will experience a physical water scarcity in the near future.
- **Economic water scarcity**
  Human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands. Water resources are abundant relative to water use, with less than 25% of the water from rivers is withdrawn for human purposes, but malnutrition exists.
- **Not estimated**

Source: International Water Management Institute, 2007

litrov ni dovolj. OZN priporoča vsaj 50 litrov sveže vode na dan, kar pa je ob velikem naraščanju prebivalstva na najbolj ogroženih območjih sveta tako rekoč nedosegljivo. Enako velik problem je neurejenost sanitarnih razmer. Poleg geografskih pogojev, ki pomenijo neenakomerno razporejenost vode, v zadnjih letih ovirajo dostop do nje predvsem množična revščina na eni in ogromni zaslužki posameznikov na

vulnerable parts of the world, this is virtually unachievable. Poor sanitation is a big problem as well. In addition to the unequal geographic distribution of water, access to drinking water is nowadays limited by poverty on one side and huge profits on the other, which determines how much water we can afford. Climate change will pose a further threat to our descendants; however, this doesn't mean we can stick our heads in the sand even today.

drugi strani, ki odločajo o tem, koliko vode si lahko privoščimo. Podnebne spremembe bodo dodatno ogrožale naše zanamce, kar pa ne pomeni, da si danes pred tem problemom lahko zatiskamo oči.

Voda v vseh jezikih pomeni ločnico med življenjem in smrtjo. Je vseobsežni gradnik življenja, nadčasovni element, ki briše meje med posameznimi kontinenti in kronologijami, znanostmi in verovanji. Z nami je od nastanka planeta, od rojstva do smrti vsakega posameznika. Je nujna dobrina za preživetje vseh živih bitij, a nas s svojo občasno destruktivno močjo hkrati opozarja na ranljivost in minljivost. Že v najstarejših obdobjih so ljudje gradili naselja ob vodah, do izuma železnice je bil transport po njih ključen za mobilnost ljudi in blaga. Moč vode je dolgo omogočala tehnološki razvoj in pogon strojev. Skozi tisočletja so se izoblikovali različni pogledi nanjo, na njeno uporabo, pa tudi čaščenje in kulturne tradicije. Poleg utilitarne rabe je navdih znanstvenikom in umetnikom, je svetost. Dostop do vode ni odvisen zgolj od naravnih danosti, temveč tudi od upravljanja in izrabe. Voda je v vseh civilizacijah ohranila osrednjo vlogo v preživetvenem, socialnem in kulturnem kontekstu, vendar je v obdobju po industrijski revoluciji s hitrim razvojem in posledično ogromnim povečanjem števila prebivalcev marsikje postala težko dostopna dobrina.

LJUBLJANSKI PROSTOR

Vodni viri za širše območje ljubljanskega prostora so podzemne vode vodonosnikov Ljubljanskega polja in Ljubljanskega barja. Vodonosnik Ljubljanskega polja se razprostira na vzhodnem delu Ljubljanske kotline, ki jo je s peščeno-prodnimi nanosi zapolnila

In all languages, water is the boundary between life and death. It's the universal building block of life, the timeless element that blurs the lines that separate continents, chronologies, sciences and faiths. It's been with us since the creation of our planet and stays with every individual from his birth to his death. It's the element essential to the survival of all living beings; however, its destructive power also shows us how vulnerable and transient we are. Already in antiquity, man settled near water, and until the invention of the railway, transport along waterways played a key role in the mobility of people and goods. The power of water has long facilitated developments in engineering and has long propelled our machines. Through the millennia, different attitudes towards water developed – towards its use, worship and related cultural traditions. In addition to its utilitarian use, water is an inspiration to scientists and artists, it's something sacred. Access to water is conditional not only upon natural conditions but also upon water management and use. In all civilizations, water has retained the central role in survival, as well as in society and culture; however, in the period after the industrial revolution with its rapid development and subsequent population explosion, it has become a scarce commodity in many places.

LJUBLJANA AREA

Water resources for the greater Ljubljana area are provided by the groundwater of the Ljubljana Field and Ljubljana Marshes aquifers. The Ljubljana Field aquifer stretches across the eastern part of the Ljubljana Basin, which was filled with sand and pebbles by the Sava river. The Ljubljana Field aquifer is fed by two main components, the Sava river and precipitation. Estimates of the rate of flow of groundwater range from a couple of metres to a couple dozen metres per day. Ljubljana Marshes are a neotectonic depression filled by lake and river sediment as well. In-between pebbles, there are silt and clay layers up

AKO SE HOČE KATERA DEŽELA PONAŠATI, DA SE V NJEJ PRETAKATA MED IN MLEKO, HOČEM REČI, DA JO JE BOG OBILNO BLAGOSLOVIL Z VSEM, KAR POTREBUJE ZA DOBRO PREHRANO, SE MORA PONAŠATI TUDI Z MNOGIMI REKAMI, POTOKI IN STUDENCI. TO ZMORE ČASTNO TUDI NAŠA KRANJSKA, KER TEKO PO NJEJ Z RIBAMI BOGATE VODE.

J. V. VALVASOR, 1689

reka Sava, in se napaja iz dveh glavnih komponent, iz reke Save in iz padavin. Hitrost toka podzemne vode ocenjujejo na nekaj metrov do nekaj deset metrov na dan. Tudi Ljubljansko barje je neotektonska udorina, napolnjena z jezerskimi in rečnimi sedimenti. Med prodi so več metrov debele meljaste in glinaste plasti. Napajalno območje spodnjih vodonosnih plasti sestavljajo dolomiti in zakraseli apnenci Krimsko-Mokrškega pogorja. Holocenske plasti Iškega vršaja pa poleg infiltracije reke Iške napajajo tudi lokalne padavine.[1]

Ljubljana z zaledjem se lahko pohvali s kakovostno vodo in bogatimi vodnimi viri, ki so omogočili več kot 5000-letno kontinuirano poselitev. Če so najstarejši stalni prebivalci gradili svoje domove v neposredni bližini virov pitne vode, hkrati pa jim je voda omogočala tudi najbolj varno in hitro premagovanje razdalj, je šele razvoj prvih urbanih naselij prinesel velik napredek pri sistematičnem zagotavljanju oskrbe z vodo – tako za preživetje kot tudi za sprostitev in zabavo. Večje melioracijske posege in

[1] Vir: Javno podjetje Vodovod – Kanalizacija, Primavoda

IF A COUNTRY WANTS TO CLAIM TO BE A LAND OF MILK AND HONEY, WHICH IS TO SAY THAT GOD HAD ABUNDANTLY BLESSED IT WITH EVERYTHING NEEDED TO FEED THE PEOPLE, IT MUST ALSO BOAST MANY RIVERS, STREAMS AND BROOKS. AND THIS MAY RIGHTEOUSLY ALSO BE SAID OF OUR CARNIOLA, AS IT IS CROSSED BY WATERS FILLED WITH FISH.

J. V. VALVASOR, 1689

to a few metres thick. The catchment area for the lower water-bearing layers lies in the dolomites and karstified carbonites of the Krim-Mokrc Hills. On the other hand, the Holocene layers of the Iški Vršaj are fed by local precipitation and infiltration by the Iška river.[1]

Ljubljana with its hinterland can boast quality water and rich water resources that have allowed the area to be continually settled for over 5,000 years. If the first permanent settlers built their homes in the direct vicinity of drinking water resources and if the water also allowed them quick and safe travel, major developments in the systematic supply of water – for survival as well as recreation and entertainment – were only made possible by urban settlements. Major amelioration and regulation works are known to have already been carried out by the great civilizations of the so-called Fertile Crescent, and their knowledge and experience spread to Europe together with agriculture. Emona – the first city in the area with a solid construction – was the first to leave a major mark on the area of today's Ljubljana. The construction of a water distribution system fed by the same area as today's Ljubljana waterworks, which was built in late 19th century, was an amazing feat of logistics and certainly worthy of respect.

[1] Source: JP Vodovod – Kanalizacija, Primavoda

Hidrografski zemljevid Ljubljane in okolice.
Projektni načrt ljubljanskega vodovoda,
Oscar Smreker, 1888 (Zgodovinski arhiv Ljubljana)

Hydrographic map of Ljubljana and surrounding area.
Project design of Ljubljana water distribution system,
Oscar Smreker, 1888 (Historical Archives Ljubljana)

KER NARAVOSLOVCI, FILOZOFI IN SVEČENIKI SODIJO, DA JE VSE ODVISNO OD VODE, SEM MENIL – KER PRVIH SEDMERO KNJIG VSEBUJE PRAVILA ZA ZGRADBE – DA BI MORAL V TEJLE OPISATI, KAKO POIŠČEMO VODO, KAKŠNE RAZLIČNE LASTNOSTI IMA GLEDE NA KRAJ, KJER JO NAJDEMO, KAKO JO DOVAJAMO IN KAKO JO MORAMO OCENJEVATI; GLEDE NA TO, DA JE NESKONČNO POMEMBNA ZA ŽIVLJENJE SÁMO, ZA ZABAVO IN ZA VSAKODNEVNO UPORABO. TO BOMO ZLAHKA OPRAVILI, ČE VODE IZVIRAJO NA ODPRTEM IN TEČEJO PO POVRŠJU. KADAR PA NI TAKO, JE TREBA IZVIRE POISKATI POD POVRŠJEM IN JIH PREUČITI. ČE TOREJ ŽELITE ODKRITI VODO, MORATE PRED SONČNIM VZHODOM Z OBRAZOM PROTI TLOM LEČI NA MESTU, KJER IŠČETE IZVIR. BRADO MORATE POLOŽITI NA TLA, JO PODPRETI IN OPAZOVATI OKOLICO; KER SE BRADA NE BO PREMIKALA, VAM POGLED NE BO SEGEL VIŠE, KOT JE TREBA, IN BO OMEJEN NA RAVEN OPAZOVANJA. NATO KOPLJITE NA KRAJU, KJER VIDITE, DA SE ZBIRAJO HLAPI IN SE DVIGUJEJO V ZRAK, SAJ ČESA TAKEGA NE BOSTE VIDELI TAM, KJER VODE NI.

MARCUS VITRUVIUS POLLIO,
DE ARCHITECTURA, VIII. KNJIGA,
1. STOLETJE PR. N. ŠT.

AS IT IS THE OPINION OF PHYSIOLOGISTS, PHILOSOPHERS AND PRIESTS THAT ALL THINGS PROCEED FROM WATER, I THOUGHT IT NECESSARY, AS IN THE PRECEDING SEVEN BOOKS RULES ARE LAID DOWN FOR BUILDINGS, TO DESCRIBE IN THIS THE METHOD OF FINDING WATER, ITS DIFFERENT PROPERTIES, ACCORDING TO THE VARIED NATURE OF PLACES, HOW IT OUGHT TO BE CONDUCTED, AND IN WHAT MANNER IT SHOULD BE JUDGED OF; INASMUCH AS IT IS OF INFINITE IMPORTANCE, FOR THE PURPOSES OF LIFE, FOR PLEASURE, AND FOR OUR DAILY USE. THIS WILL BE EASILY ACCOMPLISHED IF THE SPRINGS ARE OPEN AND FLOWING ABOVE GROUND. IF THAT BE NOT THE CASE, THEIR SOURCES UNDERGROUND ARE TO BE TRACED AND EXAMINED. IN ORDER TO DISCOVER THESE, BEFORE SUNRISE ONE MUST LIE DOWN PROSTRATE IN THE SPOT WHERE HE SEEKS TO FIND IT, AND WITH HIS CHIN PLACED ON THE GROUND AND FIXED, LOOK AROUND THE PLACE; FOR THE CHIN BEING FIXED, THE EYE CANNOT RANGE UPWARDS FARTHER THAN IT OUGHT, AND IS CONFINED TO THE LEVEL OF THE PLACE. THEN, WHERE THE VAPOURS ARE SEEN CURLING TOGETHER AND RISING INTO THE AIR, THERE DIG, BECAUSE THESE APPEARANCES ARE NOT DISCOVERED IN DRY PLACES.

MARCUS VITRUVIUS POLLIO,
DE ARCHITECTURA, BOOK VIII,
1ST CENTURY BC

regulacije poznamo že iz časa velikih civilizacij z območja t. i. rodovitnega polmeseca, od koder so se znanja in izkušnje skupaj s poljedelstvom širili v evropski prostor. Ljubljanski prostor je bistveno zaznamovala šele zgraditev prvega zidanega mesta – Emone. Izjemen logistični podvig: zgraditev vodovoda, ki se je napajal z istega območja kot kasnejši

The groundwater of the Ljubljana Field and the Ljubljana Marshes is the only source of drinking water used by the city of Ljubljana. The quality of the water resource can be compromised by unsound spatial development, pollution and intensive agriculture with its uncontrolled use of pesticides.

ljubljanski vodovod, zgrajen šele konec 19. stoletja – je vsekakor vreden občudovanja.

Podzemna voda Ljubljanskega polja in Ljubljanskega barja je edini vir pitne vode za mesto Ljubljana. Kakovost vodnega vira ogrožajo neprimerni posegi v prostor, onesnaževanje okolja in intenzivno kmetijstvo z nekontrolirano uporabo pesticidov.

VODA JE VČASIH REZKA IN VČASIH MOČNA, VČASIH KISLA IN VČASIH GRENKA, VČASIH SLADKA IN VČASIH GOSTA ALI REDKA, VČASIH JE VIDETI, KOT DA S SEBOJ PRINAŠA TRPLJENJE ALI BOLEZNI, VČASIH JE ZDRAVILNA, VČASIH STRUPENA. SPREMENITI SE JE SPOSOBNA V TOLIKO RAZLIČNIH PODOB, KOLIKOR JE RAZLIČNIH KRAJEV, SKOZI KATERE TEČE. TAKO KOT SE OGLEDALO SPREMINJA GLEDE NA BARVO TISTEGA, KAR SE V NJEM OGLEDUJE, SE TUDI VODA PREDRUGAČI GLEDE NA KRAJ, KJER JE, TER TAKO POSTANE SMRDLJIVA, OČIŠČEVALNA, TRPKA, ŽVEPLENA, SLANA, KRVAVO RDEČA, ŽALOSTNA, BESNEČA, JEZNA, RDEČA, RUMENA, ZELENA, ČRNA, MODRA, MASTNA, TOLSTA ALI VITKA. VČASIH ZANETI POŽAR, SPET DRUGIČ GA POGASI; JE TOPLA IN JE HLADNA, ODNAŠA ALI NALAGA, IZVOTLJUJE ALI KOPIČI, TRGA ALI VZPOSTAVLJA, POLNI ALI PRAZNI, SE DVIGUJE ALI POGREZA, HITI ALI JE MIRNA; VČASIH JE VZROK ŽIVLJENJA ALI SMRTI, IZOBILJA ALI POMANJKANJA, VČASIH HRANI, KDAJ DRUGIČ PA POČNE RAVNO NASPROTNO; VČASIH JE OSTREGA OKUSA, DRUGIČ JE BREZ VONJA IN OKUSA, VČASIH POTOPI DOLINE Z VELIKIMI VODAMI. S ČASOM IN Z VODO SE VSE SPREMINJA.

LEONARDO DA VINCI, 1513

WATER IS SOMETIMES SHARP AND SOMETIMES STRONG, SOMETIMES ACID AND SOMETIMES BITTER, SOMETIMES SWEET AND SOMETIMES THICK OR THIN, SOMETIMES IT IS SEEN BRINGING HURT OR PESTILENCE, SOMETIME HEALTH-GIVING, SOMETIMES POISONOUS. IT SUFFERS CHANGE INTO AS MANY NATURES AS ARE THE DIFFERENT PLACES THROUGH WHICH IT PASSES. AND AS THE MIRROR CHANGES WITH THE COLOUR OF ITS SUBJECT, SO IT ALTERS WITH THE NATURE OF THE PLACE, BECOMING NOISOME, LAXATIVE, ASTRINGENT, SULFUROUS, SALTY, INCARNADINED, MOURNFUL, RAGING, ANGRY, RED, YELLOW, GREEN, BLACK, BLUE, GREASY, FAT OR SLIM. SOMETIMES IT STARTS A CONFLAGRATION, SOMETIMES IT EXTINGUISHES ONE; IS WARM AND IS COLD, CARRIES AWAY OR SETS DOWN, HOLLOWS OUT OR BUILDS UP, TEARS OR ESTABLISHES, FILLS OR EMPTIES, RAISES ITSELF OR BURROWS DOWN, SPEEDS OR IS STILL; IS THE CAUSE AT TIMES OF LIFE OR DEATH, OR INCREASE OR PRIVATION, NOURISHES AT TIMES AND AT OTHERS DOES THE CONTRARY; AT TIMES HAS A TANG, AT TIMES IS WITHOUT SAVOR, SOMETIMES SUBMERGING THE VALLEYS WITH GREAT FLOODS. IN TIME AND WITH WATER, EVERYTHING CHANGES.

LEONARDO DA VINCI, 1513

RAZMERE V SUDANU[2]

Tomo in Bojana Križnar

CONDITIONS IN SUDAN[2]

Tomo in Bojana Križnar

1

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slika 1: V zadnjih tridesetih letih je v Sahelu padlo povprečno za štirideset odstotkov manj padavin kot dotlej.

Figure 1: In the last thirty years, there has been, on average, forty per cent less rainfall in Sahel.

slika 2: Zaradi podnebnih sprememb se Sahara, največja puščava na Zemlji, letno razširi povprečno za sedem kilometrov proti jugu v Sahel.

Figure 2: Due to climate change, the largest desert on earth, the Sahara, has increased on average by seven kilometres towards the south in Sahel.

[2] Tomu in Bojani Križnar se s spoštovanjem zahvaljujem za sodelovanje pri projektu Voda ter njunemu izjemnemu delu, ki ga nesebično opravljata v »pozabljenih deželah«.

[2] I'd like to express my great respect and gratitude to Tomo and Bojana Križnar for participating in the Water project and for the amazing work they selflessly do in "forgotten countries".

3

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slika 3: Raven podtalne vode se znižuje, zato je treba po vodo vedno dlje. Nosijo jo izključno žene in dekleta.

Figure 3: The groundwater level is dropping, forcing people to travel farther to get water. Women and children are the only ones who carry it.

slika 4: Petdeset milijonov domačinov v Sahelu zaradi podnebnih sprememb in z njimi povezane manjše količine padavin ne more več preživeti na tradicionalen način kot nekoč.

Figure 4: Fifty million people in Sahel can no longer survive living in the traditional way due to climate change and the reduced precipitation connected with it.

slika 5: Ponekod morajo staroselski domačini zapustiti zemljo, v kateri počivajo kosti njihovih prednikov, in se preseliti tja, kjer voda še je.

Figure 5: In some places, the indigenous people have had to leave the land where the bones of their ancestors rest, and move to find water.

slika 6: Tri tisoč metrov visoke gore ugaslega vulkana Jebel Marra v Darfurju v Sudanu privlačijo dež in pod seboj hranijo največje podzemno jezero pitne vode na planetu. Vojna v Darfurju je vojna za vodo!

Figure 6: The three-thousand-metre high mountains of the extinct volcano Jebel Marra in Darfur, Sudan, attract the rain and, beneath them, harbour the largest underground lake of drinking water on the planet.

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slika 7: V vojnah za vodo in druge naravne vire najbolj trpijo staroselci. Podobno kot nekoč ameriški Indijanci in avstralski staroselci se tudi Nube v gorah in druga domorodna ljudstva vsepovsod ob meji med obema Sudanoma soočajo z genocidom.

Figure 7: In the wars over water and other natural resources, it is the native people that suffer the most. Just as the American Indians and the Australian aborigines once experienced, the Nube people in the mountains and other indigenous tribes all along the border between both Sudans face genocide.

slika 8: Tudi po Sahelu se širi militantni islamski fundamentalizem, pred katerim se staroselska ljudstva branijo, kot vedo in znajo. Evropska unija se ne zmeni za krike na pomoč teh nedolžnih ljudi, ki se sami soočajo s krutim sovražnikom.

Figure 8: Militant Islamic fundamentalism is also spreading in Sahel, against which the native people are fighting as best they can. The European Union has been ignoring their cries for help from the most innocent people who have to face a cruel enemy by themselves.

9

slika 9: Arabska in afriška plemena v taboriščih, ki jih samo ponekod oskrbujejo agencije OZN in nevladne organizacije, verjamejo, da so za podnebne spremembe odgovorni ljudje v industrijskih deželah na severu planeta.

Figure 9: The Arab and African tribes living in camps that are only in some cases supplied by the UN and non-profit organisations believe that the people in industrialised countries in the northern hemisphere are responsible for climate change.

slika 10: Slovenija je od Bruslja zahtevala pomoč žrtvam vojn za vodo in druge naravne vire v Sahelu – tudi zato, da je ne bi preplavil val prebežnikov iz severne Afrike. A zaman! Kdo izza kulis demokratičnih institucij v resnici vodi zunanjo politiko članic Evropske unije?

Figure 10: Slovenia has requested the help of Brussels for the victims of the war for water and other natural resources in Sahel, also to avoid a wave of refugees from North Africa. But in vain! Who behind the scenes in the democratic institutions actually control the European Union's foreign policy?

10

11

12

13

slika 11: Do leta 2030 se bo štiri milijarde ljudi na planetu soočalo s pomanjkanjem pitne vode.

Figure 11: By 2030, four billion people will face a drinking water shortage.

slika 12: Slovenija ima veliko dobre vode – kaj, če zato tudi nas čakajo vojne za vodo?

Figure 12: Slovenia has plenty of good water – what if that means a water conflict awaits us too?

slika 13: Učiteljice v begunskem taborišču Ore Kosuoni na meji med Sudanom in Čadom s plakatom slovenskega dokumentarnega filma »Dar Fur – Vojna za vodo«. Razumejo ga bolje kot evropski politiki. Večina Evrope še naprej spi v coni udobja.

Figure 13: Teachers at the Ore Kosuoni refugee camp on the border between Sudan and Chad holding a poster from the Slovenian documentary "Darfur – War for Water". They understand it better than European politicians. The majority of Europe is still resting in its comfort zone.

MILAN DEKLEVA

***

voda neba,
voda zemlje,
voda morja
se srečujejo.
vmes najina ljubezen,
človeško srečanje
dvakrat prepečene gline.
poslušava noč,
ki ima obliko gluhca,
usta spuščajo dež
na izgubljeno džunglo
izgubljenega otoka
sredi oceana,
sredi velikana,
ki ga ni odkril
še nihče.

MILAN DEKLEVA

***

the water of the sky,
the water of the soil,
the water of the sea
meet one another.
with our love in between,
a human encounter
of twice-fired clay.
we listen to the night
shaped like a little deaf man,
the mouth is dropping rain
onto a lost jungle
of a lost island,
amid an ocean,
amid a giant
yet to be discovered
by anyone.

TRANSLATED BY ANDREJ PLETERSKI

KOMUNALNA INFRASTRUKTURA RIMSKE EMONE
COMMUNAL INFRASTRUCTURE OF ROMAN CITY OF EMONA

Andrej Gaspari

UVOD

Zagotovitev stalne oskrbe z dobro vodo je ne glede na zgodovinsko obdobje ključna za razvoj civiliziranega življenja, na potrebne količine pa so od nekdaj vplivali število prebivalstva, način rabe vode ter učinkovitost njenega prenosa in distribucije. Antična urbanistična in vojaška doktrina sta velevali umeščanje naselbin in utrdb v bližino vode, prednostno rečnih tokov ali stalnih izvirov.[1] V optimalnih okoliščinah je bil izvir znotraj naselbine ali mesta,[2] če pa površinske vode na lokaciji niso zadoščale ali sploh niso bile na voljo, so morali vodo poiskati in zajeti pod površjem.[3]

Stalen in zadosten vir čiste vode ni bil vedno očiten, njegovo iskanje pa je postalo empirična znanost. Po Vegeciju (*Vegetius Renatus*), avtorju razprave o rimski vojaški praksi s konca 4. stoletja n. št., mora biti voda zdrava in čista ter ne sme smrdeti ali imeti okusa po gnilobi, saj je slaba voda kot strup in povzroča epidemije.[4] Rimski arhitekt in vojaški inženir Vitruvij (Marcus Vitruvius Pollio; 80/70–20/15 pr. n. št.), ki je osmo knjigo svojega dela *De Architectura*, napisano nekje med letoma 27 in 23 pr. n. št., posvetil hidrologiji in hidravliki, je inženirjem pri določanju kakovosti vode svetoval, naj ne upoštevajo samo bistrosti, okusa in pretoka, temveč tudi postavo in

1 Polyb., *Hist.*, 6, 27, 3; Hyg., *De metatione castrorum*, 57.

2 Veg., *Epit. Rei Mil.*, 4, 10: *Magna urbis utilitas est, cum perennes fontes murus includit.*

3 Vitr., *De Arch.*, 8, 1, 1: Sine *[aqua] autem non profluent, quaeranda sub terra sunt capita et colligenda.*

4 Veg., *Epit. Rei Mil.*, 3, 2.

INTRODUCTION

Ensuring a permanent supply of good water is essential for the development of civilized life, irrespective of the historical period. The required quantities of water have always depended on the size of the population, the way water is used, and the efficiency of its transmission and distribution. In antiquity, urban and military doctrine determined the settlements and fortifications to be located near water, especially near river currents and permanent springs.[1] In terms of optimal circumstances, a water spring was located within the settlement or city,[2] and if surface water was insufficient or not present at the location, water had to be found under the surface and drawn out.[3]

A permanent and sufficient source of clean water was not always obvious, and finding it became an empirical science. According to Vegetius (*Vegetius Renatus*), the author of a discussion about Roman military practice from the end of the 4th century, water was to be healthy and clean and it must not stink or taste like decay, because water of poor quality was like a poison and caused epidemics.[4] Roman architect and military engineer Vitruvius (*Marcus Vitruvius Pollio*; 80/70–20/15 B.C.), who dedicated his eighth book, titled *De Architectura* and written between 27 and 23 B.C., to hydrology and hydraulics, suggested to engineers that, when defining the quality of water, they had to to be attentive not only to its clarity, taste and flow, but also to the law and the local population's customs

1 Polyb., *Hist.*, 6, 27, 3; Hyg., *De metatione castrorum*, 57;

2 Veg., *Epit. Rei Mil.*, 4, 10: *Magna urbis utilitas est, cum perennes fontes murus includit.*

3 Vitr., *De Arch.*, 8, 1, 1: *Sine [aqua] autem non profluent, quaeranda sub terra sunt capita et colligenda.*

4 Veg., *Epit. Rei Mil.*, 3, 2.

polt lokalnega prebivalstva, ki to vodo pije.[5] Po istem avtorju voda ni ključna samo za zadovoljevanje življenjskih potreb in vsakdanjo rabo, temveč tudi za užitek, poleg tega pa je še zastonj.[6]

Gradnja vodovodov in odstranjevanje odplak v okviru kompleksne kanalizacijske mreže kot ene glavnih značilnosti rimskih mest sta bila že na ravni samega projektiranja novih naselbin ali prenove starih zasnov neposredno usmerjena v zagotavljanje primernih sanitarno-higienskih razmer za njihove prebivalce, kar izhaja tudi iz antičnih pravnih določb o potrebnosti zagotavljanja rednega čiščenja in vzdrževanja odtočnih kanalov.[7] Za omilitev nevarnosti za javno zdravje, ki jo je pomenila izpostavljenost nesnagi in zastajajočim odplakam, so morale biti ulice opremljene z odprtinami, za stalno izplakovanje odtokov pa so morale biti na voljo zadostne količine vode iz akveduktov in padavin. Povezavo med vodovodi in kloakami izpostavlja že geograf, filozof in zgodovinar Strabon iz Amaseje (64/63 pr. n. št.–ok. 24 n. št.), ki omenja, da »akvedukti dovajajo vodo v mesto v takšnih količinah, da skozi mesto in skozi kloake tečejo prave reke«.[8]

Pričujoči prispevek je izsek iz celovite študije, ki obravnava podatke, ugotovitve in domneve o zgodnji komunalni infrastrukturi kolonije Julije Emone iz historičnega tiska in znanstvene literature ter jih primerja z rezultati sodobnih zaščitnih raziskav na območju mesta z okolico.[9] Sklepne ugotovitve so postavljene v kontekst novejših raziskav zgodnjega urbanizma

5 Vitr., *De Arch.*, 8, 1, 2; 8, 4.

6 Vitr., *De Arch.*, 8, 1, 1: *[Aqua] est enim maxime necessaria et ad vitam et ad delectationes et ad usum cotidianum.*

7 Bassi 1997, 215, op. 1 (s predhodno literaturo); Gellichi 2000.

8 Strab., Geogr., 5, 3, 8; glej Hodge 1991, 334; Mecucci 2004–2005, 4–5.

9 Celoten prispevek bo objavljen v samostojni publikaciji v začetku leta 2016.

about drinking water.[5] In the opinion of the same author, water was not essential only to meet basic human needs and daily use, but it was also used for pleasure while simultaneously being free of charge.[6]

As one of the main characteristics of Roman cities, building aqueducts and removing sewage was extremely important in order to ensure the appropriate sanitary-hygienic conditions. This is also determined in terms of antique legal provisions concerning the need to ensure regular cleaning and maintenance of main sewers.[7] To prevent the inhabitants from being exposed to dirt and stagnant sewage, the streets had to be equipped with special openings; for the permanent flushing of outflows, there had to be sufficient quantities of water from aqueducts and precipitations. The connection between the aqueducts and cloacas was mentioned by a geographer, philosopher and historian Strabo of Amasia (64/63 B.C.-around 24 A.D.), writing that 'the aqueducts bring water into the city in such enormous quantities, that real rivers are flowing through the city and cloacas'.[8]

This contribution is a part of a study discussing data, knowledge and assumptions about the early communal infrastructure of the colony of Iulia Emona, based on historical sources and scientific literature in comparison to the results of modern rescue investigations at the city and its surroundings.[9] The conclusions are made using the context of more modern research of early urbanism, concerning comparable settlement centres of the Xth and XIth regions of Roman Italy, which contributed essential and surprising facts about the chronology of communal installation of the newly established colonies and the entire renovation of the existing urban centres.

5 Vitr.,*De Arch.*, 8, 1, 2; 8, 4.

6 Vitr., *De Arch.*, 8, 1, 1: *[Aqua] est enim maxime necessaria et ad vitam et ad delectationes et ad usum cotidianum.*

7 Bassi 1997, 215, n. 1 (with the preliminary literature); Gellichi 2000.

8 Strab., *Geogr.*, 5, 3, 8; see Hodge 1991, 334; Mecucci 2004–2005, 4–5.

9 The whole article will be published in a new publication at the beginning of 2016.

primerljivih naselbinskih centrov X. in XI. regije Italije, ki so prispevale ključna in nemalokrat presenetljiva spoznanja o kronologiji komunalnega opremljanja novoustanovljenih kolonij ali celovitega prenavljanja obstoječih urbanih središč.

VODNJAKI

Uvodni del Frontinove razprave o vodovodih Rima se začne z ugotovitvijo, da so bili 441 let po ustanovitvi mesta njegovi prebivalci še vedno zadovoljni s pridobivanjem vode iz vodnjakov, izvirov ali reke Tibere.[10] Opisano situacijo na področju zgodnje oskrbe z vodo je mogoče preslikati v prazgodovino celinske Evrope, vodnjaki, površinske vode in deževnica pa so bili tudi primarni vodni viri prebivalcev zgodnjerimske naselbine pod Grajskim gričem v Ljubljani ter najstarejše faze obzidanega mesta na levem bregu Ljubljanice. Z arheološkimi raziskavami po letu 1999 je skupno število dokumentiranih rimskih vodnjakov v Emoni (z območja *intra moenia*) naraslo že na 25 (sl. 5).

Geološke razmere so za pridobivanje vode z vodnjaki več kot primerne. Na območju obzidanega mesta je več lokalnih horizontov podtalne vode, katerih gladina se spreminja zaradi lokalnega prepletanja prepustnih in manj prepustnih sedimentov. Zgornji horizont, ki mu tvorijo podlago mešane peščeno-prodne oziroma glinasto-meljaste naplavine, se napaja z rožniške strani in leži v globini 2 do 4 m, spodnji horizont pa je v globini okoli 15 m.[11] Na prednosti vode iz vodnjakov na območju Gradišča pred z minerali revno, mehko vodo brez sledov nevezanih ogljikovih kislin iz

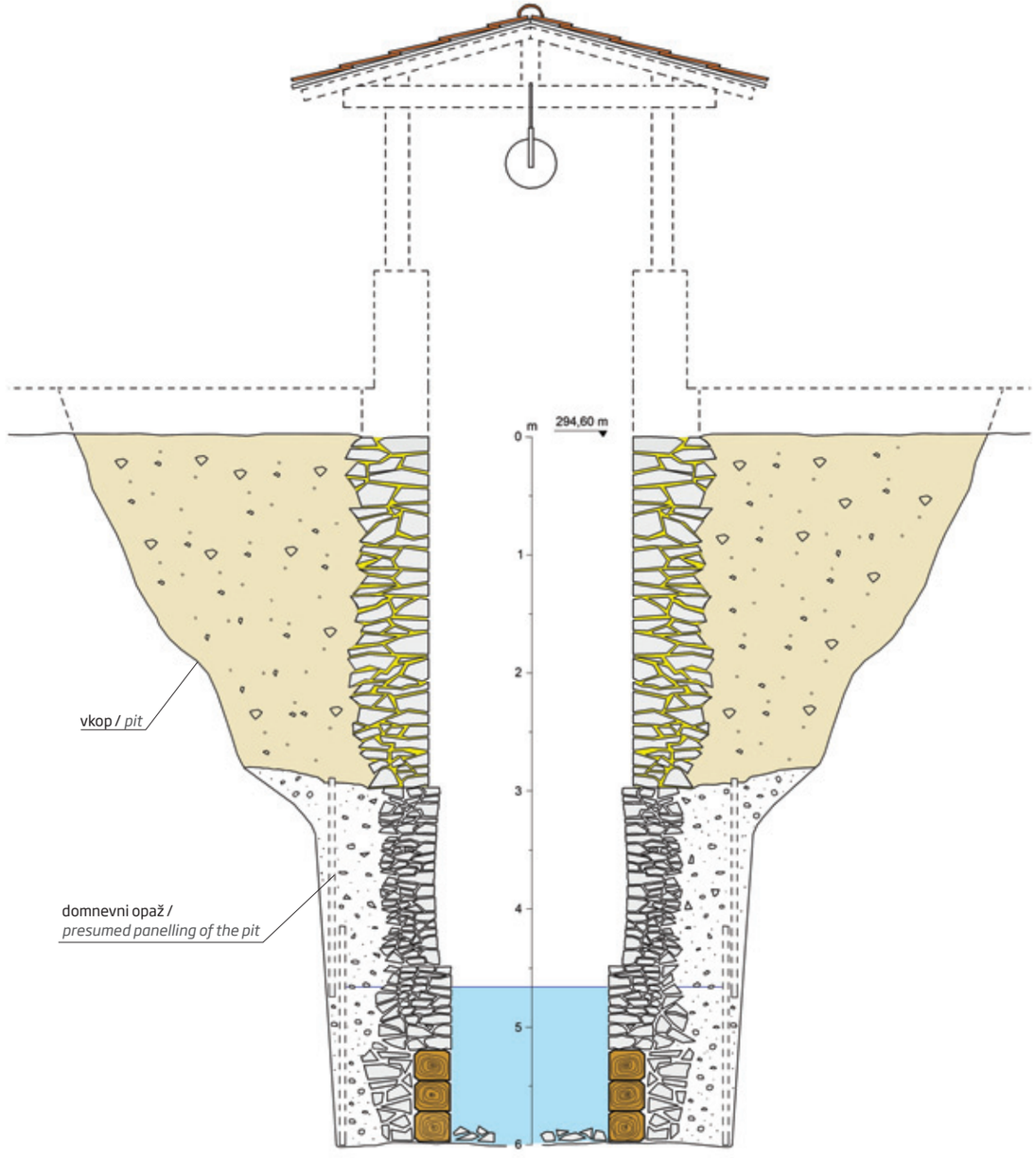
[10] Fron., *Aq.*, 1, 4.
[11] Drobne, Tovornik 1961, 272.

WELLS

The introduction part of discussion of Sextus Iulius Frontinus (around 34–104 AD) about the aqueducts of Rome started 441 years after the establishment of the city, when its inhabitants were still satisfied with getting water out of the wells, water springs, or the Tiber River.[10] The explanation of the early water supply may be reflected in the prehistory of continental Europe; wells, surface water and rainwater were considered to be primary water sources for the inhabitants of the early Roman settlement beneath the hill of Grajski grič in the city of Ljubljana as well as of earliest stages of the walled city on the left bank of the Ljubljanica River. Archaeological research since 1999 has revealed the total number of 25 documented Roman wells in the city of Emona from the area of *intra moenia* (fig. 5).

Geological conditions for drawing water out of wells are almost perfect. There are more local layers of underground water in the area of city walls, the level of which is changing due to the local layers of permeable and less permeable sediments. The upper layer, the base of which consists of mixed sandy gravel or clay-silt alluvia, supplies water from the direction of the hill of Rožnik and is 2 to 4 metres deep, while the lower layer is placed around 15 metres deep.[11] The benefits of water from the wells in the area of Gradišče and from the places like the hills of Grajski grič, Golovec, Rožnik, Tivoli and Šišenski hrib, where a small quantity of minerals is present in soft water, including no traces of unbound carbon acids, have been described in a book by city doctor Franc Viljem Lipić (Franz Wilhelm Lippich) from 1834, which describes the topography of the city of Ljubljana.[12]

[10] Fron., *Aq.*, 1, 4.
[11] Drobne, Tovornik 1961, 272.
[12] Lippich 1834, 18–22.



Slika 1:
Shematiziran presek vodnjaka iz prve polovice 1. stoletja n. št., cardo H

Figure 1:
A schematised cross-section of a well from the first half of the 1st century AD, cardo H

Grajskega griča, Golovca, Rožnika, Tivolija in Šišenskega hriba je opozoril že nekdanji mestni zdravnik Franc Viljem Lipič (Franz Wilhelm Lippich) v leta 1834 izdani knjigi o topografiji Ljubljane.[12]

Najstarejši emonski vodnjaki, ki sodijo v čas pripravljalnih del za gradnjo mesta ter v obdobje med njo in neposredno po njej, so bili dokumentirani v severozahodnem območju insule XXXIX blizu severnih mestnih vrat[13] ter v južnem delu mesta v severovzhodnem delu insule XIII[14] in na kardu H med insulama XXVII in XLVI. Ta 6 m globoki vodnjak s kamnitim vencem notranjega premera okoli 1,8 m je bil zgrajen hkrati ali neposredno po pozidavi mestnega rastra in izstopa tako po lokaciji na ulici v bližini križišča kot po dimenzijah in kakovostni gradnji (sl. 1).[15]

Pri presoji okoliščine, da so bili vsi ostali dokumentirani vodnjaki locirani znotraj stanovanjskih ali javnih kompleksov v insulah ali njim pripadajočih ograjenih dvorišč, se zarisuje logičen sklep o verjetnem obstoju več javnih vodnjakov na ulicah in drugih odprtih javnih prostorih, npr. v okolici foruma, mestnih vrat in frekventiranih križišč, ki so pomenili glavni vir vode mestnim prebivalcem pred gradnjo vodovoda, vendar še niso bili odkriti oz. niso bili dokumentirani. Dimenzije vodnjakov v insulah ustrezajo prevladujočim meram vodnjakov v Cisalpini, pri katerih se srednji premeri večinoma gibljejo med 70 in 80 cm.[16]

Oskrbo mesta s kakovostno pitno vodo je verjetno že okoli sredine 1. stoletja zaokrožila gradnja akvedukta iz izvira

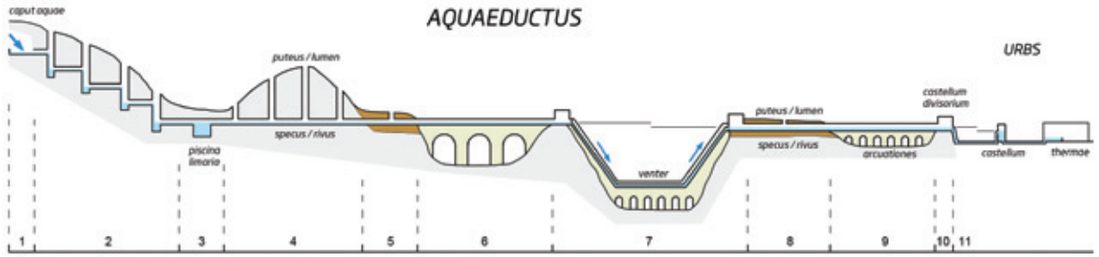
[12] Lippich 1834, 18–22.
[13] Gaspari 2010, 119, sl. 71.
[14] Ib., 4–41, sl. 29.
[15] Ib., 55, sl. 41–42.
[16] Vigoni 2009, 140, op. 55.

The oldest wells in the city of Emona are from the period of preparation works for the building of the city and from the period during the construction and directly after it. They were documented in the north-western area of insula XXXIX close to the northern city gate[13] and at the southern part of the city in the north-eastern part of insula XIII[14] and at H cardo between the insulae XXVII and XLVI. This six-metre deep well with a stone lining of an inner diameter of 1.8m was built at the same time or directly after the building of a city raster and is distinct in terms of location. It is located at the street near crossroads and is noteworthy in terms of the dimensions and quality of the building (fig. 1).[15]

Taking into account that all the other documented wells were located within the residential or public complexes in insulae or enclosed yards, we may conclude the more public wells probably existed in the streets and other opened public places, such as in the surroundings of forum, city gates and crowded crossroads. Such wells can be considered the main water source for the inhabitants before the building of an aqueduct, but they have not yet been discovered or documented. The dimensions of wells in insulae suit the prevailing dimensions of the wells in Cisalpina, where the central diameters are mostly between 70 and 80cm.[16]

Supplying the city with water of good quality was perhaps, as early as around the middle of the 1st century, enhanced by the building of an aqueduct for which water from the Slatek spring was used. The chronology of wells in the insulae, some of which were in use until the 20th century suggests that its inhabitants, even after the installation of water from the Slatek spring, at least for their home use and for the flushing of private latrines, still partially used well water.

[13] Gaspari 2010, 119, fig. 71.
[14] Ib., 4–41, sl. 29.
[15] Ib., 55, sl. 41–42.
[16] Vigoni 2009, 140, n. 55.



1. Zajetje (galerija) / *source (infiltration gallery)*
2. Kaskade (jaški) / *steep chutes (dropshafts)*
3. Sedimentacijski bazen / *settling tank*
4. Predor z jaški / *tunnel with shafts*
5. Vkopan kanal z jaški / *covered channel with shafts*
6. Most akvedukta / *aqueduct bridge*
7. Visokotlačni sifon / *(inverted) siphon*
8. Vkopan kanal z jaški / *covered channel with shafts*
9. Arkada / *arcade*
10. Razdelilni stolp / *distribution basin*
11. Napeljava v mestu / *urban distribution*

Slika 2:
Teoretični diagram rimskega vodovoda

Figure 2:
Theoretical diagram of the Roman aqueduct

Slatek, kronologija vodnjakov v insulah, ki sega skozi celotno obdobje organiziranega življenja v mestu, pa nakazuje, da so njegovi prebivalci tudi po napeljavi vode iz Slatka vsaj za hišno rabo in spiranje zasebnih latrin v določeni meri še naprej uporabljali podtalnico.

VODOVOD

V študijah s področja klasične antike vodovodi veljajo za enega od prepoznavnih simbolov rimske civilizacije. Moderna definicija, po kateri gre za zbir posameznih zgradb oziroma naprav za zajem, napeljavo in distribucijo vodnega vira (sl. 2), ne zadosti antičnemu pojmovanju, v skladu s katerim vodovod ni bil samo materialno sredstvo, namenjeno zadovoljevanju konkretne potrebe (*instrumentum salubritatis*), temveč tudi fenomen kulturnozgodovinske narave (*ornamentum amoenitatis*).[17] Kljub poudarjenosti njihove funkcije v smislu izražanja izbire višjega življenjskega sloga so bili vodovodi v rimskem obdobju vendarle manj pogosti od drugih tehničnih rešitev za oskrbo z vodo.[18]

[17] Vell. Pat., 2, 81, 2.
[18] Fusco 2014 (in tam citirana literatura).

AQUEDUCT

In the studies of classics, aqueducts are considered one of the characteristics of the Roman civilization. The modern definition, according to which the aqueducts are considered to be a collection of individual buildings or devices for conveying and distribution of a water (fig. 2), is insufficient in terms of understanding in antiquity, according to which the aqueduct was not considered only as a material device to satisfy the concrete need (*instrumentum salubritatis*), but also as a phenomenon of a cultural-historical kind (*ornamentum amoenitatis*).[17] Despite the emphasis on their function in terms of the ability to choose a higher standard of living, the aqueducts in the Roman period were still less common than the other solutions for water supply.[18]

Analyses of the inscriptions from different *regiones* of Italy have revealed the water infrastructure was built sponsored by the municipal administrations. It was realized between the 1st century B.C. and the 2nd century A.D. while from the 2nd century onwards, the orders of local institutions were limited to renovations and decorations; this means

[17] Vell. Pat., 2, 81, 2.
[18] Fusco 2014 (and the literature quoted there).

Analize napisnega gradiva iz različnih regiones Italije so pokazale, da je gradnja vodne infrastrukture pod pokroviteljstvom municipalnih uprav potekala med 1. stoletjem pr. n. št. in 2. stoletjem n. št., od 2. stoletja naprej pa so bila naročila lokalnih ustanov omejena predvsem na obnove in okrasitve; to pomeni, da so bile lokalne skupnosti tedaj večinoma bodisi že opremljene s potrebnimi napravami ali pa ekonomsko stanje civitates ni več dopuščalo gradnje večjih del *ex novo*.

Glavni namen akveduktov je bila oskrba mest z vodo, ki je bila distribuirana v javne vodnjake kot glavni vir pitne vode za prebivalce in kopališke komplekse, pod določenimi pogoji pa tudi v zasebne namene. Akvedukt se je navadno končal v distribucijskem vodohranu (*castellum divisorium*), na katerega je bila priključena napeljava za oskrbo različnih delov mesta. Vodohrani so bili zato prirejeni tako, da so omogočali nadzorovano distribucijo vode, in sicer je bilo najprej poskrbljeno za napajanje cevi za dovod javnim vodnjakom, nato kopališčem, in šele če je količina vode to dopuščala, tudi cevi, ki so vodile k zasebnim odjemalcem.[19] V mestih s tlačnim dovodom so bili na glavnih vodovodnih ceveh v mestu razmeščeni sekundarni distribucijski stolpi, s katerimi so zmanjšali pritisk.[20]

ŠTEVILO PRIKLJUČKOV ZASEBNIH ODJEMALCEV JE BILO OMEJENO, VEČINA PREBIVALCEV RIMSKIH MEST PA JE VODO ZA HIŠNE POTREBE IN PITJE PRIDOBIVALA IZ ŠTEVILNIH ULIČNIH VODNJAKOV (LACUS) V OBLIKI KAMNITEGA KORITA, FONTANE ALI NIMFEJA.

[19] Vitr., *De Arch.*, 8, 6, 1–2.
[20] Hodge 1991, 279–291.

that the local communities were already equipped with the necessary infrastructure, or that the economic conditions of the *civitates* no longer enabled greater buildings to be build *ex novo*.

The main purpose of aqueducts was the water supply of cities. Water was distributed to the public wells as the main source of drinking water for the inhabitants and bathing complexes and also for the private purposes under certain conditions. The aqueduct was usually led to a basin (*castellum divisorium*) for distribution, to which the conduits for the water supply of different parts of the city was connected. The basins were therefore arranged to enable the controlled distribution of water; water for the pipes leading to the public wells was first ensured, then for baths and, if there was still enough water, for the pipes leading to the private users.[19] In the cities with water pipes under pressure, there were the so-called secondary distributional towers placed at the main pipes of the aqueduct by which the water pressure could be reduced.[20]

THE NUMBER OF CONNECTIONS OF PRIVATE USERS WAS LIMITED, AND THE MAJORITY OF THE INHABITANTS OF ROMAN CITIES OBTAINED WATER FOR THEIR HOME NEEDS AND DRINKING FROM THE NUMEROUS STREET WELLS (*LACUS*), SHAPED LIKE A STONE TROUGH, FOUNTAIN OR NYMPHAEUM. IN THE ANTIQUE ROME, MORE THAN 60% OF WATER WAS INTENDED FOR PUBLIC USE AND THE REST FOR PRIVATE USE. ACCORDING TO SOME DATA, THE DAILY USE OF WATER FOR ONE PERSON OF THE LOWER OR MIDDLE CLASSES WAS 67 LITRES PER DAY.[21] THERE WERE 591 WELLS IN THE CITY.

[19] Vitr., *De Arch.*, 8, 6, 1–2.
[20] Hodge 1991, 279–291.
[21] Bruun 1991, 101–104.

V ANTIČNEM RIMU JE BILO VEČ KOT 60 ODSTOTKOV VODE NAMENJENE JAVNI PORABI, PREOSTANEK PA ZASEBNI. PO ENI OD OCEN PORABE VODE NA OSEBO ZA NIŽJI IN SREDNJI SLOJ PREBIVALSTVA, KI JE VODO DOBIVALO IZ 591 VODNJAKOV, JE TA ZNAŠALA 67 LITROV NA DAN.[21]

V rimskem svetu so privilegij napeljave vode v zasebna bivališča urejali municipalni zakoni in cesarski odloki, začasna in povsem individualizirana dobava zasebnim odjemalcem pa je bila podvržena sezonskim in urnim omejitvam, določenim v okviru koncesij, ki so jih podeljevali mestni magistrati.

Za distribucijo vode iz vodnega stolpa h končnim destinacijam so v rimskem obdobju glede na različne namene uporabljali cevi iz lesa, keramike, brona, kamna in, najpogosteje, svinca.

Na urbanih območjih je bila iz svinca običajno izdelana celotna napeljava mestnega vodovodnega omrežja. Rimljani so se zavedali toksičnosti svinca oziroma belega svinčevega karbonata (*cerussa*), ki se je uporabljal v kozmetiki in pri pridobivanju barvil. Vitruvij, katerega opažanja so slonela na nevarnem početju livarjev in varilcev cevi,[22] je zato dajal prednost keramičnim cevem. Tudi po Kolumeli, ki kot najbolj zdravo vodo prepoznava deževnico, je ta nenavadno dobra, če se dovaja v cisterno po lončenih ceveh.[23] V nasprotju z razširjenim prepričanjem Rimljani kljub temu niso množično umirali zaradi zastrupitev s svincem, saj je bil sistem zasnovan na

[21] Bruun 1991, 101–104.
[22] Vitr., *De Arch.*, 8, 6, 10–11.
[23] Columella, *De Re Rustica*, 1, 5, 2.

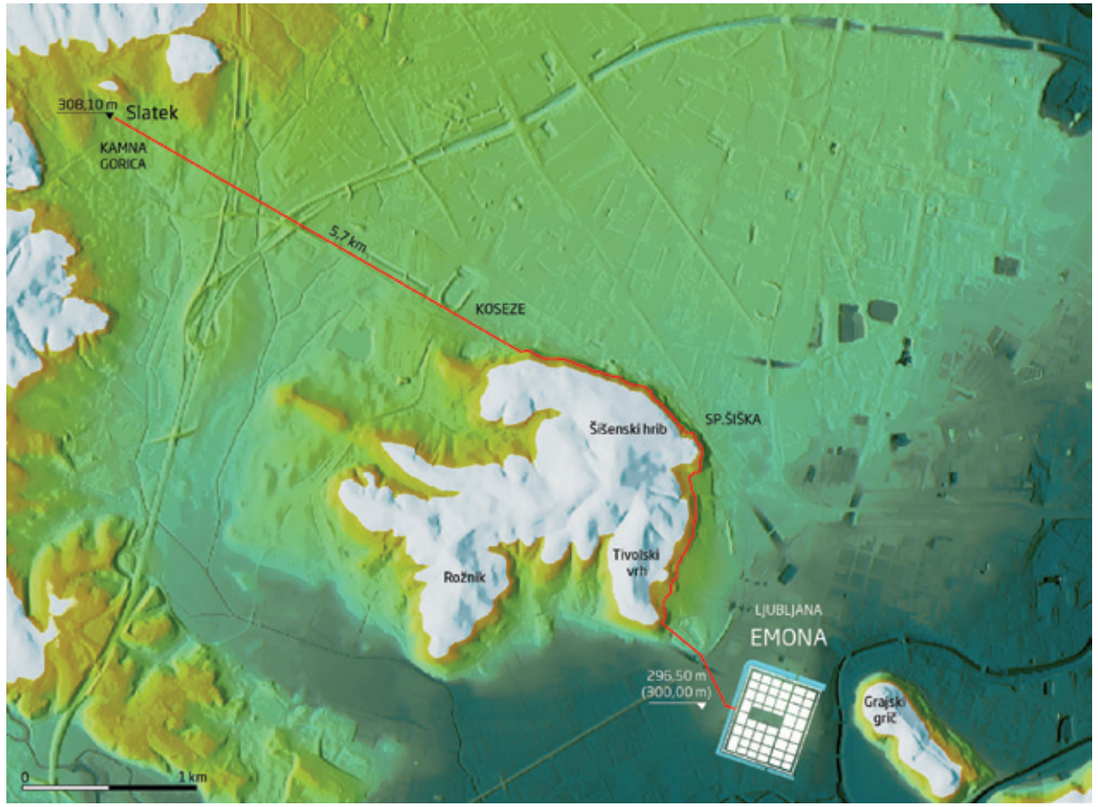
In the Roman world, the privilege of water installation into private homes was regulated by the municipal laws and imperial decrees, while the temporary and completely individualized supply to the private users was subjected to the seasonal and hourly limitations, defined in terms of concessions issued by the city magistrates.

For the distribution of water from the water tower to the final destinations, pipes, made of wood, ceramic, bronze, stone and most frequently lead were used in the Roman Period, depending on the purpose.

In the urban areas, the entire installation of the city aqueduct system was usually made of lead. The Romans were aware of the toxicity of lead or the white lead carbonate (*cerussa*) used in the cosmetics and in the extraction of dyes. Vitruvius, who observed the founders and pipe welders at their dangerous work,[22] preferred ceramic pipes. According to Collumela, who recognized rainwater as the healthiest kind of water, it was usually of good quality if was accumulated into the cistern through the clay pipes.[23] However, Romans did not die due to the poisoning caused by lead since the entire system was planned on the permanent water flow; contact with lead was, therefore, minimal. Moreover, water was mostly hard; therefore, calcareous sinter or calcium carbonate ($CaCO_3$), which accumulated in the pipes, protected the users.[24]

The water springs and a Roman aqueduct from Slatek (fig. 3) were first mentioned by Valentin Vodnik in 1818 in comments to a sepulchral stele of *Marcus Octavius Satullus* built in a church of St. Jernej in Šiška.[25] They were revealed by comparative studies of water from the springs in the hilly surroundings for the purpose of planning of the water supply system for the city of Ljubljana in the

[22] Vitr., *De Arch.*, 8, 6, 10–11.
[23] Columella, *De Re Rustica*, 1, 5, 2.
[24] Bruun 1991, 129–130.
[25] CIL III, 3865.



Slika 3: Vodovod iz izvira Slatek pri Kamni Gorici

Figure 3: Aqueduct from the Slatek spring near Kamna Gorica

stalnem pretoku vode, zato je bil stik s svincem minimalen. Poleg tega je bila voda večinoma trda, zato je odjemalce varovala siga oz. kalcijev karbonat ($CaCO_3$), ki se je nabiral v ceveh.[24]

Prve konkretnejše podatke o izvirih in rimskem vodovodu iz Slatka (sl. 3), ki ga prvi omenja Valentin Vodnik leta 1818 v okviru obravnave nagrobne stele M. Oktavija Satula (*M. Octavius Satullus*), vzidane v cerkev sv. Jerneja v Šiški,[25] so prinesle primerjalne študije vode iz izvirov v hriboviti okolici za potrebe načrtovanja ljubljanskega vodovoda v drugi polovici 19. stoletja. Povzetek

second half of the 19th century. In the summary of a report of *Wasserversorgungscommission* from the municipal council held on the 7th of June 1870, it is mentioned that Roman bricks and the remains of aqueduct had been found with the previous distribution of plots of ground in Dravlje. This is in the chapter about carbonate springs near Glinica.[26] In the introduction to the report, a story is mentioned stating that an aqueduct was leading from the Slatek spring to the settlement of Ljubljana in antiquity. Professor Ivan Vrhovec mentions in his work from 1886, concerning the history of the city of Ljubljana and previous

[24] Bruun 1991, 129–130.

[25] CIL III, 3865.

[26] Die Wasserversorgung Laibachs, *Laibacher Zeitung*, 25th of June 1870, num. 142, p. 1022.

poročila Wasserversorgungscommission na občinskem svetu 7. junija 1870 v poglavju o karbonatnih izvirih pri Glinici navaja,[26] da so pri zadnji zemljiški razdelitvi pri Dravljah naleteli na rimske opeke in ostanke vodovoda. V uvodu k poročilu omenja, da se je do danes pri tamkajšnjih prebivalcih ohranila povedka, da je od izvira Slatek v prastarih časih v Ljubljano vodil vodovod. Profesor Ivan Vrhovec, ki se je v svojem leta 1886 objavljenem delu o zgodovini Ljubljane posvetil tudi nekdanjim vodovodom, navaja, da je najstarejši prej ko ne iz Utika napeljani vodovod, ki naj bi bil »v uporabi še leta 1737«.[27] O tem je sklepal na podlagi določil prodajne pogodbe med komendo nemškega viteškega reda in mestom Ljubljano, ki vključujejo tudi pogoj, da se v prastari vodovod (dejansko gre za kloako pod cesto F; op. A. G.) ne sme delati novih odprtin[28] in da se ne sme povzročati drugih onesnaženj, in sicer z namenom ohranitve podzemnega kanala in vodnjakov v vsej čistoči, ki bo vodnjakom komende in manjšemu izviru pri mestnem stolpu v Krakovem ter posledično javnosti še naprej v vsakem času zagotavljala čisto in zdravo vodo.

Do ključnega odkritja je privedlo zaščitno sondiranje ledine Krivec v neposredni bližini delujočega zajetja Slatek, kjer so v testnem jarku na globini okoli 1,5 m pod površino naleteli na traso vodovoda v smeri približno SZ–JV, ki je bil dokumentiran v dolžini 1,2 m.[29] Dokumentirani pretok na izviru Slatek (1,96 l/s) je brez upoštevanja morebitnih drugih dotokov teoretično zagotavljal okoli 170 m^3 vode na dan, kar bi lahko pri okvirno

[26] Die Wasserversorgung Laibachs, *Laibacher Zeitung*, 25. junij 1870, št. 142, str. 1022.

[27] Vrhovec 1886, 93–96.

[28] Plesničar Gec 1999, 43, sl. 60, 62, 63.

[29] Masaryk, Hvalec, Berdnik 2015.

aqueducts, that the oldest aqueduct is most probably from Utik, which should still be 'in use in 1737'.[27] He presumed that, based on the definitions of sales agreement between the Commandery of the Teutonic Order and the city of Ljubljana, a condition was included that no holes should be made into the old aqueduct (it is actually a cloaca beneath the F road; n. A.G.)[28] and no other pollution should be caused in order to keep the underground canal and wells in all good condition. The canal is still going to ensure clean and healthy water for the wells of Commandery, and a small spring close to the city tower in Krakovo and, consequently, for the public.

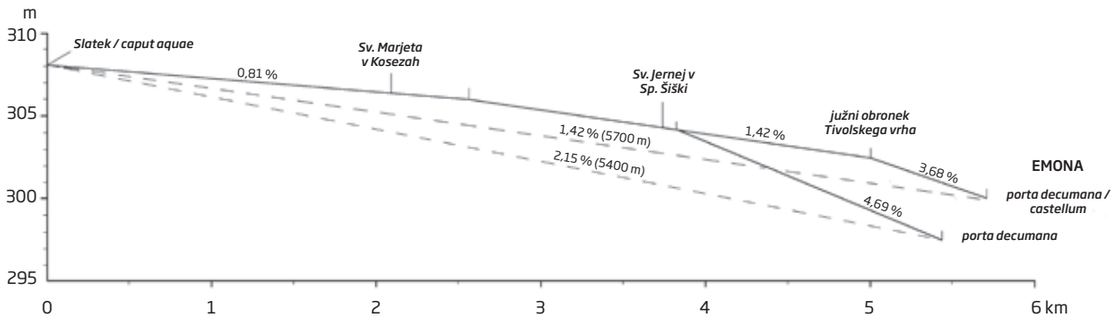
The essential discovery was revealed by rescue sounding of the fallow of Krivec in the direct vicinity of the functioning Slatek spring, where a 1.2 m line of the aqueduct was documented in the direction NW-SE, in a trial trench at the depth of around 1.5 m beneath the surface.[29] Documented water flow at the spring of Slatek (1.96 l/s) theoretically ensured around 170 m^3 of water daily without taking into account some other possible influxes. With approximately 50–70 litres of water daily use per person[30] and taking into account the losses caused by not using rainwater, that quantity may be theoretically sufficient for the needs of drinking water of the inhabitants of the city of Emona. The discovery at the fallow of Krivec confirmed existing assumptions about the location of a special water reservoir in the direct vicinity of still-functioning concrete pool and the assumption about the line of aqueduct through Koseze and Šiška. The direction of the conduit suggests choosing the shortest distance from the water reservoir located close to the southern foothills of an elevation (334.8 m), consisting of Jurassic period limestones, to the foothills of the outermost fringe of Šišenski hrib (Debeli hrib). In Zgornja Šiška, the aqueduct was leaning narrowly

[27] Vrhovec 1886, 93–96.

[28] Plesničar Gec 1999, 43, fig. 60, 62, 63.

[29] Masaryk, Hvalec, Berdnik 2015.

[30] Bruun 1991, 103–104.



Slika 4: Profil domnevnih nagibov vodovoda iz izvira Slatek

Figure 4: Presumed gradient profile of the aqueduct from the Slatek spring

50–70 litrih dnevne porabe na osebo[30] in upoštevajoč izgube zaradi neizkoriščanja prelivne vode teoretično zadostilo potrebam emonskih prebivalcev po pitni vodi. Odkritje na ledini Krivec je potrdilo dosedanje domneve o lokaciji zajetja v neposredni okolici še delujočega betonskega bazena in trasi vodovoda skozi Koseze in Šiško. Smer napeljave kaže na izbiro najkrajše razdalje od zajetja ob južnem vznožju vzpetine (334,8 m) iz jurskih apnencev do vznožja skrajnega severozahodnega obronka Šišenskega hriba (Debeli hrib). Ta del trase morda izdaja raven potek historične komunikacije od cerkve sv. Marjete v Kosezah skozi Draveljsko gmajno v Kamno Gorico. V Zgornji Šiški se je vodovod tesno prislonil na vznožje Šišenskega hriba, njegovo nadaljevanje mimo Vodnikove domačije, cerkve sv. Jerneja, Bellevueja in Cekinovega gradu pa je bilo verjetno že speljano v pobočju čez žlebove in slemena na način, ki je vzdrževal ustrezen padec do vodnega stolpa (*castellum*). Pri tem ni izključeno, da je vodovod v zadnjem delu trase skozi Tivoli potekal po dvignjeni konstrukciji, ki je zagotavljala zadostno višino za distribucijo v mestu (sl. 4).

30 Bruun 1991, 103–104.

AQUEDUCTS FROM THE DIRECTION OF ROŽNIK AND GLINICA

In his report about the archaeological finds of Carniola in 1890, Simon Rutar mentioned the western defensive trench of the city of Emona, writing[31] that water was flushing into a trench partly through the natural, partly through the artificial 'waterways beneath the Šišenski hrib and Rožnik where in this century there was still a water spring, so strong that it could impel a water-mill and was bringing water to the Jesuit pond at Bičevje. The trace of such artificial waterway, enclosed by gravel, was found in 1871 as a tobacco factory was built. The waterway was running from Rožnik towards Gradišče'. Later researchers interpreted that installation as a part of water supply regulation of the walled city,[32] while Šašel connected it to the information about the remains of aqueduct canal 'from the direction of Glinica', which should have been discovered at Postojnska street.[33] According to the assumptions about the possible comparison of height ratios of this area in antiquity to the present ratios, it is more likely that the potential aqueducts were intended to the suburbs, trade and service buildings or activities in the vicinity of an Emona–Aquileia road and the branch towards Vrhovci.[34]

against the slopes of Šišenski hrib and continued to pass the places like Vodnikova hiša, the church of St. Jernej, Bellevue and the Cekin castle. It was probably placed to the slope crossing the grooves and ridges to maintain the appropriate inclination to the water tower (*castellum*). In its last section through Tivoli, the aqueduct could also run over the rising feature ensuring the sufficient height for the distribution in the city (fig. 4).

31 Rutar 1891, 187.

VODOVODI IZ SMERI ROŽNIKA IN GLINICE

V poročilu o arheoloških najdbah na Kranjskem leta 1890 je Simon Rutar ob omembi zahodnega obrambnega jarka Emone zapisal,[31] da je voda prihajala v jarek deloma po naravnih, deloma po umetnih »vodotočinah izpod Šišenskega hriba in izpod Rožnika, kjer je izviral še v tem stoletji tako močan studenec, da je mlin gonil in da je napajal jezuitski ribnik na Bičevji. Sled take umetne vodotočine, obzidane iz samega prodovca, našli so leta 1871., ko so zidali tobačno tovarno. Smer te vodotočine držala je od Rožnika proti Gradišču.« Poznejši raziskovalci so to napeljavo interpretirali kot del vodooskrbnega sistema obzidanega mesta,[32] J. Šašel pa jo je povezal s podatki o ostankih vodovodnega kanala »iz smeri Glinice«, ki naj bi bili odkriti na Postojnski ulici.[33] Izhajajoč iz domneve o primerljivosti višinskih razmerij tega območja v antiki z današnjimi, se zdi verjetnejša teza, da so bili potencialni vodovodi namenjeni primestnim stanovanjskim, obrtnim in servisnim stavbam oz. dejavnostim v okolici ceste Emona–Akvileja in arheološko ugotovljenega odcepa proti Vrhovcem.[34]

RIMSKI VODOVOD Z GOLOVCA?

Pri gradnji odvodnega kanala vzdolž Glavnega oz. Stolnega trga so avgusta 1863 naleteli na dotlej neznan vodovod, ki mu je E. Costa pripisal antično starost in ga je

31 Rutar 1891, 187.

32 Glej Schmid 1913, 87; Klemenc 1955; Plesničar Gec 1977; ead 1999, 62.

33 Šašel 1975, 189.

34 Plesničar Gec 1999, 100; Hvalec *et al.* 2012.

A ROMAN AQUEDUCT FROM GOLOVEC?

As the main sewer along the Glavni or Stolni trg was built in August of 1863, they found an aqueduct, unknown until then; in the opinion of Costa, it was antique and interpreted by him as evidence for a previously unknown Roman settlement on the left bank of the Ljubljanica River. Through the whole length of Stolni trg, along the cathedral, between the house num. 298 and 309 they found well-preserved earthenware pipes of length of around 15 inches (39.45cm) with a diameter of 2 inches and 3 lines (5.92 cm) ahead and a diameter of 3 inches and 4 lines (8.77cm) at the back.[35] The pipes were inserted one in another and almost hermetically closed without the junctures, and it was easy to pull them apart. The pipes were running in the direction from Šolski trg (Vodnikov trg) towards the building of a city hall at Glavni

32 Glej Schmid 1913, 87; Klemenc 1955; Plesničar Gec 1977; ead 1999, 62.

33 Šašel 1975, 189.

34 Plesničar Gec 1999, 100; Hvalec *et al.* 2012.

35 "Viennese inch" (inch)=2.63 cm; (line)=0.22 cm. The National Museum of Slovenia preserves in terms of 'Domplatz' site 5 pipes (inv. num. R 2461–2465), of which the inventory was made by Alphons Müllner. The preserved lengths of three pipes are 33.7 cm, 39.7 cm and 40 cm, for the last one there is also a diameter of 10.5 cm written in the inventory book. Perhaps at the same time some other were also found, completely the same as the latter but without information about site.

interpretiral kot dokaz za do tedaj neznano rimsko poselitev levega brega Ljubljanice. Na celotni dolžini Stolnega trga vzdolž katedrale so med hišnimi št. 298 do 309 naleteli na dobro ohranjene lončene vodovodne cevi dolžine okoli 15 col (39,45 cm), ki imajo spredaj premer 2 coli in 3 črte (5,92 cm), zadaj pa 3 cole in 4 črte (8,77 cm).[35] Cevi so bile vstavljene druga v drugo in tako rekoč hermetično zaprte brez kitanja stikov, tako da so se zlahka potegnile druga iz druge. Cevi so držale iz smeri Šolskega trga (Vodnikov trg) proti stavbi Magistrata na Glavnem trgu, in sicer čim bližje Magistratu, tem bliže površini, tako da so bile zadnje dvignjene cevi le še 2 čevlja in pol (0,77 m) pod površino. Cevi bi se po mnenju Coste morale nadaljevati čez Sejemski trg (Jahrmarktplatz; današnji Krekov trg) in ob Grajskem griču do Gruberjevega kanala. Ob poglobitvi oz. izkopu slednjega so prav tako naleteli na lončene cevi, obrnjene proti mestu. Te cevi naj bi bile tiste, ki so jih po izpovedi nekega zidarja našli pred leti pri gradnji Hradeckijevega predmestja na vznožju Golovca, onstran Gruberjevega kanala. Lončarska masa, odločno žganje in oblika cevi so Costo navdali s prepričanjem, da nedvomno sodijo v rimsko obdobje, v tem pa so ga utrdile tudi rimske najdbe, odkrite ob isti priložnosti na različnih mestih vzdolž Stolnega trga.[36] Ponovno so na omenjeno napeljavo naleteli pri kopanju za vodovod leta 1889.[37]

Costovo poročilo o ostankih vodovoda na Glavnem trgu je natančno pretehtal

[35] Dunajski palec (cola) = 2,63 cm; črta = 0,22 cm. Narodni muzej Slovenije hrani pod najdiščem "Domplatz" 5 cevi (inv. št. R 2461–2465), ki jih je inventariziral A. Müllner. Ohranjene dolžine treh dostopnih cevi znašajo 33,7 cm, 39,7 cm in 40 cm, pri zadnji pa je v inventarni knjigi zapisan tudi premer 10,5 cm. Verjetno so bile ob isti priložnosti najdene tudi druge, povsem enake prej omenjenim, ki so brez zaznambe najdišča.

[36] Costa 1863; id. 1864.

[37] Rutar 1891, 190.

trg. The closer they were to the city hall, the closer they were also to the surface; therefore, the back pipes were rising only 2 and a half inches (0.77 m) beneath the surface. According to Costa, the pipes should have continued through the Sejemski trg (Jahrmarktplatz; present day Krekov trg) and in the vicinity of Grajski grič to the Gruberjev kanal. As they were deepening or digging up the latter, they also found separated pipes turned towards the city. These pipes should have been (as was suggested by a certain bricklayer) those found a few years ago by the building of Hradeckijevo predmestje at the foothills of Golovec on the other side of Gruberjev kanal. The fabric, hard burning and the shape of pipes persuaded Costa that they were undoubtedly of Roman Period. He was also certain about that because of the Roman finds, found at the same time at different spots along Stolni trg.[36] This installation was found again, as they were digging up for a water supply system in 1889.[37]

Costa's report on the remains of the aqueduct at Glavni trg was taken into consideration by Vrhovec in the aforementioned work about the topography of the city of Ljubljana. Concluding that Romans were not building such small aqueducts for the public purposes, Vrhovec was sceptical the Roman origin of the pipes and concluded that it is actually a very old aqueduct of the city of Ljubljana. Based on Costa's data about the direction of aqueduct and reducing the depth of pipes in the direction of the city hall, he also concluded that the installation was undoubtedly leading into the aqueduct in front of the city hall. In his opinion, this aqueduct could no longer be used in 1565 because water was brought into the city wells from the springs beneath Rožnik through larch pipes in that year.[38]

New information about the installation from Golovec was obtained, as the tunnel beneath

[36] Costa 1863; id. 1864.

[37] Rutar 1891, 190.

[38] Vrhovec 1886, 96.

I. Vrhovec v prej omenjenem delu o topografiji Ljubljane. Na podlagi sklepanja, da rimski praksi ni ustrezala gradnja javnim potrebam namenjenih vodovodov tako majhne zmogljivosti, je podvomil o rimski provenienci odkritih cevi in sklepal, da gre za zelo star ljubljanski vodovod. Na podlagi Costovih navedb o smeri vodovoda in manjšanju globine cevi v smeri Magistrata je sklenil, da je napeljava brez dvoma vodila v vodnjak pred mestno hišo. Po njegovem mnenju ta vodovod leta 1565 ni mogel biti več v uporabi, saj so tega leta v mestne vodnjake vodo napeljali iz izvirov pod Rožnikom, in sicer po macesnovih cevih.[38]

Novi podatki o napeljavi z Golovca so prišli na dan ob gradnji predora pod Grajskim gričem leta 1950, na Streliški ulici v šestdesetih letih in na Ciril-Metodovem trgu ob kopanju jarka za PPT-omrežje junija 1971.[39] Na isti cevovod so ponovno naleteli leta 1981 pri izkopu jarka za telefonsko napeljavo v izteku Študentovske ulice ob hišni številki Vodnikov trg 3.[40] Zaščitne raziskave ob prenovi infrastrukturnih vodov vzdolž Krekovega, Ciril-Metodovega in Vodnikovega trga, ki so jih v letih 2009/2010 izvedli Muzej in galerije mesta Ljubljane, so na območju pred predorom pod Grajskim gričem ter na potezi vzdolž Stolnice in nekoliko proti Glavnemu trgu ponovno prinesle nekaj fragmentov obravnavanih cevi.

Pregled gradiva, ki ga hranijo Narodni muzej Slovenije ter Muzej in galerije mesta Ljubljane, je pokazal, da ostanki, odkriti na Streliški ulici, pred predorom pod Grajskim gričem in čez Študentovsko ulico do Ciril-Metodove ulice ter naprej proti Rotovžu, pripadajo nizkotlačni napeljavi, ki so jo

[38] Vrhovec 1886, 96.

[39] Slabe 1974, 132–133; Vahen 1986, 217–219, sl. 1–3; Plesničar Gec 1992, 92, sl. 1; ead. 1999, 62, sl. 97.

[40] Slabe 1983, 229, sl. 47.

the Grajski grič was built in 1950, at Streliška street in the 1960s and on Ciril-Metodov trg as a trench for post network was dug in June 1971.[39] The same pipeline was found again in 1981, as they were digging a ditch for a telephone infrastructure at the end of Študentovska street close to Vodnikov trg 3.[40] Rescue excavations at the time of renovation of infrastructure conduits along the Krekov, Ciril-Metodov and Vodnikov trg, conducted by the Museum and Galleries of Ljubljana in 2009/2010 at the area in front of the tunnel beneath Grajski grič, along the Cathedral and slightly towards Glavni trg, again revealed a few fragments of the pipes discussed here.

The analyses of the material being preserved at the National Museum of Slovenia and the Museum and Galleries of Ljubljana have revealed that the remains discovered at Streliška street, in front of the tunnel beneath Grajski grič, and through the Študentovska street to the Ciril-Metodova street and further towards the city hall were part of a low pressure installation that consisted of pipes of similar dimensions, shape and were made on a pottery wheel.[41]

For the type of pipes, no reliable analogies were found among this kind of Roman finds; the pipes from the Roman contexts (*tubuli fitili*), include smaller main installations, urban distributional systems and outflows,[42] the length between 40 and 70cm, a less-stressed conoidal, almost cylindrical shape and a greater diameter of 10-20 cm. The junctures were mostly luted by hydraulic mortar or clay in the case of used Roman pipes.

Additional arguments to prove Vrhovec's presumption about the much later origin of the conduit are as follows: firstly, its running which at

[39] Slabe 1974, 132–133; Vahen 1986, 217–219, fig. 1–3; Plesničar Gec 1992, 92, fig. 1; ead. 1999, 62, fig. 97.

[40] Slabe 1983, 229, fig. 47.

[41] A comparable study of the potter's clays of which the pipes are made, remains a desideratum.

[42] Adam 1984, 276; Hodge 1991, 113–114.

sestavljale cevi podobnih dimenzij, oblike in keramične mase, izdelane na lončarskem vretenu.[41]

Za tip cevi ne poznamo zanesljivih analogij med tovrstnim rimskim gradivom; cevi iz nesporno rimskih kontekstov (*tubuli fitili*), ki vključujejo manjše glavne napeljave, urbane distribucijske sisteme in odtoke,[42] praviloma označujejo dolžina med 40 in 70 cm, manj poudarjeno konična, skoraj valjasta oblika in večji premer, pretežno 10–20 cm. Stiki so bili pri uporabljenih rimskih cevih praviloma zatesnjeni s hidravlično malto ali glino.

Dodatna argumenta, ki kažeta na pravilnost Vrhovčevega sklepanja o bistveno mlajšem izvoru ljubljanske napeljave, sta njen potek, ki na odseku vzdolž Ciril-Metodove ulice dosledno sledi fasadni liniji poznosrednjeveške-novoveške zazidave, in usmeritev proti Mestnemu trgu. Opisane značilnosti cevi kažejo na vodovod s konca 15. ali iz prve polovice 16. stoletja, ki je glede na najdbo razcepnika poleg vodnjaka pred mestno hišo oskrboval tudi druge odjemalce v izteku trase. Predlagano datacijo podpira tudi odsotnost solne glazure, ki je bila običajna od začetka 16. stoletja naprej, vendar se ob tej kronološki opredelitvi poraja vprašanje tehnične izvedbe prehoda napeljave čez mestni jarek južno od Kloštrskih vrat, ki je bil izravnan šele leta 1772.[43] Vsekakor ni mogoče povsem izključiti možnosti, da obravnavana napeljava sodi šele v zadnjo četrtino 18. stoletja.

Tudi lončene cevi, na katere so naleteli na Hradeckega cesti pri mostu čez Gruberjev prekop oz. na Galjevici, so verjetno mlajšega izvora in zelo verjetno pripadajo

41 Neizogibna primerjalna študija keramičnih mas, iz katerih so izdelane cevi, ostaja dezideratum.

42 Adam 1984, 276; Hodge 1991, 113–114.

43 Korošec 1991, 64, 69–70.

the section along Ciril-Metodova street accurately follows the façade line of the late medieval-modern time building; secondly, it turns towards Mestni trg. The described characteristics of pipes date the aqueduct into the end of the 15th century or into the first half of the 16th century, which, according to the discovery of the divider beside the well in front of the city hall, also supplied the other users at the end of the line. The suggested date is also supported by the absence of salt glazing, which was typical from the beginning of the 16th century onwards, but with such a chronological interpretation an issue occurs about how the transition of installation across the city ditch was made. The city ditch was located south of the Cloister gate and was not filled before 1772.[43] It is also possible for the installation discussed here to be dated to the last quarter of the 18th century.

The clay pipes found at Hradeckijeva road near the bridge across Gruberjev prekop or at Galjevica are probably also later and most likely belong to the installation in direction to Stari trg,[44] which was already assumed by Vrhovec along the south-eastern foothills of Grajski grič. The conduit running from Golovec to the Jesuit college (built in 1613–1615) should have already been dry before the pipeline was interrupted by digging up for the purpose of Gruberjev kanal. After the complaints of inhabitants due to the dry well at Stari trg, the city hall suggested using the pipes of aforementioned conduit for the new aqueduct; as they were pulling down the feature; this was done in 1776.[45]

The locations of possible water captures for both aqueducts are given in the report of *Wasserversorgungscommission* from June of 1870, mentioning that one of the greatest water springs of Golovec comes out in Štepanja vas, directly behind house num. 40 at the branch towards Hrušica. This

43 Korošec 1991, 64, 69–70.

44 Gaspari 2014, 204.

45 Vrhovec 1885, 208.

napeljavi v smeri Starega trga,[44] ki jo je vzdolž jugovzhodnega vznožja Grajskega griča domneval že I. Vrhovec. Napeljava, ki je z Golovca držala v jezuitski kolegij (zgrajen v letih 1613–1615), naj bi bila suha že pred presekanjem cevovoda ob izkopu Gruberjevega kanala. Po pritožbah meščanov zaradi suhega vodnjaka na Starem trgu je magistrat svetoval, da se za nov vodovod porabijo cevi omenjene napeljave, kar so ob rušitvi poslopja leta 1776 tudi storili.[45]

Lokaciji možnih zajetij za oba vodovoda prinaša poročilo Wasserversorgungscommission iz junija 1870, ki navaja, da eden od najbolj izdatnih izvirov Golovca prihaja na dan v Štepanji vasi takoj za hišo št. 40 na odcepu ceste proti Hrušici. Ta izvir zbira vodo iz treh glavnih izvirov v grapah severovzhodnega pobočja glavnega vrha Golovca. Poročevalec je ocenil, da bi lahko to vodo zbirali v rezervoar na manjši izravnavi, kjer je bilo nekdaj kratek čas vojaško strelišče, od tam pa bi se lahko s pomočjo naravnega pritiska dovajala v vse točke mesta. Potencialno zajetje vodovoda proti Staremu trgu (292 m) bi smeli iskati v enem od izvirov pod sicer manj vodnatim severozahodnim obronkom Golovca.

Po W. Schmidu so bile svinčene vodovodne cevi položene v cestišča dekumanov vzporedno s kloakami. Na ulici D je bila ob južni fasadi insule XIV med polaganjem kanalizacije na Gorjupovi ulici leta 1911 odkrita okoli 4 m dolga cev ovalnega preseka, ki je ležala 70 cm pod površino.[46] Ostanki svinčenih cevi so se ohranili tudi v insulah IV, VII, X, XII in XIII, kjer so po Schmidu vedno ležali v najmlajši kulturni plasti.[47]

44 Gaspari 2014, 204.

45 Vrhovec 1885, 208.

46 Schmid 1913, 86–87, Taf. XIV.

47 Ib. Schmid 1913, 87.

water spring collects water from three main water springs in the ravines of the north-eastern slope of the main peak Golovec. The reporter was of the opinion that this water could be accumulated in the reservoir at smaller levelling, where there was a military shooting range for a short time; from there, water could be supplied to all the city spots by using a natural pressure. The potential basin of the aqueduct towards Stari trg (292) could be found in one of the springs beneath the north-western slope of Golovec containing a smaller quantity of water.

According to Schmid, the lead aqueduct pipes were placed into the roads of decumani parallel to cloacas. At street D, close to the south façade of insula XIV, an approximately 4 m long pipe of oval cross-section was found at Gorjupova street in 1911 as a sewer system was installed. It was lying 70 cm deep beneath the surface.[46] The remains of lead pipes have also been preserved in insulae IV, VII, X, XII in XIII, where, according to Schmid, they were always placed in the latest layer reflecting human activity.[47]

Plesničar Gec also mentions that the individual pieces of aqueduct installation, mostly lead pipes, were found in almost every insula researched (fig 5).[48] At the Museum and Galleries of Ljubljana, 23 parts of pipes are preserved, belonging to at least seven different sizes.

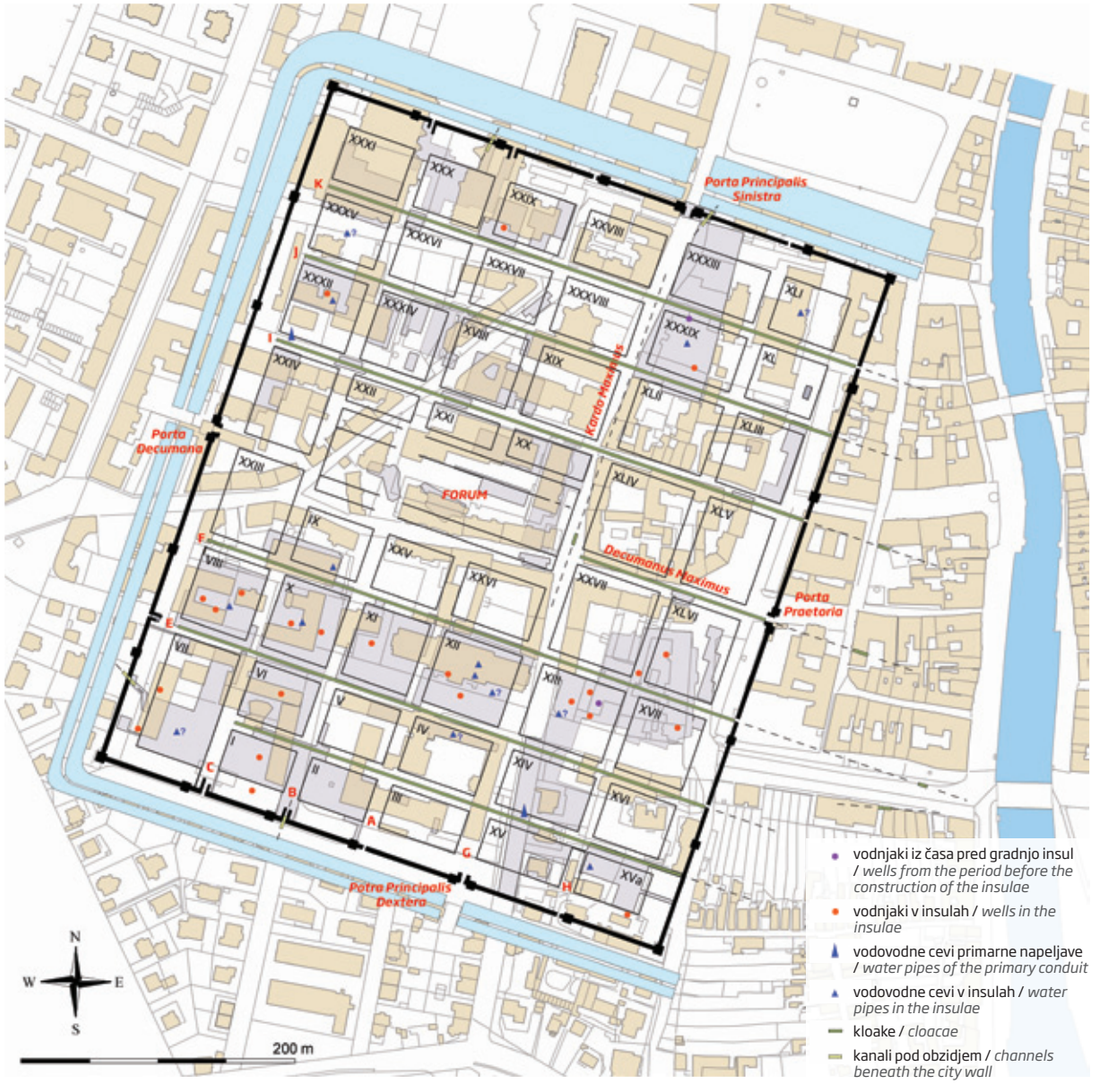
During a renovation, as they were installing the heating system at the north edge of Gregorčičeva street in 1975, the team from City Museum found 4.4 m long piece of lead pipe with one connection of a smaller diameter.[49] It was found parallel with the façade of insula XXXII. Because of the great diameter of the main pipe, Plesničar Gec assumed that the installation was bringing water to the entire north part of Emona. Because of the well in the north part of insula XIII, which proved that

46 Schmid 1913, 86–87, Tab. XIV.

47 Ib., 87.

48 Plesničar Gec 1999, 62.

49 Plesničar Gec *et al.* 1983, 11, fig. 2.



Slika 5: Ureditev vodooskrbe in ravnanja z odplakami v rimski Emoni

Figure 5: Water supply and wastewater management in Roman Emona

Tudi L. Plesničar Gec navaja, da so posamezne dele vodovodne napeljave, večinoma svinčenih cevi, našli skoraj v vsaki od raziskovanih insul (sl. 5).[48] Muzej in galerije mesta Ljubljane hranijo 23 delov cevi, ki pripadajo vsaj sedmim različnim kalibrom.

there was no aqueduct there, she attributed the discovered pipe to the period of the renovation of insula in the first half of the 4th century.[50]

The preserved part of installation consists of one whole pipe in the length of around 2.9 m and the

[48] Plesničar Gec 1999, 62.

[50] Plesničar Gec *et al.* 1983, 11, fig. 2.

Slika 6: Del svinčenega cevovoda primarne napeljave, odkrit na Gregorčičevi ulici leta 1975

Figure 6: Lead pipe of the primary conduit, discovered at Gregorčičeva street in 1975

Med reševalno akcijo ob polaganju toplovoda na severnem robu Gregorčičeve ulice leta 1975 je ekipa Mestnega muzeja vzporedno s fasado insule XXXII odkrila 4,4 m dolg kos svinčene cevi z enim priključkom manjšega premera (iz kataloškega dela št. 190).[49] L. Plesničar Gec je zaradi velikega premera glavne cevi domnevala, da je napeljava napajala ves severni del Emone, na podlagi obstoja vodnjaka v severnem delu insule XIII, ki naj bi izključeval obstoj vodovoda, pa je odkrito cev pripisala obdobju prenove insule v prvi polovici 4. stoletja.[50]

Ohranjeni del napeljave sestavljajo ena cela cev dolžine okoli 2,9 m in končna dela dveh sosednjih (sl. 6). Spoja sta zvarjena s trakasto svinčeno objemko. Zunanji obod plašča cevi z 1 do 1,1 cm debelim ostenjem, vključno s šivom, znaša 55,4 cm. Cev kapljastega preseka je visoka 19 cm in široka 15 cm, njen notranji premer pa je glede na zunanji obseg z upoštevanjem debeline ostenja ocenjen na nekaj čez 15 cm. Ta je blizu dvema od šestnajstih uradnih velikosti, ki so bile v uporabi v Frontinovem času, in sicer quinquagenaria (površina: 50 kvadratnih palcev; premer 8 palcev = 14,7 cm) oziroma sexagenaria (60 kvadratnih palcev; 8,8 palca = 16,2 cm).[51] Dolžina cevi je zelo blizu priporočeni standardni dolžini 10 *pedes* = 2,96 m[52].

final parts of two neighbouring pipes (fig. 6). The joints are covered by a closely fitting lead sleeve. The outer circumference of a pipe mantled with 1 to 1.1 cm thick walls, including a seam, is 55.4 cm. The cross-section of the pipe, shaped like a drop, is 19 cm high and 15 cm wide while its inner diameter is a little bit more than 15cm. This is close to two of the sixteen formal sizes used in Frontinus period: *quinquagenaria* (surface: 50 square inches; diameter 8 inches = 147.2 cm) or *sexagenaria* (60 square inches; 8.8 inches = 16.2 cm).[51] The length of pipes is quite close to the recommended standard length of 10 *pedes*=2.96 m[52].

A piece of a smaller connection is preserved at the main pipe, owing an external circumference of around 13.3 cm. The inner diameter of a pipe of circular cross-section with 0.8 cm thick walls is around 2.6 cm. In terms of a quarter of an inch (*quadrantes*), this is approximately characteristic of the *quinaria* type of pipes, which had a diameter of 5/4 inch (2.32 cm). According to Frontinus, *quinaria* is considered as the basic unit of water flow and also as the size of the smallest pipe. At the same time, that size is the largest one intended for private installations.[53]

[49] Plesničar Gec *et al.* 1983, 11, sl. 2.

[50] Ib., 11, sl. 2.

[51] Adam 1984, 276.

[52] Plin., *Nat. Hist.*, 31, 57–58

[51] Adam 1984, 276.

[52] Plin., *Nat. Hist.*, 31, 57–58

[53] Frontin., *Aq.*, 106.

Slika 7: Žig svinčarja Lucija Anirija Rufa

Figure 7: Seal of the plumbarius L. Annirius Rufus

Na glavni cevi se je ohranil še del manjšega priključka, pri katerem znaša obod plašča okoli 13,3 cm. Notranji premer cevi okroglega preseka z 0,8 cm debelim ostenjem meri okoli 2,6 cm, kar izraženo v četrtinki palca (quadrantes) približno ustreza cevem tipa *quinaria*, ki so imele premer 5/4 palca (2,32 cm). Kvinarija pomeni po Frontinu tako osnovno enoto pretoka kot velikost najmanjše cevi, ki je bila obenem največja predvidena velikost cevi za zasebne napeljave.[53]

Tik pod priključkom je na glavni cevi 22 cm dolg žig z napisom L•ANNIRIVS•RVFVS•F, izpisanim v reliefu s pomočjo žiga z retrogradnim napisom, predhodno odtisnjenega v peščen kalup za ulivanje pločevine (sl. 7). Deli imena in okrajšava perfekta tretje osebe ednine glagola *facere* so med seboj ločeni z eno okroglo in dvema trikotnima punktuacijama. Paleografske značilnosti žiga omogočajo okvirno datacijo v zgodnjecesarsko obdobje.

Glede na dimenzije cevi je očitno, da gre za primarno žilo javne napeljave, ki ima med

Directly under the connection, there is 22 cm long seal with an inscription reading L•ANNIRIVS•RVFVS•F, placed on the main pipe and written on a relief using a seal with retrograde inscription that was preliminary impressed into a sandy mould for the pouring of sheet metal (fig. 7). The parts of the name and the abbreviation of the perfect tense of the 3rd person singular in the case of the verb *facere* are separated from each other with one round and two triangular punctuations. The palaeographic features of a seal enable dating it to the early imperial period.

According to their dimensions, there have been more such pipes found in Cisalpina and at the south of Gallia than in other parts of Italy, including Rome. The name, written in the nominative form and the abbreviation of a verb *f(ecit) or f(acit)* form a standard formula, which was used by the Roman craftsmen for signing of their products. According to Annirius Rufus, this was, therefore, most likely a *plumbarius* who made the installation; if he were an *officinator*, his name would be written in a genitive form, added by an expression *ex officina*.[54]

[53] Fron., *Aq.*, 106.

[54] Bruun 2012, 149–153; Fusco 2014, 174–179.

številnimi dokumentiranimi cevmi iz Italije, vključno z Rimom, le malo primerjav, nekaj več pa v najdbah iz z vodo bogatejših mest Cisalpine in južne Galije. V nominativu izpisano ime in okrajšava glagola *f(ecit)* ali *f(acit)* oblikujeta standardno formulo, ki so jo rimski rokodelci uporabljali za podpisovanje svojih izdelkov. Imenovani L. Anirij Ruf je bil tako najverjetneje plumbarius, ki je izdelal napeljavo, saj bi bilo njegovo ime v primeru, da bi šlo za lastnika delavnice (*officinator*), izpisano v genitivu z dodanim izrazom *ex officina*.[54]

Glavnim žilam napeljave z zunanjim obsegom 55,4 cm pripadajo še štirje deli cevi iz drugih delov mesta, od katerih je eden ohranjen v daljšem segmentu (ohr. d. 95,5 cm), pri treh pa gre za krajše kose razsekanih cevi, ki so bile verjetno že v antiki namenjene reciklaži. Na daljšem in enem od treh krajših delov sta ohranjena žiga istega plumbarija, na veliko verjetnost, da je celo napeljavo izdelala njegova delavnica, pa kaže tudi identična izvedba varov večine ohranjenih cevi.

V vseh treh primerih žig plumbarija na desni strani spremlja za 12 oziroma 13 cm oddaljen žig z dokaj realistično upodobitvijo delfina z navzgor obrnjenim viličastim repom, hrbtno plavutjo in šilastim kljunom.

Predlagana datacija žigov umešča gradnjo javne vodovodne napeljave v mestu v bistveno zgodnejši čas, kot je bilo to domnevano doslej, seveda če zanemarimo možnost, da je bila izdelana iz starih, od drugod pripeljanih cevi.[55] Glede na pojav žigov istega plumbarija in enako izvedbo varov cevi večjih kalibrov je ob upoštevanju verjetne organizacije del mogoče sklepati,

[54] Bruun 2012, 149–153; Fusco 2014, 174–179.

[55] Glej Bruun 1991, 60, op. 92.

With the main threads of water installation with the outer circumference of 55.4 cm, there are also four pieces of pipes from the other parts of the city, of which one is preserved in longer segment (lenght of 95.5 cm) while the other three are shorter pieces of interrupted pipes, intended for recycling in antiquity. With all four pieces, there are preserved seals of the same *plumbarius*. It is most likely that the entire installation was made in his workshop because the welded seams of the majority of preserved pipes are made identically. The seals of the *plumbarius* on the right side are accompanied by 12 or 13 cm distant seals with a depiction of a dolphin with fork-like tail turning upwards, a dorsal fin and a conical beak.

The suggested date of seals places the building of the public aqueduct in the city into a much earlier period, assuming that it was not made of old pipes, driven from somewhere else.[55] According to the appearance of the seals of the same *plumbarius* and the same manner of welded seams at the pipes of greater sizes, we may conclude that the primary and secondary sections of the street installation were made at the same time and by the same concessionaire.

Whether the pipes were produced in Emona or were driven to Emona already made is still not certain because the analyses of lead isotopes have not yet been conducted. The only evidence might be the seals with a dolphin, fairly similar to the seal depicted at the lead ingots of Hispanic origin from the late Republican and early Imperial ship cargoes from the western Mediterranean.[56] The frequent appearance of seals with dolphins on the ingots from the mines in the vicinity of Carthago Nova (Sierra Morena district), which were owned by Roman State or family companies (*Atellii, Aquinii, Iunii Paeti, Lucretii, Planii Russini, Pontilieni, Vtii* ...) indicates, perhaps, that this

[55] See Bruun 1991, 60, n. 92.

[56] Brown 2011, 138.

da so bili primarni in sekundarni vodi ulične napeljave izdelani naenkrat in v režiji istega koncesionarja.

O tem, ali so bile cevi izdelovane v Emoni ali pa so bile pripeljane že izdelane, je pred izvedbo analiz svinčevih izotopov za zdaj mogoče previdno sklepati le po žigih delfina, ki močno spominja na podobno dimenzionirane žige delfinov na svinčenih ingotih hispanske provenience iz poznorepublikanskih in zgodnjecesarskih ladijskih tovorov v zahodnem Sredozemlju.[56] Pogost pojav žigov delfinov na ingotih iz rudnikov v okolici mesta Carthago Nova, ki so bili v lasti rimske države ali družinskih podjetij (*Atellii, Aquinii, Iunii Paeti, Lucretii, Planii Russini, Pontilieni, Vtii* ...), morda kaže, da je imel ta simbol posebno povezavo z omenjenim obmorskim mestom.[57]

S pridržkom bi torej lahko sklepali, da je plumbarij Anirij Ruf z žigom delfina, ki ga je poustvaril iz nabavljenih ingotov in vtisnil v matrico za izdelavo pločevine, označil zajamčeno kakovost oziroma izvor uporabljenega materiala.

Na notranji površini ohranjenih cevi je opazna tanka plast belo sive konkrecije, ki skupaj z odsotnostjo sledov korozije nakazuje pretok vode z le rahlo vsebnostjo karbonata, kar ustreza lastnostim izvira Slatek. Dejstvo, da konkrecija prekriva celotno notranjo površino pregledanih cevi, in ne samo npr. spodnje polovice, nakazuje, da gre za tlačno napeljavo. To posledično potrjuje obstoj centralnega vodnega stolpa, morda pa tudi sekundarnih distribucijskih stolpov, v skladu s prej predstavljeno teorijo in prakso, čeprav so znane tudi znotrajmestne napeljave brez stolpov

[56] Brown 2011, 138.
[57] Domergue 1965, 19; Trincherini *et al.* 2009, Table 1, 4.

symbol was specially connected to the mentioned littoral city.[57]

We may conclude with reservations, that the *plumbarius* Annirius Rufus mark guaranteed quality or the origin of used material by the seal of a dolphin; it was made of purchased ingots and impressed into a matrix for producing sheet metal.

At the inner surface of the preserved pipes, a thin layer of white-grey concretion is visible. Together with the absence of corrosion traces, it indicates water flow with slight carbonate contents, which is typically for the Slatek water spring. The fact that concretion covers the entire inner surface of examined pipes (not only the lower half) indicates a pressure system. Consequently, this confirms the existence of a central water tower and perhaps also secondary towers corresponding to the discussed theory and practice, although there are some installations inside cities known without *castella divisoria* (for example Ostia, Antiochia), with the network of conduits similar to that of the present time.[58]

According to Schmid's findings and late omission of cleaning of cloacas, we should assume that the aqueduct network was functioning at least until the end of the 4th century or until the beginning of the 5th century. The last documented renovation of the city may also be dated to this period. This inference is supported by the situation from the other cities of Italy and provinces, where private patronage or public care for the aqueducts and installation are documented until the beginning of the 5th century.

[57] Domergue 1965, 19; Trincherini *et al.* 2009, Tables 1, 4.
[58] Hodge 1991, 320–321.

(npr. Ostia, Antiochia) z današnji podobno mrežo vodov.[58]

Glede na Schmidove ugotovitve in pozno opustitev čiščenja kloak bi smeli domnevati, da je vodovodno omrežje v mestu delovalo vsaj do konca 4. stoletja ali začetka 5. stoletja, kamor sodi zadnja od dokumentiranih prenov. To sklepanje je podprto s situacijo iz drugih mest Italije in provinc, v katerih sta zasebni patronat ali javna skrb za vodovode in napeljavo dokumentirana vse do začetka 5. stoletja.

KANALIZACIJA

ORIS UREDITVE ODVAJANJA ODPLAK V RIMSKIH MESTIH

V kolonijah in municipijih Italije je bila skrb za vzpostavitev in vzdrževanje kanalizacije naložena lokalnim magistratom, cenzorjem in edilom, sama gradnja in upravljanje pa sta bila navadno podeljena v zakup konduktorjem (*conductores*),[59] za katere je delalo osebje, imenovano *cloacarii*.[60]

Gradnja primarnih in sekundarnih kanalizacijskih vodov, ki so odvajali umazano vodo iz latrin, kopališč, zasebnih bivališč, meteorno vodo ter presežno vodo iz pretočnih vodnjakov in akveduktov, se je navadno izvedla hkrati z gradnjo ulične mreže, in sicer v skladu s formalno hierarhijo javnih in zasebnih vodov, znano tudi iz pisnih in epigrafskih virov. Zasebni priključki so vodili v sekundarne kanale, pogosto v stranskih ulicah, ti so se izlivali v primarne kanale v

[58] Hodge 1991, 320–321.
[59] Plin., *Nat. Hist.*, 36.
[60] *Edict. Imp. Diocl.*, 7, 32.

CANALIZATION SYSTEM

DESCRIPTION OF SEWAGE-MANAGEMENT IN ROMAN CITIES

In the colonies and *municipia* of Italy, taking care of the installation and maintenance of the canalization system was attributed to the local magistrates, censors and aediles, while building and administration were leased to conductors (*conductores*),[59] for which teams were working, called *cloacarii*.[60]

The building of primary and secondary canalization conduits, which took away waste water from the latrines, baths, private homes, rainwater and excessive water from the fountains and aqueducts, was mainly done at the same time as the building of the street network. It was realized according to the formal hierarchy of public and private conduits, also known from written and epigraphic sources. The private connections led to the secondary canals, frequently on the side streets. These were flowing into primary canals located at the axes of the main city streets, and the latter were flowing into the main waste channels. These channels usually correspond to more or less regulated watercourses inside the cities or in their vicinity. The management of sewage was regulated in a natural way, i.e. using a gravitational effect caused by a slight inclination of the main sewers.

DUE TO A LACK OF WRITTEN SOURCES, IT WAS THOUGHT THAT THERE WAS NO PUBLIC SERVICE FOR THE CLEANING OF STREETS IN ANTIQUITY. THE OWNERS WERE REQUIRED TO CARE OF FAÇADES WHILE THE ADMINISTRATION

[59] Plin., *Nat. Hist.*, 36.
[60] *Edict. Imp. Diocl.*, 7, 32.

oseh glavnih mestnih ulic, slednji pa v glavne odvodne žile, ki se pogosto ujemajo z bolj ali manj reguliranimi vodotoki v notranjosti mest ali v njihovi neposredni okolici. Odvajanje odplak je bilo urejeno po naravni poti, tj. ob izkoriščanju učinka gravitacije, ki je izviral iz blagega nagiba odvodnih kanalov.

ZARADI POMANJKANJA VIROV JE VEČKRAT VZNIKNILO MNENJE, DA PRAVA JAVNA SLUŽBA ČIŠČENJA MESTNIH ULIC V ANTIKI NI OBSTAJALA IN DA NAJ BI BILI K TEMU OBVEZANI LASTNIKI OBJEKTOV S FASADAMI, OBRNJENIMI NA KONKRETNE DELE ULIC, UPRAVA PA JE POSREDOVALA LE V PRIMERU, DA TI TEGA NISO ZAGOTOVILI.[61] MED UKREPI MESTNIH OBLASTI ZA ZMANJŠANJE ONESNAŽENJA, SMRADU IN POSLEDIČNEGA ŠIRJENJA BOLEZNI SO BOLJE ZNANE ZAKONSKE PREPOVEDI IN KAZNI, PREDVSEM ZA ODLAGANJE ODPADKOV TER ŽIVALSKIH KADAVROV IN KOŽ.[62] NAZOREN JE JUVENALOV ZAPIS O RAZŠIRJENEM METANJU DOMAČIH ODPADKOV SKOZI OKNO V NOČNIH URAH,[63] TOVRSTNE NEVARNOSTI ZA MIMOIDOČE PA SO BILE PREPOZNANE TUDI V ZAKONIH, KI SO PREVIDELI MOŽNOST POŠKODB ZARADI PADAJOČIH ODPADKOV IN NEVARNOST OVIR NA CESTIŠČU TER OPREDELILI ODŠKODNINSKO ODGOVORNOST LASTNIKOV, STANOVALCEV IN PODNAJEMNIKOV.[64]

Iz besedila Tabule Heraclensis (*Lex Iulia Municipalis*; okoli 45 pr. n. št.)[65] bi bilo

61 Panciera 2000, 96–99.
62 Npr. *Lex Lucerina, Lex Libitinariorum*; Dig., 43, 10, 1–5.
63 Juv., *Sat.*, 3, 268.
64 Dig., 9, 3, 5 (Ulp.).
65 CIL I, 593.

INTERVENED ONLY IN CASE IF THAT WAS NOT ENSURED.[61] THE CITY AUTHORITIES ISSUED LAWS AND PUNISHED PEOPLE FOR THROWING AWAY GARBAGE, ANIMAL REMAINS AND SKINS IN ORDER TO REDUCE POLLUTION, OFFENSIVE ODOURS AND THE SPREAD OF DISEASES.[62] IUVENALIS REPORTS THE DISPOSAL OF GARBAGE THROUGH THE WINDOWS IN THE NIGHTS.[63] THIS WAS ALSO CONSIDERED TO BE DANGEROUS IN LEGISLATION. FALLING GARBAGE COULD HARM PEOPLE, AND POLLUTE THE ROADS. THE OWNERS, RESIDENTS AND SUBTENANTS HAD TO PAY COMPENSATION IN SUCH CASES.[64]

According to the *Tabula Heraclensis* (*Lex Iulia Municipalis*; around 45 B.C.),[65] we may conclude that city magistrates not only took care of the efficiency and functionality of streets (*tuitio*), but also controlled their purification (*purgatio*). Similar to the roads, the tradesmen had to ensure the cleaning of the city cloacas. This was extremely dangerous and potentially fatal. They also issued taxes for the cleaning of cloacas.[66] In legal texts, a *cloacarium* is mentioned, i.e. a tax for the use and maintenance of cloacas.[67] Traianus decided that in Nicaea and Nicomedia criminals were to be used for the cleaning of canals, the paving of streets and the taking care of baths.[68]

The latrines (*foricae*) in public or private Roman baths were managed by *foricarii*.[69] They were often not connected to the city canalization system; therefore, the tenants (*stercorarii*) cleaned them.

61 Panciera 2000, 96–99.
62 Npr. *Lex Lucerina, Lex Libitinariorum*; Dig., 43, 10, 1–5.
63 Juv., *Sat.*, 3, 268.
64 Dig., 9, 3, 5 (Ulp.).
65 CIL I, 593.
66 Lib., *Or.*, 46, 21.
67 Dig., 30, 39, 5 (Ulp.); 7, 1, 27, 3 (Ulp.).
68 Plin., *Ep.*, 10, 42.
69 Mart., 6, 93, 1–2; Suet., *Vesp.*, 23, 3.

mogoče sklepati, da sta bila v pristojnosti mestnih magistratov ne samo skrb za učinkovitost in funkcionalnost ulic (*tuitio*), temveč tudi nadzor nad njihovim čiščenjem (*purgatio*). Podobno kot je veljalo za ceste pred njihovimi lokali, so bili trgovci dolžni zagotavljati tudi čiščenje mestnih kloak, kar pa je bilo lahko smrtno nevarno opravilo, zato so to obveznost nadomestili s finančnimi dajatvami.[66] Pravni teksti poročajo o *cloacariumu*, dajatvi za uporabo in vzdrževanje kloak.[67] Po odločitvi Trajana so v Nikeji in Nikomediji za čiščenje kanalov, tlakovanje ulic in službo v termah uporabljali obsojene kriminalce.[68]

Latrine (*foricae*) v javnih ali zasebnih termah, ki so jih upravljali *foricarii*,[69] pogosto niso bile povezane z mestnim kanalizacijskim omrežjem, zato so njihovo čiščenje opravljali zakupniki (*stercorarii*). Ti so iztrebke iz mesta odvažali na velikih vozovih (*plostra stercoraria*),[70] za kar so imeli dovoljenje tudi prvih deset ur dneva, ko je bila vožnja drugim vozilom prepovedana. Tovor so prodajali kot gnojilo in literarni viri obširno poročajo o njegovi uporabi v poljedelstvu.[71]

KLOAKE IN KANALIZACIJSKO OMREŽJE EMONE

Tloris insularne razdelitve in poteka mestnih ulic s kanalizacijsko mrežo vred se je izpopolnil z raziskavami W. Schmida, ki je kloake ugotovil pod vsakim od sedmih dekumanov, ulic v smeri vzhod–zahod.[72]

66 Lib., *Or.*, 46, 21.
67 Dig., 30, 39, 5 (Ulp.); 7, 1, 27, 3 (Ulp.).
68 Plin., *Ep.*, 10, 42.
69 Mart., 6, 93, 1–2; Suet., *Vesp.*, 23, 3.
70 Dig., 7, 12, 10 (Ulp.); Tac., *Ann.*, 11, 32, 3.
71 Npr. Var., *Rust.* 1, 13, 4; Colum., *Arb.* 21, 2; 23, 1.
72 Schmid 1913, 83–86, Taf. III; id. 1941, Abb. 2.

Excrement was driven away on big carts (*plostra stercoraria*);[70] this also permitted in the first ten hours of a day. Other vehicles were prohibited on the road at this time. According to the written sources, the cargo was sold as manure, and it was used in agriculture.[71]

CLOACAS AND CANALIZATION SYSTEM OF EMONA

The ground plan of Emona comprises the division of insulae and a course of city streets including the canalization system. It was supplemented by the research of Schmid, who found cloacas beneath each of seven decumani, the streets in east-west direction.[72] The outline of the constructional-technical characteristics of the central canalization system is given, according to the historical publications, and partly supplemented by the results of the research since 1999 (fig 5).

The cloacas, into which the rainwater from the streets and neighbouring roofs, the sewage from the public toilets and baths and private parts of insulae were flowing through the shafts at the roads and a canalization system, were located towards the east city walls. The excessive water from the aqueducts and fountains could also flow into them with very little inclination. The cloacas began at the roads in direction to the west walls, except in case of decumanus D where the cloaca began in the centre of cardo C in front of the insula VII in south-western part of the city. That was also the case in cloaca beneath the main decumanus (*decumanus maximus*), which was documented east of forum basilica.

Beside the accumulating canals, Schmid also assumed that there was a cloaca towards the main

70 Dig., 7, 12, 10 (Ulp.); Tac., *Ann.*, 11, 32, 3.
71 For example Var., *Rust.* 1, 13, 4; Colum., *Arb.* 21, 2; 23, 1.
72 Schmid 1913, 83–86, Taf. III; id. 1941, Abb. 2.

V nadaljevanju podani oris gradbenotehničnih značilnosti centralnega kanalizacijskega sistema je povzet po starejših objavah in mestoma dopolnjen z rezultati raziskav po letu 1999 (sl. 5).

Kloake, v katere so skozi jaške na cestiščih in sekundarno kanalizacijsko mrežo iztekale padavinska voda z ulic in sosednjih streh, odplake iz javnih stranišč in kopališč ter zasebnih delov insul, pa tudi morebitna dodatna presežna voda iz vodovodov in pretočnih vodnjakov, so z neznatnim padcem, prilagojenim naravnemu nagibu terena ob postopnem povečevanju notranje višine, potekale v sredinski osi cestišč proti vzhodnemu mestnemu obzidju. Začenjale so se na cestiščih v osi fasad robnih insul ob zahodnem obzidju, razen dekumana D, kjer se je kloaka začela v sredini karda C pred insulo VII v jugozahodnem delu mesta, ter kloake pod glavnim dekumanom (*decumanus maximus*), na katerem je bil njen potek ugotovljen šele vzhodno od forumske bazilike.

Poleg naštetih zbirnih kanalov je Schmid domneval tudi kloako, ki je v osi glavnega karda (*kardo maximus*) povezala kanala pod glavnim dekumanom in dekumanom I. Na južnem koncu Gradišča (Burgstallgasse; današnja Slovenska cesta pri križišču z Rimsko cesto) so pri izkopu kanala poleti 1910 namreč naleteli na enako grajen kanal podobnih dimenzij, ki je potekal proti severu in se je iztekal v kloako, ki je vodila pod Gregorčičevo ulico oz. Sotesko (Hilschergasse) proti Novemu trgu (Auerspergplatz).

Onstran obzidja dokumentirani odseki kažejo, da so se kloake pod glavnim in prvima stranskima dekumanoma (F in I) bolj ali manj premočrtno nadaljevale proti Ljubljanici, večje odstopanje od v mestu začrtane osi pa je bilo ugotovljeno pri kanalu, dokumentiranem leta 1991 ob gradnji Fakultete za arhitekturo na Zoisovi cesti, pri katerem gre morda za nadaljevanje kloake pod ulico D.

Po izkopu 2,5 do 5,7 m širokega in do 3,13 m globokega jarka ter niveliranju trase kloak so na dno jarka položili dva pasova tegul z navzdol obrnjenimi robniki ali tri pasove opečnih laterkulov ter jih zafugirali z glino ali malto. Natančno zložene opeke so bile podložene z lomljenci ali malto, v južnem delu mesta pa so zaradi mehkih barjanskih tal na dno vkopa predhodno namestili plavajočo podlago iz prečno položenih hrastovih brun.

Iz vodoravno zloženih lomljencev grajskega peščenjaka, vezanih s sivo belo apneno malto, so nato praviloma okoli 90 cm (3 pm) narazen (notranja širina kloak sicer niha med 0,65 in 1,01 m) sezidali 60 do

cardo (*kardo maximus*), connecting two canals beneath the main decumanus and decumanus I. At the south end of Gradišče (Burgstallgasse; present day Slovenska cesta at the crossroads with Rimska cesta), as they built a canal in the summer of 1910, a canal was found built in the similar manner and being of similar size. It was running towards the north and flowed into a cloaca, leading towards Novi trg (*Auerspergplatz*). This cloaca was located beneath the Gregorčičeva street or Soteska (Hilschergasse).

The sections documented beyond the walls indicate that cloacas beneath the main and the first two side decumani (F and I) continued straight towards the Ljubljanica River. There was a significant difference documented in 1991, as they built a Faculty of Architecture at Zoisova Street. This canal could be a part of cloaca beneath street D.

As they dug up a 2.5 to 5.7m wide and up to 3.13m deep ditch and as they levelled the cloacas, they put to the bottom of a ditch two layers of tegulae with their winged borders turned downwards, or they put three layers of brick laterculi bound by clay or mortar. Accurately placed bricks were supported by quarry stones or mortar. At the south part of the city, they first placed a floating foundation made of oak beams to the bottom of a ditch because of the softer base.

From horizontally placed sandstone, bound with white lime mortar, they built 60-150 cm high and 45-110 cm thick vertical sides. They were around 90 cm (3 pm) apart (the inner width of cloacas is between 0.65 and 1.01 m) and built in such manner that side edges of the outer border of bottom bricks reached the area beneath the both sides. The inner surface of sides is carefully bound and partly covered with plaster. To build them, they also used pieces of tegulae and brick laterculi. The edge of the sides is at some places not emphasised or present. It indicates the transition to the vault of cloaca made of larger quarry stones and tegulae. According to the traces of boards in the mortar, they built it using semi-circular or roof-like panelling. The inner line of the cross-section of the vault may change at different parts of the same cloaca (for example, a cloaca beneath the road F) indicating different manners of techniques in cases of collaborating builders (fig 8).

The inner height of cloacas is mostly between 1.40 and 1.65 m (otherwise 0.8 to 2 m), and the vault is 45 to 50 cm high. The outer vault mantles, between 35 and 65 cm thick, were irregularly rounded up and bound by mortar. There are many imprints of feet and nailed shoes visible in the mortar. The outer surface of around 1.8-2 m wide, and high cloacas was thickly covered with pieces of clay at some places. The ditch was then filled up with the previously dug up material.

Slika 8: Kloaka pod dekumanom F na lokaciji NUK II

Figure 8: Cloaca under decumanus F at the location NUK II

150 cm visoki navpični stranici debeline 45–110 cm, in sicer tako, da so stranski robovi zunanjih pasov talnih opek segali pod stranici. Notranja stran stranic, pri gradnji katerih so občasno uporabili tudi kose tegul in laterkulov, je skrbno fugirana in mestoma ometana. Zob v končni višini stranic, ki ponekod ni izrazit oziroma ga celo ni, označuje prehod v obok kloake iz večjih lomljencev ali tegul, ki je bil glede na odtise desk v malti zgrajen z uporabo polkrožnega ali strehastega opaža. Notranji obris preseka oboka se lahko na različnih delih iste kloake spreminja (npr. kloaka pod cesto F), kar nakazuje različne tehnike sodelujočih graditeljev (sl. 8).

Notranja višina kloak večinoma znaša med 1,40 in 1,65 m (sicer 0,8 do 2 m), od česar odpade na obok med 45 in 50 cm. Zunanji plašči obokov, debelih med 35 in 65 cm, so bili nepravilno polkrožno zaobljeni in zamazani z malto, v kateri se razmeroma pogosto pojavljajo odtisi bosih nog in nažebljičenih podplatov obuval. Zunanjost okoli 1,8–2 m širokih in podobno visokih kloak je bila mestoma na debelo obložena s kosi gline, jarek pa so nato zasuli z materialom, pridobljenim pri izkopu.

Na začetkih, nekaterih križiščih in tudi ponekod zunaj njih so bile kloake opremljene z eno- ali dvodelnimi kamnitimi pokrovi dimenzij okoli 1,1 x 1,1 x 0,25 m z luknjo premera 20–30 cm in čepom v sredini, položenimi na zob stranic v običajni višini ali na ravni oboka. Tak začetek, sezidan iz laterkulov, je bil dokumentiran npr. pri kloaki D, na dekumanu J pa je bil odkrit okrogel vstopni jašek, vzidan v obok kloake in prekrit s kamnito ploščo.

Udore ali rekonstrukcije obokov, do katerih je prišlo z opuščanjem vzdrževanja v poznorimskem obdobju, so večinoma prekrili s kamnitimi ploščami (E) in

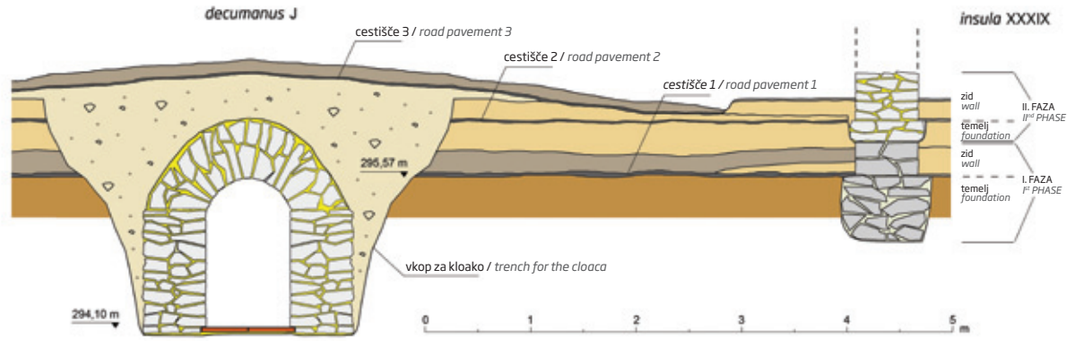
At their beginnings, at certain crossroads and somewhere outside the crossroads, the cloacas were arranged by one- or two-part stone lids of the sizes around 1.1 × 1.1 × 0.25m. They had a hole of 20-30 cm in diameter, and a stopper placed in the centre. The stone lids were usually placed to the edge of the sides or higher to the vault. Such a beginning, built of brick *laterculi*, was documented near cloaca D, while there was a circular entrance shaft found at decumanus J. It was built in the cloaca's vault and covered by a stone slab.

Collapses caused by inappropriate maintenance and, consequently reconstructions, in the late Roman Period were covered by stone slabs (E) and pieces of sepulchral architecture (J). They also used some other kinds of materials, for example, a special bench placed at the cloaca near the crossroads of the main cardo and decumanus J[73] and, for example, the old forum decoration at the cloaca beneath the decumanus J at the beginning of Igriška street.[74]

The contents of side canals from the neighbouring cardines and insulae were flowing into cloacas through the connections or openings in the upper parts of sides or vaults, in relation to exchanging needs. The canals in insulae were built at the same time as outer and inner walls, which is documented by the homogenous wall line and a relieving arch above the canal. They could also make openings at the locations of planned canals and later on rebuild them.

The canals, usually having much greater inclination than cloacas, are 25–50cm wide and 25–50 cm high. The tegulae or bricks, forming the bottom of canals, are surrounded by lines of stones or bricks and covered by stone slabs or tegulae. Some canals are entirely built of stone and at the bottoms and walls they are covered by smooth plaster made of hydraulic mortar. The rifts

[73] Gaspari, Novšak 2012.
[74] Rutar 1891, 186.



Slika 9: Shematiziran presek dekumana J in južne fasade insule XXXIX na lokaciji Šumi (2005)

Figure 9: Schematized cross-section of the decumanus J and the southern facade of the insula XXXIX at the location Šumi (2005)

elementi grobne arhitekture (J) ter drugim priročnim materialom, med drugim tudi z odsluženo merno mizo (na kloaki ob križišču glavnega karda in dekumana J)[73] in starim forumskim okrasom (na kloaki pod dekumanom J na začetku Igriške ulice).[74]

Stranski kanali iz sosednjih kardov in insul so se iztekali v kloake skozi vnaprej pripravljene priključke ali preboje v zgornjih delih stranic ali obokov, skladno s spreminjajočimi se potrebami. Podobno so kanale v insulah gradili bodisi hkrati s fasadnimi in notranjimi zidovi, kot je dokumentirano s homogenim potekom zidu in razbremenilnim lokom nad kanalom, ali pa so ob spremembah notranje zasnove insul v zidovih na mestih načrtovanih kanalov izdelali preboje ter jih naknadno nadzidali.

Kanali, ki imajo običajno bistveno večji nagib od kloak, so široki med 25 in 50 cm ter visoki 25–50 cm. Tegule ali zidaki, ki

between the individual slabs were usually closed by mortar. The connection canals were rarely built in the same way as cloacas. There is also known a canal where the bricks are arranged in a triangular shape.

The canals of private parts of insulae begin with shaft-like or funnel-shaped rims, built of bricks or stone and sometimes covered by perforated lead grates. They may also begin with tubular mouths made of arranged bricks or starting in the *latrina* shafts. Sometimes, the stone lids or features with high edges and circular opening at one end, are the remains being preserved of these *latrina* shafts. The only known public latrine (fig. 10) was documented in the north-eastern part of insula XVII and may be dated to the last decade of the 4th century. It belongs to the usual type of common toilets. Because it is placed in the corner between decumanus F and the intervallum, very close to *porta praetoria*, it could be used by the visitors to Roman baths and passers-by.[75]

[73] Gaspari, Novšak 2012.
[74] Rutar 1891, 186.
[75] Snoj 1990; Plesničar Gec 1999, 80, fig. 139–143.

tvorijo dno kanalov, so obzidani s kamni ali opekami ter prekriti s kamnitimi ploščami ali tegulami. Nekateri kanali so v celoti zidani iz kamna, njihovo dno in ostenje pa prekriva zglajen omet iz hidravlične malte. Reže med posameznimi ploščami pokrovov so bile navadno zafugirane z malto. Izjemoma so bili tudi priključni kanali zidani v tehniki kloak, izpričan pa je tudi primer kanala iz v trikotnik postavljenih opek.

Kanali v zasebnih delih insul se začnejo z jaškastimi ali lijakastimi ustji, sezidanimi iz opek ali kamna in občasno prekritimi s predrtimi svinčenimi rešetkami, cevastimi izlivi iz na rob zloženih opečnih korcev in v jaških latrin, pri katerih so se občasno ohranili kamniti pokrovi oz. stojišča z zvišanima robovoma in okroglo odprtino na enem koncu. Edina znana javna latrina je bila dokumentirana v severovzhodnem delu insule XVII in sodi v zadnje desetletje 4. stoletja (sl.10). Pripada običajnemu tipu skupinskih stranišč, zaradi umestitve v vogalni prostor med dekumanom F in intervalumom, zelo blizu glavnih vzhodnih vrat, pa so jo lahko uporabljali tako obiskovalci term kot mimoidoči.[75]

Poleg splošne ureditve odvajanja odplak je bil glavni namen kanalizacijskega sistema preprečevanje kontaminacije vodnjakov zaradi izpuščanja odplak v prodnate savske nanose.[76] O tej nevarnosti, ki je pred gradnjo vodovoda ob koncu 19. stoletja pretila tudi prebivalcem Ljubljane, je pisal c.-kr. profesor dr. Baltazar Knapič, ki je v osemdesetih letih opravil številne kemijske preiskave užitnosti vode v ljubljanskih vodnjakih. V poročilu iz leta 1886 je ugotavljal, da je voda mnogih vodnjakov popolnoma neužitna, da vsebuje gnilobne snovi, amonijak in druge primesi,

[75] Snoj 1990; Plesničar Gec 1999, 80, sl. 139-143.
[76] Vahen 1986, 219-220.

In addition to the general regulation for taking away the sewage, the main purpose of the canalization system was to prevent the pollution of wells because the sewage could flow into gravel base.[76] The inhabitants of Ljubljana were also threatened by such a disaster before the water supply system was built at the end of the 19th century. This was reported by Professor Baltazar Knapič, who conducted numerous chemistry research studies, based on the suitability of Ljubljana wells at the end of the 19th century. In his report from 1886, he determined that water from numerous wells is completely unsafe to drink, that it contained decaying material, including ammonia and other elements, indicating the quick spreading of urine into underground water and from there into wells.[77]

Based on the bottom sizes, deposits and the top of cloacas, from the excavations of Plesničar Gec, Damjan Vahen calculated the inclinations and permeability of the main accumulating canals. He determined that they indicated an almost completely straight bottom, where the maximal decline of cloaca D is 1.9‰, while the minimal decline of cloaca K is 0.03‰. The average inclination of cloacas from the vicinity of the western walls towards the flow in the direction to the Ljubljanica River was evaluated at 0.9 ‰. This may mean that without additional flushing in cloacas, the sewage only slid and at some places fell according to their specific weight.[78]

Undoubtedly, the Romans had to take into account the regulations for systematic cleaning of cloacas so that they could flush excrement that was sliding too slowly. For this activity, stone slabs with a hole and a stopper in the middle were placed to the edge of the sides of the cloaca, at the beginning of cloacas and at some crossroads. In the holes, rainwater was accumulated, which was flowing to the roads in case

[76] Vahen 1986, 219-220.
[77] See Tominšek-Rihtar 1997, 32; Studen 2006, 143.
[78] Vahen 1986, 224, fig. 7.

Slika 10: Poznorimska javna latrina iz severovzhodnega vogala insule XVII

Figure 10: Late Roman public latrine from the northeastern corner of the insula XVII

ki pričajo o močnem prodiranju »scalnice« v podzemno vodo in od tam v vodnjake.[77]

D. Vahen je na podlagi izmerjenih absolutnih višin dna, usedlin in vrha kloak iz izkopavanj L. Plesničar Gec izračunal nagibe in prepustnost glavnih zbirnih kanalov. Ugotovil je, da kažejo na skoraj povsem ravno dno, pri čemer znaša največji padec kloake D 1,9 ‰, minimalni padec kloake K pa 0,03 ‰. Povprečni nagib kloak od bližine zahodnega obzidja proti iztoku v Ljubljanico je bil ocenjen na 0,9 ‰, kar bi

[77] Glej Tominšek - Rihtar 1997, 32; Studen 2006, 143.

of downpours. Entrance shafts with mobile one- or two-part lids enabled regular cleaning. The dating of finds from the sediments at individual sections of cloacas, especially in the vicinity of shafts, indicates at least periodical cleaning of cloacas until the beginning of the 4th century. At more remote parts, where gasses were formed as faeces decayed, where people could only be for a very short time, the sediments indicate a longer chronological sequence.

New facts in relation to the communal arrangement of a city were revealed by using a

pomenilo, da so odplake brez dodatnega spiranja v kloakah le polzele in se mestoma sedimentirale po svoji specifični teži.[78]

Na podlagi tega ni mogoče dvomiti, da so morali Rimljani predvideti ukrepe za sistematično čiščenje kloak, s katerimi so izpirali prepočasi polzeče blato. Temu so bile namenjene plošče z luknjo in čepom v sredini, ki so bile položene na zob stranic kloake na začetkih kloak in na nekaterih križiščih. Odprtine so sprejemale meteorne vode, ki so se ob nalivih izlivale na cestišča, vstopni jaški s premičnimi eno- ali dvodelnimi pokrovi pa so omogočali redno čiščenje. Datacija najdb iz sedimentov na posameznih odsekih kloak, zlasti v bližini jaškov, kaže na njihovo vsaj občasno čiščenje vse do začetka 4. stoletja, na bolj oddaljenih delih, kjer ob razkroju fekalij nastajajoči plini preprečujejo daljše zadrževanje, pa sedimenti izkazujejo daljše kronološko zaporedje.

Nova spoznanja v zvezi s komunalnim opremljanjem mesta je omogočila dokončna uveljavitev stratigrafske tehnike izkopavanj po letu 1999, po pomembnosti rezultatov za obravnavano temo pa izstopajo raziskave na območju Šumi v letih 2004–2007,[79] Barjanski cesti v letu 2006[80], območju NUK II v letu 2008[81] in na Gregorčičevi ulici 1 leta 2013.[82] Potrdilo se je, da so bili centralni zbirni kanali pod dekumani zasnovani v okviru enotnega urbanističnega načrta, pri čemer so bile v večini dokumentiranih primerov kloake zgrajene zelo kmalu po dograditvi fasadnih zidov insul (sl. 9).

Raziskave po letu 1999 so prav tako pokazale, da je bilo v času neposredno

78 Vahen 1986, 224, sl. 7.
79 Gaspari *et al.* 2007, 113–114.
80 Plestenjak, Hrustel, Podpečan 2006; Plestenjak, Hrustel 2007.
81 Gaspari s sod. 2008; Gaspari, Lux 2009; Gaspari 2010.
82 Rozman 2014.

stratigraphic method of excavation (established after 1999). In relation to this topic, extremely valuable research in terms of results is known for the area of Šumi from 2004–2007,[79] from Barjanska road in 2006,[80] from the area of NUK II in 2008[81] and from Gregorčičeva street 1 in 2013.[82] It was confirmed that the central accumulating canals beneath the decumani were planned according to a unified urban plan. In case of the majority of documented instances, the cloacas were built very soon after the façade walls of insulae were built (fig. 9).

Research after 1999 also indicated that before or during the building of insuale, the removal of sewage was arranged by latrines, similar to that documented at the place of later insula XXXIII,[83] and by the sink-holes at the yard parts of insulae. In the south part of the neighbouring insula XXXIX, there was a short canal documented with a bottom made of tegulae and with built sides. The canal was led from the building to the septic pit at the yard and is referred to the period before or directly after the central canalization system of cloacas and their connections from insulae were built. A similarly built canal at the west part of the insula is contemporary, leading towards the main cardo.[84] According to the discussed connection between cloacas beneath the *cardo maximus*, mentioned by Schmid, a greater connecting canal beneath the main city street in a north-western direction should have existed.

79 Gaspari *et al.* 2007, 113–114.
80 Plestenjak, Hrustel, Podpečan *2006*; Plestenjak, Hrustel 2007.
81 Gaspari *et al.* 2008; Gaspari, Lux 2009; Gaspari 2010.
82 Rozman 2014.
83 Gaspari 2010, 119, fig. 72.
84 Ib., 136.

pred ali med samo gradnjo insul odvajanje odplak urejeno z latrinami, kakšna je dokumentirana na prostoru poznejše insule XXXIII,[83] in s ponikovalnicami na dvoriščnih delih insul. V južnem delu sosednje insule XXXIX je bil dokumentiran kratek kanal z dnom iz tegul in zidanima stranicama, ki je bil speljan iz objekta v septično jamo na dvorišču in sodi v obdobje tik pred dograditvijo centralnega kanalizacijskega sistema kloak in njihovih priključkov iz insul ali neposredno po njej. Okvirno sočasen je tudi podobno grajen kanal v zahodnem delu insule, ki je bil speljan proti glavnemu kardu,[84] kar bi glede na pri Schmidu omenjeno povezavo med kloakama pod kardo maximusom morda lahko potrjevalo obstoj večjega povezovalnega kanala pod glavno mestno ulico v smeri sever–jug.

ZAKLJUČEK

V mestih severne Italije je gradnja kanalizacije sovpadala z generalno urbanistično prenovo mest ob spremembi njihovega pravnega položaja v cezarjanskem obdobju ali v okviru gradnje novoustanovljenih Avgustovih kolonij. Predvsem v primeru mest s pravilnim tlorisom je bila zaradi organiziranja del v logičnem zaporedju gradnja kanalizacije predvidena in vsaj deloma izvedena že v času gradnje ulic.[85]

V skladu s predstavljenimi ugotovitvami je mogoče zgodnji urbanistični razvoj mesta na levem bregu Ljubljanice orisati v naslednjih potezah. Izbiri kraja in trasiranju mestnega

83 Gaspari 2010, 119, sl. 72.
84 Ib., 136.
85 Bassi 1997, 236, op. 47.

CONCLUSION

In the cities of northern Italy, the building of sewage systems coincided with a general urban renovation of the cities, as their legal situation was changing in the period of Julius Caesar or in terms of building of newly established colonies in the period of Emperor Augustus. Especially in case of the cities with a regular ground plan, the work was organized in logical sequences and the building of a sewage system was already foreseen and at least partly realized at the time the streets were built.[85]

Consequently, the early urban development of a city on the left bank of the Ljubljanica River may be described in the following manner. The place was first chosen for arranging the city raster with walls and insulae being bounded by the intervallum and system of cardines and decumani. Then the main city buildings and the buildings of the elite areas along the main streets were built at the end of the reign of Augustus or at the beginning of the reign of Tiberius.[86] To what extent and by which technical means the removal of sewage and the water supply were arranged in the wooden buildings from the period of building is quite unclear. The Roman city of Emona was certainly arranged by prominent public wells for drawing underground water. They were located at the main crossroads and some other crowded areas while smaller wells were located at the private parts of insulae. In the residential areas, sewage was removed by rainwater into latrines or underground streams. Dirt and rainwater from the streets that had no pavements were removed by a provisional system of ditches and drainage near the road edges.

The archaeological data about the building of a sewage system with cloacas are somewhat contradictory. On the one hand, earlier

85 Bassi 1997, 236, n. 47.
86 Gaspari 2010, 78–79; id. 2014, 134–141; Gaspari *et al.* 2014, 146–150, 164–165.

rastra z obzidjem ter insul, ki so jih omejevali intervallum ter mreža kardov in dekumanov, je sledila gradnja glavnih mestnih stavb in pozidava elitnih predelov vzdolž glavnih ulic, nekje v izteku Avgustove vladavine oziroma v prvih letih vlade Tiberija.[86] V kolikšni meri in s katerimi ukrepi je bilo v lesenih objektih iz časa gradnje oziroma v najzgodneje naseljenih insulah z že zgrajenimi obodnimi zidovi in delom notranjih objektov poskrbljeno za odvajanje odplak in oskrbo z vodo, je še precejšnja neznanka, zagotovo pa je bila Emona opremljena z zmogljivimi javnimi vodnjaki za zajem podtalne vode, razmeščenimi ob glavnih križiščih in drugih frekventiranih predelih, ter z manjšimi vodnjaki v zasebnih delih insul. V stanovanjskih predelih so se odplake s pomočjo deževnice odvajale v latrine oz. ponikovalnice, umazanijo in meteorne vode z ulic, ki v tem času še niso imele pločnikov, pa je odvajal provizoričen sistem jarkov in drenaž ob robovih cestišč.

Arheološki podatki o času gradnje kanalizacijske mreže s kloakami so si deloma nasprotujoči. Na eni strani so ugotovitve starejših raziskovalcev o vnaprej predvidenih priključkih v fasadnih zidovih insul in ujemanju površine za gradnjo kloak s prvim cestiščem oziroma hodno površino za gradnjo insul in obzidja, ki se skladajo z logiko infrastrukturnega opremljanja mesta in napeljujejo na sklep, da so bili nekateri elitni predeli mesta že od samega začetka priključeni na centralne zbirne kanale. Del te zgodnje mreže bi bili lahko tudi kanali, speljani pod obzidjem v mestne jarke. Na drugi strani so terenska opažanja zadnjih let opozorila, da je bila vsaj v določenih predelih mesta gradnja kloak izvedena s površine nasutij, ki so se naslanjala na predhodno

[86] Gaspari 2010, 78–79; id. 2014, 134–141; Gaspari *et al.* 2014, 146–150, 164–165.

researchers realized there were the connections built in the façade walls of insulae in advance. The surface for the building of cloacas was adjusted to the road or the walking surface of insulae and walls. This is logical in terms of city infrastructure, and we may conclude that some of the wealthier areas of the city were connected to the central accumulating canals from the early beginning. The sewers flowing beneath the city walls into city ditches could also be part of this early system. However, archaeological observations have recently given evidence that the building of cloacas was executed at the surface of levelling layers in some city areas, leaning on the previously built peripheral walls of insulae. That coincides with the openings in the same walls of the oldest connecting canals, indicating a certain time gap between the building or the completion of building of the central canalization system. It corresponds to the original and partly realized urbanistic plan and the changes or renovation of original plan in case of certain insulae.

The water supply from the public and private wells was completed by building of the aqueduct from the water basin of Slatek, reaching the city at the west city gate from which water was running through the lead pipes to the users. The building of aqueduct system, proven by a palaeographical analysis of a seal at the pipeline beneath the first decumanus north of *porta decumana*, coincides with the filling of public well at cardo H and the building of the earliest documented Roman baths at the part of insula XLVI, south of the main decumanus in the vicinity of *porta pretoria*. It also partly coincides with the proposed dating of the completion of canalization system in the late Tiberian-Claudian period. In addition to Slatek, ensuring drinkable water, water of poorer quality from the water springs in Podrožnik and Tivoli may have also been provided, which was, together with water from the wells and rainwater, used for other purposes.

The aqueduct and canalization system were directly connected what is proven in ensuring a

zgrajene obodne zidove insul, kar sovpada s preboji taistih zidov za najstarejše priključne kanale in nakazuje določen časovni zamik med gradnjo oz. dograditvijo centralnega kanalizacijskega sistema v skladu z izvirnim in do določene mere že uresničenim urbanističnim načrtom ter spremembami ali prenovo izvirne zasnove predhodno sicer poseljenega, a komunalno neopremljenega preostanka insul.

Oskrbo z vodo iz javnih in zasebnih vodnjakov je zaokrožila gradnja vodovoda iz zajetja Slatek, ki je mesto dosegel pri zahodnih vratih, od koder je bila voda po svinčenih ceveh speljana k različnim odjemalcem. Gradnja vodovodnega omrežja, potrjena s paleografsko analizo žiga, sovpada z zasutjem javnega vodnjaka na kardu H in gradnjo najzgodnejšega dokumentiranega kopališča na razširjenem delu insule XLVI južno od glavnega dekumana, v bližini porte pretorie, ter se okvirno ujema s predlagano datacijo dokončanja kanalizacijske mreže v poznotiberijsko-klavdijskem obdobju. Poleg Slatka, ki je zagotavljal pitno vodo, je bila v mesto morda napeljana tudi manj kakovostna voda iz izvirov v Podrožniku in Tivoliju, ki so jo skupaj z vodo iz vodnjakov in deževnico porabljali za ostale namene.

Sklepanje o neposredni povezanosti vodovoda in kanalizacijskega omrežja dodatno utemeljuje potreba po zagotovitvi stalnega izpiranja nesnage, ki bi jo bilo zaradi izjemno majhnega nagiba dna kloak izjemno težko doseči le z uporabo deževnice in vode iz vodnjakov, brez vodovoda pa si je težko predstavljati tudi dobavo stalno tekoče vode kot pogoja za normalno delovanje javnih kopališč.[87]

[87] Sen., *Epist.*, 86, 9; glej npr. Manderscheid 1988, 114–117.

permanent flushing of sewage, which would be very difficult to do only with the use of rainwater and water from the wells because of the extremely slight inclination of the bottom of cloacas. The supply of permanent running water for the normal operation of public baths would be difficult without the use of an aqueduct.[87]

The final arrangement of city infrastructure[88] was rounded up by the entire renovation of certain *insulae*,[89] documented by the completion of building or new building of inner division, by the furnishing of rooms with mortar pavements of good quality (*pavimenta*) built in a technique of *opus signinum* and by the earliest wall painting. The first renovation of the city walls should be referred to the same period.[90] The very frequent coins of emperor Claudius from the roads at decumani F, J and K, the well-preserved as of the same ruler, being placed beneath the corner pebble of mortar base for mortar floor in insula XXXIX,[91] reasonably accurately date the aforementioned investments related to the city into the period towards the middle of the 1st century.

[87] Sen., *Epist.*, 86, 9; see for example Manderscheid 1988, 114–117.

[88] It should be noted that the water supply and communal infrastructure, the hygienic-sanitary standard and quality of life, similar to the Roman, in Ljubljana has been only accomplished between 1880 and 1910 with the building of water supply system and canalization system (Tominšek-Rihtar 1997; Studen 2006), almost one and a half millennia after the organized way of life in Roman city of Emona.

[89] Gaspari 2010, 135–136; id. 2014, 192–199.

[90] Šašel 1968, 550.

[91] Gaspari 2010, fig. 76.

Dokončno ureditev ključne mestne infrastrukture[88] je spremljala celovita prenova nekaterih insul,[89] ki jo dokumentirata dozidava ali novogradnja notranje razdelitve ter oprema dela prostorov s kakovostnimi maltnimi tlaki (*pavimenta*) v tehniki *opus signinum* in najzgodnejšo stensko poslikavo, v isti čas pa naj bi sodila tudi prva obnova obzidja.[90] Zelo pogosti Klavdijevi novci s prvih cestišč po gradnji kloak na dekumanih F, J in K ter dobro ohranjen as istega vladarja, položen pod vogalno oblico podlage za maltni estrih v insuli XXXIX,[91] naštete investicije v mesto precej natančno datirajo v čas proti sredini 1. stoletja.

[88] Ni odveč spomniti, da je z rimsko primerljivo vodooskrbno in komunalno infrastrukturo ter z njima povezana higiensko-sanitarni standard in kakovost življenja Ljubljana pridobila šele z zgraditvijo vodovoda in kanalizacije med letoma 1880 in 1910 (Tominšek - Rihtar 1997; Studen 2006), torej skoraj poldrugo tisočletje po koncu organiziranega življenja v Emoni.

[89] Gaspari 2010, 135–136; id. 2014, 192–199.

[90] Šašel 1968, 550.

[91] Gaspari 2010, sl. 76.

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NIKO GRAFENAUER

Voda

Voda je izmuzljiva
in mnogoobrazna.
Včasih se na široko razliva,
a včasih je neopazna.

V ivnato čipko se skrije
ali kot solza za veke.
A vidna je, ko se razvije
v tekoči trak reke.

Najlepša je, kadar kraljuje
razlita čez celo obzorje.
Takrat se voda imenuje
morje.

Voda kljub starosti sije
venomer mlada.
In nikdar se ne ubije,
četudi pada.

Ker voda ne more biti
neživa.
Saj mora z življenjem pojiti
vse, kar prebiva.

NIKO GRAFENAUER

Water

Water is evasive
as it wears many faces.
It spills broadly at times
or just unnoticeably lies.

It hides within a lace of frost
or behind an eyelid it shivers.
Yet it's visible as it unfolds
into running ribbons of rivers.

It's finest when it reigns
spilt all across the horizon.
Then such water free of chains
is watched over by Poseidon.

Water shines despite its age,
being young it never stops.
It's not killed at any stage
although it often drops.

Water cannot be
but alive and kicking.
For it must fuel with life
everything existing.

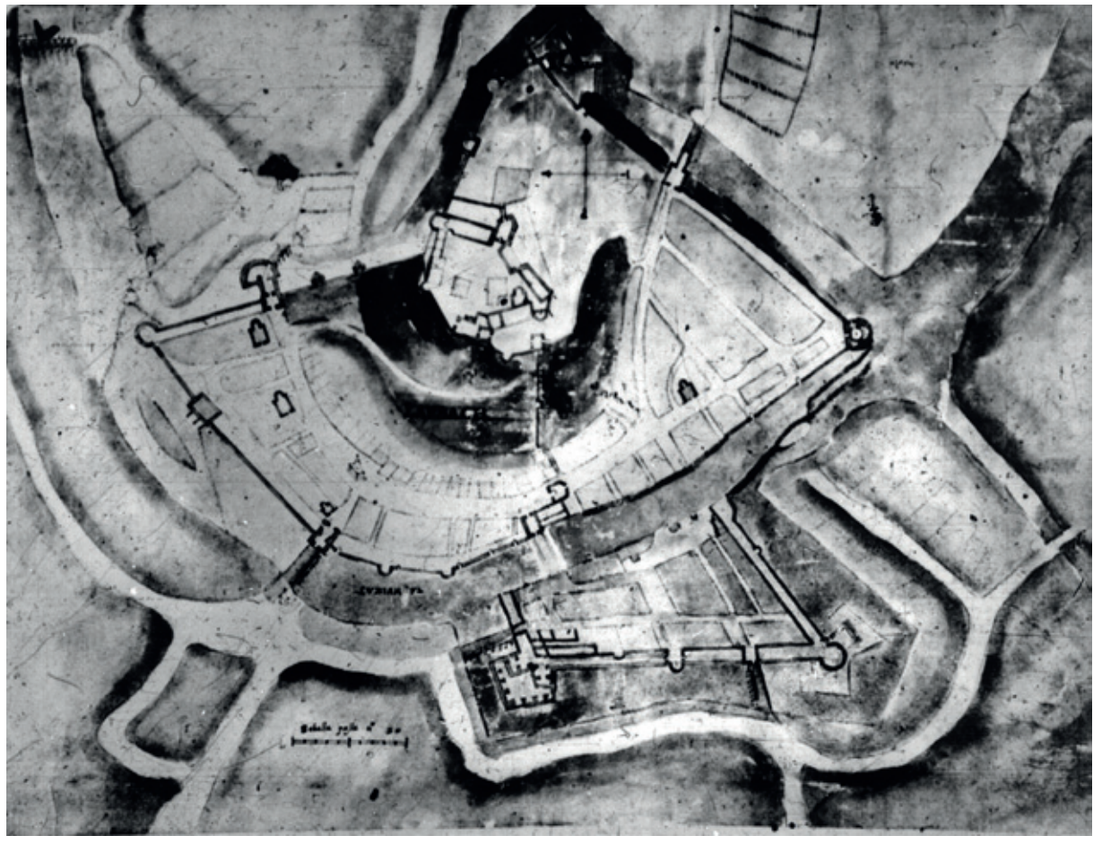
TRANSLATED BY ANDREJ PLETERSKI

KOMUNALNA UREDITEV LJUBLJANE V SREDNJEM VEKU
THE WATER AND SEWAGE SYSTEM OF THE MEDIEVAL TOWN OF LJUBLJANA

Martin Horvat

Srednjeveška Ljubljana se je iz starejših naselbinskih jeder od sredine 11. stoletja rojevala v okviru ljubljanskega zemljiškega gospostva koroških vojvod Spanheimov. Za razliko od Emone je bilo glavno jedro srednjeveške poselitve, podobno kot pred prihodom Rimljanov, ponovno locirano na naravno dobro zavarovanem predelu med desnim bregom Ljubljanice in utrjenim

The medieval town of Ljubljana was developing from the previous settlement cores from the middle of the 11th century onwards, based on the Ljubljana land seigniory of the Spanheims, the Dukes of Carinthia. In comparison to Emona, the main core of medieval settlement was located again to the naturally well-protected area between the right bank of the Ljubljanica River and the fortified castle hill, similarly as before the arrival



Nicolo Angielini, Tloris Ljubljane, 16. stoletje (Staatsarchiv Dresden - varianta A)

Nicolo Angielini, Plan of Ljubljana, 16th century (Staatsarchiv Dresden – variant A)

Vodni zbiralnik med arheološkimi raziskavami, Mačkova ulica, 13. stoletje (MGML, foto J. Hobič)

Water reservoir during archaeological excavations, Mačkova Street, 13th century (MGML, photo J. Hobič)

grajskim gričem. Razen peščice visokega plemstva je bilo prebivalstvo skoraj izključno slovenskega izvora. Na podlagi rezultatov arheoloških raziskav lahko sklepamo, da začetki urbanizacije prostora, na katerem se je razvijala srednjeveška Ljubljana, sodijo v 12. stoletje. Raziskave na današnji Stritarjevi, Mačkovi in Krojaški ulici kažejo na naselje lesenih stavb z vrtički in ulicami.

Komunalna ureditev Ljubljane v srednjem veku je slabo znana. Intenzivna izraba ulic in komunskih poti je velikokrat zabrisala ostanke starejše ureditve oskrbe z vodo in odvajanja odplak. Med redka odkritja, povezana z oskrbo prebivalcev srednjeveške Ljubljane z vodo, moramo uvrstiti vodni zbiralnik, ki je bil odkrit na križišču Mačkove in Medarske ulice. Datiramo ga lahko v 13. stoletje, zgrajen pa je bil iz zloženega kamenja brez veziva. Ker ne seka vodonosnih plasti niti ne sega do podtalnice (globok je

of Romans. The inhabitants were almost exclusively of Slovene origin with the exception of the high nobility. Based on the results of archaeological research, it may be concluded that the beginnings of urbanisation of the area may be dated to the 12th century. The research at the present Stritarjeva, Mačkova and Krojaška streets reveal that there was the settlement of wooden buildings with small gardens and streets.

The water and sewage system of the medieval town of Ljubljana in the Middle Ages is not well-known. The intensive use of streets and the water and sewage system in many instances blurred the remains of older systems. Among the rare discoveries comprising the water supply of the inhabitants, there is a water reservoir discovered at the crossroads of Mačkova and

dobra dva metra), se je očitno napajal zgolj z atmosfersko vodo. Podoben vodni zbiralnik je bil odkrit tudi pri arheoloških raziskavah Turjaške palače na Gosposki ulici; ta je z globino dobrih treh metrov že presekal nekaj slojev, po katerih se pretaka tako imenovana »viseča« podtalnica.

Na podlagi skromnih podatkov o oskrbi z vodo in o komunalni ureditvi srednjeveške Ljubljane lahko sklepamo, da je bila vse do 16. stoletja Ljubljanica še vedno glavni vir oskrbe z vodo. Redki javni vodni zbiralniki so imeli zaradi komunalnih odplak zagotovo zelo slabo kakovost vode.

V 16. stoletju se je podoba mesta spremenila. Zrasle so nove zidane hiše z vso potrebno infrastrukturo. V reko Ljubljanico so bili speljani kanali za odpadne vode, ulice in dvorišča so tlakovali z rečnimi oblicami. Ostanki komunalnega kanala in tlakovanega dvorišča s komunsko potjo, odkriti pri

Vodni zbiralnik, Mačkova ulica, 13. stoletje (MGML, foto J. Hobič)

Water reservoir, Mačkova Street, 13th century (MGML, photo J. Hobič)

Medarska streets. It may be dated to the 13th century, and it was built of interlocking stones without mortar. Without intersecting watertight layers and without being extended to the level of groundwater (the depth is around two metres), it was obviously filled up only by naturally accumulating water. A similar water reservoir was also discovered by archaeological research on Auersperg Mansion at Gosposka Street, which, with the depth of around three metres, had already intersected some layers where the so-called “hanging” groundwater flows.

Based on rare data about the water supply and also about the sewage handling of the medieval town of Ljubljana, we may conclude that the Ljubljanica River remained the main source of water until the 16th century. The few public water reservoirs contained water of very poor quality because of sewage.

The appearance of the town changed in the 16th century. New houses were built of stone or brick with all necessary infrastructure. Canals for wastewater flowed into the Ljubljanica River while the streets and yards were paved with river pebbles. The remains of a sewage canal and paved yard public access, discovered by the archaeological research of Auersperg Mansion, give evidence about the developed residential culture of the citizens of Ljubljana in this period. The sewage canal is interesting because it probably flowed into a Roman cloaca.

In addition to the very beginning of a city water supply system, to which a few houses and city wells at Stari trg and perhaps at Mestni trg in the 16th century were connected, the main sources of water supply in the 17th century remained water reservoirs and wells. It is not surprising, therefore, that the wells were often a component element of new building projects. At this point,

arheoloških raziskavah Turjaške palače, pričajo o visoki bivalni kulturi ljubljanskih meščanov v tem času. Kanal za odplake je zanimiv tudi zato, ker je bil verjetno speljan v rimsko kloako.

Poleg prvih zametkov mestnega vodovoda, s katerim so v 16. stoletju poleg redkih hiš oskrbovali predvsem javni vodnjak na Starem in verjetno tudi Mestnem trgu, so glavno težo oskrbe z vodo tudi v 17. stoletju še vedno nosili vodni zbiralniki in vodnjaki. Tako ne preseneča, da so bili vodnjaki pogosto sestavni del novih gradbenih projektov. Na tem mestu moramo omeniti vodnjak, ki ga lahko povežemo z ureditvijo dvoriščne ploščadi pri gradnji Turjaške palače med letoma 1654 in 1659. Ocenjujemo, da ga je z vodo napajala podtalnica, ki je v času gradnje palače ležala približno 20 m pod nivojem dvoriščne ploščadi. V 18. stoletju so v vodnjak postavili leseno cev (po dolžini prevrtana in skrbno sestavljena debla) ter ga zasuli. Vse do leta 1928, ko so tako predelan vodnjak (“šterno”) dokončno opustili, so torej na površino črpali vodo po leseni cevi, ki je še vedno ohranjena in vidna sredi kamnitega obroča.

Sodobni gradbeni posegi so marsikje spremenili podzemne vodne tokove in prebili vodonosne sloje. S tem so po Stari Ljubljani presahnili tudi mnogi vodni viri. Osuševanje zemeljskih plasti pa je povzročilo sesedanje nekaterih predelov Ljubljane in hude poškodbe na stavbni dediščini.

VODNI ZBIRALNIK NA LJUBLJANSKEM GRADU

Po načinu zbiranja vode sodi vodnjak v poseben tip vodnega zbiralnika. Gre pravzaprav za specifično vrsto cisterne, ki je sestavljena iz treh vertikalnih obročev.

we have to mention a well that may be linked to the arrangement of the courtyard of Auersperg Mansion, built between 1654 and 1659. We presume that the well was filled with groundwater, being located approximately 20m under the ground level, as the mansion was built. In the 18th century, a wooden pipe was placed into the well (perforated and carefully united trunks) and then it was filled up with soil. Until 1928, when the reshaped well was finally abandoned, water was pumped to the surface through the wooden pipe, which remains preserved and visible in the middle of a stone hoop.

Modern building interventions changed the underground water currents in many places and broke through watertight layers. Consequently, many water sources in Stara Ljubljana dried up. The draining of soil layers caused some areas of the city of Ljubljana to sink; buildings were also seriously damaged.

WATER RESERVOIR AT LJUBLJANA CASTLE

A well is considered as a particular type of water reservoir, according to its way of collecting water. It is a specific kind of a cistern, composed of three vertical hoops. The outer and the thickest one functions as a filter (rough material), while the intermediate hoop is a part of the basic cylinder. In comparison to the built, circularly shaped inner hoop, this one is made of interlocking stones without mortar. A cylindrically shaped trench, dug into the ground, is covered with clay, which prevented the trickling of water into its marl base. The level of water was regulated by a main sewer, dug up before the building of castle complex in modern times. The filter cistern is actually a reshaped medieval water reservoir of which, unfortunately, only its main sewer is preserved. Because of the building of new castle complex at the beginning of the

Vodni zbiralnik, Ljubljanski grad, 16. stoletje (MGML, foto B. Zakeršnik)

Water reservoir, Ljubljana Castle, 16th century (MGML, photo B. Zakeršnik)

Zunanji, najdebelejši, ima funkcijo filtra (grobo nasutje), vmesni obroč pa že tvori del osnovnega cilindra. Za razliko od krožno oblikovanega zidanega notranjega obroča je ta sestavljen iz suhozidno zloženega kamenja. Cilindrično oblikovan vkop v raščeni teren je obložen z ilovico, ki je preprečevala pronicanje vode v lapornato osnovo. Nivo vode je uravnaval odtočni kanal, ki je bil izkopan pred gradnjo novoveškega grajskega kompleksa. Filtrska cisterna je pravzaprav predelan srednjeveški vodni zbiralnik, od katerega se je žal ohranil le odtočni kanal. Gradnja novega grajskega kompleksa je v začetku 16. stoletja zahtevala predelavo starega zbiralnika v večjo filtrsko cisterno . Cisterna je bila od dvorišča ločena in zavarovana z zidano ograjo ali celo posebnim objektom.

»NEKATERI SO MNENJA, DA JE V STARI LJUBLJANI, OB KRIŽIŠČU STAREGA TRGA, GORNJEGA TRGA IN NEKDANJE IZPRED CERKVE SV. JAKOBA TJA VODEČE ŠENTJAKOBSKE ULICE, STALA TUDI NAJSTAREJŠA LJUBLJANSKA MESTNA HIŠA, PRED NJO NA MALEM TRGU PA JE BIL VODNJAK IN JE RASLA LIPA. GLEDE VODNJAKA IN LIPE, KI NAJ BI PO VALVASORJU IN VSEH, KI SO GA IZPISOVALI, STALA NEKDAJ NA TEM MESTU LJUBLJANE, JE PA MOGOČE, DA STA STALA TAMKAJ ŽE V STAREJŠIH ČASIH, KAJTI ŠKOF HREN OMENJA LETA 1622 POSTAJO OB PROCESIJI NA TELOVO, KI DA JE BILA PRI LIPI OB VODNJAKU.«

M. KOS, SREDNJEVEŠKA LJUBLJANA. TOPOGRAFSKI OPIS MESTA IN OKOLICE (1955)

16th century, the old reservoir was reshaped into a bigger filter cistern. The cistern was separated from the yard and protected by a fence or a special building.

“SOME PEOPLE BELIEVE, THAT IN THE OLD PART OF THE TOWN, STARA LJUBLJANA, THE OLDEST TOWN HALL WAS STANDING, WHILE IN FRONT OF IT THERE WAS A WELL AND A LINDEN-TREE GROWING IN THE SMALL SQUARE. THE TOWN HALL WAS LOCATED AT THE CROSSROADS OF STARI TRG, GORNJI TRG, AND FORMER ŠENTJAKOBSKA STREET IN FRONT OF THE CHURCH OF ST. JAKOB. ACCORDING TO VALVASOR AND SOME OTHER WRITERS REPORTING ABOUT THE WELL AND A LINDEN TREE, THEY WERE BOTH LOCATED IN THIS PART OF THE TOWN OF LJUBLJANA. IT IS ALSO POSSIBLE THAT THEY WERE STANDING THERE EARLIER. IN 1622, A BISHOP NAMED HREN MENTIONED A STATION BEING ERECTED FOR THE PROCESSION OF A FEAST OF CORPUS CHRISTI, WHICH WAS LOCATED BY THE LINDEN TREE CLOSE TO THE WELL.”

M. KOS, SREDNJEVEŠKA LJUBLJANA. TOPOGRAFSKI OPIS MESTA IN OKOLICE (1955)

MILAN JESIH

***

Večer je vlažen, sluzasti oblaki
si čohajo trebuhe ob planine;
na vrtu krčme pojejo južnjaki
neznosno lepe, temne sevdalinke.

Trenutek je, ko bi kar padal, padal,
pozabljal se, znal biti dež težak,
da bi v strnišča mrtva se zabadal
in na gosto šrafiral topi zrak,

da zginilo bi vse, kar je vrh zemlje,
v vodeni preji mira predzačetka,
in znova se začelo iz temeljev –

najprej sam nič, potem meglica redka,
iz mleka sneg – in v eni sami piki
svetloba, zbrana v silnosti veliki.

MILAN JESIH

***

Damp is the evening, and the slimy clouds
are rubbing their bellies on the alp;
outside the inn, some migrants from the south
are singing sevdah songs, transfixing, dark.

At such a time I want to fall, to fall,
forget myself, to be the rain, to tear
and stab the stubbled fields, alive no more,
to draw thick hatches in the blunted air

till all things vanished from the face of earth
in watery yarns of pre-beginning sleep
and from foundations sprang another birth –

at first mere nothing, then a mist should seep,
and snow from milk – and in a dot, all light
condense together in majestic might.

TRANSLATED BY NADA GROŠELJ

VELIKO ČIŠČENJE LJUBLJANE
THE GREAT PURIFICATION OF LJUBLJANA

Janez Polajnar

Med morda največje samoumevnosti sodobnega časa gotovo sodijo tekoča pitna voda v stanovanju in seveda odtoki, kamor voda ponikne, ko končamo pomivanje, umivanje, kuhanje itd. Življenja si danes preprosto ne moremo zamisliti brez urejene kuhinje s koritom in kopalnice s kadjo, prho in »vodnim« straniščem. Zgraditev sodobnih vodovodnih in kanalizacijskih sistemov zato gotovo pomeni enega večjih prelomov v socialni in kulturni zgodovini vsakdanjega življenja. Nova infrastruktura je namreč omogočila uveljavitev povsem novih bivalnih in higienskih standardov.

Zgraditev je bila na začetku neločljivo povezana z naraščanjem mest in procesom urbanizacije; podeželje je v tem oziru močno zaostajalo. Da se je »generalno čiščenje« mest sploh začelo, se je moral najprej spremeniti odnos do vode in posledično do čistega in umazanega, če uporabimo kar naslov knjige Georgesa Vigarella. Vse od epidemij kuge v novem veku je med zdravniki in teoretiki namreč vztrajalo prepričanje o nevarnostih vode in miazmah, ki lahko skozi pore prodrejo v telo in ga okužijo. Razmišljanja so se spremenila konec 18. stoletja, ko je meščanstvo »odkrilo« krepčilno vodo. Telo je bilo treba okrepiti, zato se je bilo treba umivati z mrzlo vodo. Kakor piše Vigarello, je »ta dinamika vplivala na druga področja, predvsem v mestih, na njihovo arhitekturo, komunikacije in vodne tokove. Skrb za telo je zahtevala popolno prestrukturiranje mest pod zemljo in nad njo. Voda je bila gotovo eden najpomembnejših dejavnikov v urbanizacijskih posegih v 19. stoletju.

Running water in our homes is taken for granted nowadays, as are the drains into which water disappears underground as soon as we finish washing dishes, clothes, and so on. We simply cannot imagine our life without a kitchen with a sink or a bathroom with a bathtub, a shower and a toilet. The development of modern water and sewer systems is thus clearly considered one of greater changes in the social and cultural history of daily life. The new infrastructure has enabled putting into effect completely new dwelling and hygienic standards.

At its beginning, this development was inseparably linked with the rise of cities and the process of urbanisation; in this aspect, the countryside lagged behind. The relation to water had to change, as Georges Vigarello writes in his book. In the time of the plague, doctors and theorists were certain about the dangers of water and miasmas that could break through the pores of the body and infect it. The reflections changed at the end of the 18th century as the middle class 'discovered' healing water. The body needed to be strengthened; therefore, should be washed with cold water. This is a private field, but one may stress, as Vigarello writes that 'these dynamics influenced other fields, especially in the cities; their architecture, communications and water currents. Taking care of a body required a complete reorganisation of cities under the ground level and above it. Water was undoubtedly one of the most important factors in terms of urbanisation interventions in the 19th century. The supply and 'breathing' of great agglomerations were completely changed.'[1]

[1] Vigarello 1999.

Popolnoma je spremenila oskrbo in ‹dihanje› velikih aglomeracij.«[1]

K spremembam so odločilno prispevali industrijska revolucija, skokovita rast mestnega prebivalstva in napredek v znanosti konec 18. in v 19. stoletju. Težave mest pri oskrbi s čisto pitno vodo in pri odvajanju odplak so postajale vse manj obvladljive. Premik k asanaciji mestnega okolja pa je zagon dobil po prihodu epidemije kolere, nove epidemične bolezni, ki so jo zaradi velikega smrtnega davka imenovali kuga 19. stoletja. Povezava bolezni s katastrofalnimi higienskimi razmerami v mestih ter nekoliko kasnejše odkritje mikrobov in njihovega pomena za širjenje epidemičnih bolezni sta povzročila velike spremembe v politiki javnega zdravstva.

Kranjsko in Ljubljano je v 19. stoletju kolera »obiskala« kar sedemkrat, a do zadnje epidemije Ljubljana v komunalnem oziru skoraj ni videla večjih sprememb v infrastrukturi. Nekaj pobud je bilo, a kakor bomo videli, sta šele predzadnji izbruh kolere leta 1886 in potres leta 1895 pomenila tisto prelomnico, po kateri je Ljubljana dobila drugačno podobo.

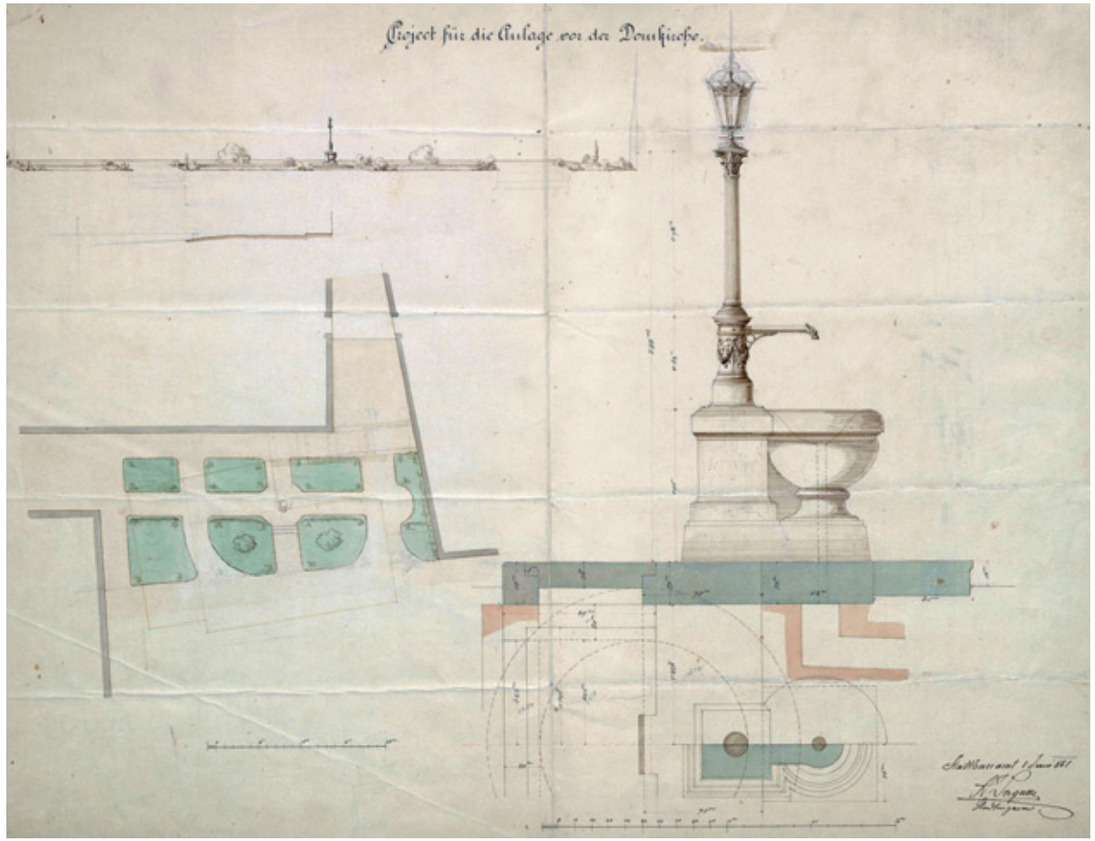
Malokdo danes torej pomisli, da so bila mesta pred zgraditvijo velikih podzemnih omrežij videti zelo drugače in so tudi zelo drugače »dišala«. Nekoliko romantično sliko mesta v preteklosti si še lahko predstavljamo, ko pomislimo na vodnjake na mestnih trgih in ženske, ki se zbirajo ob njih (naporno prenašanje vode je bilo večinoma žensko opravilo). Manj nostalgije po starih časih zbujajo netlakovane ulice, ki so se ob večjem deževju spremenile v blatne »njive«, kot zadnjo pa naj omenimo kanalizacijo. Kanali so bili slabo narejeni in premalo nagnjeni,

[1] Vigarello 1999.

The Industrial Revolution, rapid urbanisation and scientific development from the end of the 18th century onwards brought about great changes. The problems of supplying cities with clean drinking water and handling sewage were becoming less and less controlled. The movement for the improvement of sanitary conditions of the urban environment began after the arrival of epidemics of cholera, a new disease called 'the plague of 19th century' due its death toll. The connection of disease to the catastrophic hygienic circumstances in the cities, followed by the discovery of microbes and their role in the spread of epidemic diseases consequently caused great changes in the policies of public health service.

Carniola and Ljubljana were threatened by cholera seven times in the 19th century, but it was not until the final epidemic that Ljubljana received significant changes in the municipal infrastructure as a matter of policy. There were some initiatives but not earlier than by the last epidemic of cholera in 1886 and the earthquake of 1895 were there meaningful changes in Ljubljana's sanitation.

Few people consider that the cities were completely different, especially concerning odour, before the building of underground sewer systems. One may imagine a slightly romantic image of a city in the past, as we think of the wells at city squares and of the women gathering near them (the tiresome carrying of water was mainly women's work). Less nostalgia about the old times is given to the unpaved streets that were transformed into muddy tracks after rain and by the sewer system. The sewers were made poorly and with too little inclination, so the sewage accumulated and stank badly. Among more common solutions, there were the so-called 'little commune streets', which one may still see in Ljubljana between some houses at Breg and Stari trg. These were narrow little streets between the house's external walls from which a ditch led to the road. The toilet and other kinds of sewage very slowly flowed together into this ditch through



Načrt za postavitev vodnjaka pred stolnico v Ljubljani. Mestni gradbeni urad, 1881 (Zgodovinski arhiv Ljubljana)

Plans for a fountain in front of the Ljubljana cathedral. City Building Office, 1881 (Historical Archives Ljubljana)

tako da so se odplake kopičile in povzročale nemogoč smrad. Med bolj pogoste »rešitve« so spadale t. i. komunske uličice, ki jih je mogoče v Ljubljani med nekaterimi hišami na Bregu in Starem trgu še vedno videti; danes sicer brez izvornega namena. To so bile tesne uličice med mejnimi zidovi hiš, iz koder je proti cesti vodil jarek. V ta jarek se je prek visečih lesenih cevi stekala straniščna in druga nesnaga, ki pa je le slabo odtekala, kar je povzročalo, da so, kakor je zabeleženo v spominski knjižici Ljubljana po potresu iz leta 1911, »zastajajoče in z gnilobnimi tvarinami nasičene tekočine okuževale ozračje in močile ter razjedale zidovje«.[2]

the hanging wooden pipes. The result was that 'stagnant and decayed materials' saturated liquids infected the air, moistened and corroded walls'.[2]

In the second half of the 19th century, people in the cities across Europe realised that the regulation of communal infrastructure was a vital need, but everything depended on finances; because such projects generally meant a great investment on the part of a city. The establishment of modern hygienic principles, which were

[2] Govekar, Zarnik 1911, 93.

[2] Govekar, Zarnik 1911, 93.

V 2. polovici 19. stoletja so v mestih po vsej Evropi ugotavljali, da je ureditev komunalne infrastrukture nujno potrebna, a kot vedno je bilo tukaj še vprašanje denarja, saj so tovrstni projekti navadno zahtevali velik finančni vložek mesta. Uvajanje modernih načel higiene, ki so jo vedno bolj zagovarjali naravoslovci in higieniki, je bilo zato različno uspešno in vezano prav na finančne zmožnosti mesta, da izpelje projekt, ter seveda odvisno od zavzetosti in pobud lokalnih veljakov za izvedbo tovrstnih projektov.[3] Prav zaradi tega je navadno prednost dobila zgraditev vodovoda. Razlogov je bilo več, po spoznanju, da se prek onesnažene vode v vodnjakih širijo bolezni, je namreč postavitev vodovoda zagotovila takojšnji učinek. Čista voda pomeni zdravje. Povsem ekonomsko gledano je bilo priključek na »bistro studenčnico« bistveno laže prodati kakor pa priključek na odvodni kanal.[4]

Zato pojdimo najprej k vodovodu.

LJUBLJANSKA VODA

Pred uvedbo vodovoda so za preskrbo s pitno vodo v Ljubljani skrbeli vodnjaki, ki pa jih je z naraščanjem mesta vedno bolj primanjkovalo. Oskrba Ljubljane s pitno vodo je iz leta v leto postajala večji problem. Prav tako so postajale vse pogostejše pritožbe občanov nad pomanjkanjem pitne vode. V Kmetijskih in rokodelskih novicah so zato npr. z veseljem objavili novico, »da se na Št. Jakobskem trgu v Ljubljani koplje nov vodnjak (štirna)«. Nasploh so pohvalili delo župana Mihaela Ambroža, a so ga hkrati tudi že opomnili, da je vodnjak potreben

[3] Studen 1995, 37.

[4] Remec 2014.

increasingly supported by natural scientists and hygienists was, therefore, more or less successful and linked to the financial abilities of a city to carry out the project and to the readiness and initiative of local leaders to realise such projects.[3] Consequently, the construction of water supply systems had the advantage of being realised first. The reasons were numerous; as soon as the people realised that polluted water in wells caused diseases, the construction of a water supply system offered an immediate effect. Clean water brought health. In economic terms, the connection to fresh spring water was much easily sold than the connection to drain canal.[4]

LJUBLJANA WATER

Before the establishment of a water supply system, wells were used as a way of getting drinking water in Ljubljana but there was soon a lack of wells due to the expansion of the city. Getting drinking water in Ljubljana was becoming more difficult year by year. The complaints of the city's population due to the lack of drinking water were also becoming more common. In the *Kmetijske in rokodelske novice* newspaper, it was, therefore, announced with great fanfare '[…] that at St. Jakob's square in Ljubljana a new well is being dug' ('stirna' in Slovene). The work of Mihael Ambrož was praised, but there was addition commentary that a well is also needed at '[…] spodnje Poljane, which not possessing any well, except that of an agricultural society in its garden.'[5] Mihael Ambrož had already thought of a more modern solution to the problem of drinking water. During his time as mayor, they first began to consider the building of the city's water supply system but '[…] Mayor Ambrož did not manage

[3] Studen 1995, 37.

[4] Remec 2014.

[5] *Kmetijske in rokodelske novice*, 31.7.1861.

V GLAVNEM MESTU MONARHIJE, NA DUNAJU, SO VODOVOD ODPRLI LETA 1873. NA SLOVENSKEM SO SE KOT PRVI S SODOBNIM VODOVODOM LAHKO POHVALILI V KAMNIKU LETA 1888. SLEDILI SO LJUBLJANA LETA 1890, MARIBOR LETA 1902, NOVO MESTO LETA 1903, CELJE LETA 1908 IN KRANJ LETA 1911.

tudi na »spodnjih Poljanah, ktere nimajo nobenega vodnjaka, razun tistega, ki ga ima kmetijska družba na svojem vertu«.[5] Mihael Ambrož je glede reševanja problema pitne vode sicer že razmišljal o sodobnejši rešitvi. V času njegovega županovanja so namreč v Ljubljani prvič začeli razmišljati o zgraditvi mestnega vodovoda, vendar »županu Ambrožu ni uspelo uresničiti tega načrta zaradi šibkih mestnih financ in neregulirane Ljubljanice«.[6] Do uresničitve je tako prišlo, kot bomo videli, šele skoraj 30 let kasneje.

Vodnjaki niso bili problematični samo zaradi svojega števila, temveč vedno bolj zaradi onesnažene vode v njih, kar je bilo posledica onesnaženja tal, in ne vzdrževanja vodnjakov. Leta 1871 je mesto zato sprejelo »red o vodnjakih«. Ta je določal sestavo in naloge komisije za nadzor nad vodnjaki, dalje je določal preiskavo, zapisnik in stroške ter predvideval tudi kaznovanje. Občinski svet je s tem ustanovil komisijo, ki je pregledala vodo v javnih in nekaterih zasebnih vodnjakih ter ugotovila, da je voda v vodnjakih slaba. Stanje se je v naslednjih letih še slabšalo. Leta 1875 je Slovenski narod že očital mestnemu zastopu, da ni storil ničesar za ureditev oskrbe z

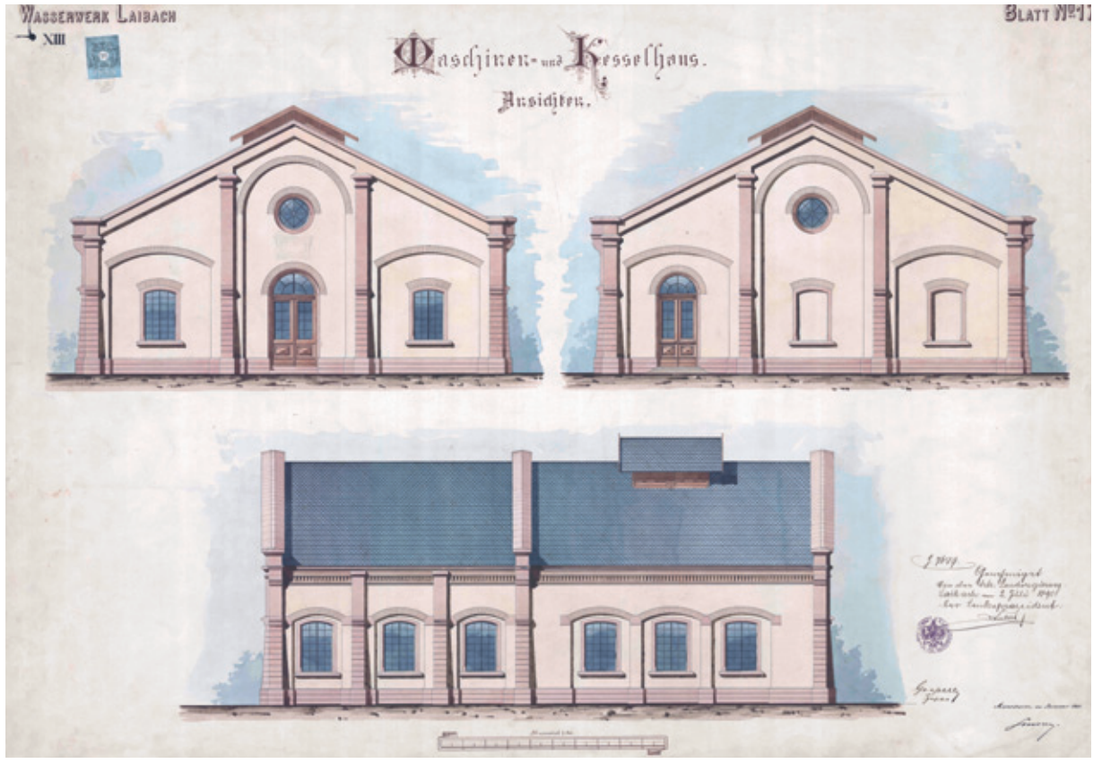
[5] Kmetijske in rokodelske novice, 31. 7. 1861.
[6] Drnovšek 1984, 219.

IN THE CAPITAL OF THE AUSTRO-HUNGARIAN EMPIRE, VIENNA, THE WATER SUPPLY SYSTEM WAS OPENED IN 1873. IN SLOVENIA, THE FIRST MODERN WATER SUPPLY SYSTEM WAS ESTABLISHED IN KAMNIK IN 1888. THE CITY OF LJUBLJANA FOLLOWED IN 1890, MARIBOR IN 1902, NOVO MESTO IN 1903, CELJE IN 1908 AND KRANJ IN 1911.

to realise this plan due to the poor city's financial sources and non-regulated Ljubljanica River.'[6] It was only realised 30 years later.

The wells were not only problematic due to their number but also because of their increasingly polluted water, which was a consequence of ground pollution and not well maintenance. Therefore, in 1871, the city passed legislation defining the structure and duties of a commission for the supervision of wells, the investigation, minutes, expenses and even sanctions for misuse. The city council established by that a commission that examined the water in public and some private wells, concluding that the well water was of poor quality. The situation worsened in the following years. In 1875, the *Slovenski narod* newspaper criticised the city council for not doing anything about the regulation of the water supply. The wells had become useless, according to the newspaper. 'Who does not think in recent time about water from the numerous Ljubljana wells tasting like liquid manure?'[7] In 1876, as a solution the commission advised the building of two new wells, at Marija and Krizevniski squares but neither was realised. It is noteworthy that a water supply system had been a solution a few years previously (1873) in Vienna but was not considered as a possible solution for Ljubljana.[8]

[6] Drnovšek 1984, 219.
[7] *Slovenski narod*, 25.6.1875.
[8] Sonc 1934, 310.



Pogled na strojnico in kotlovnico od zunaj. Projektni načrt ljubljanskega vodovoda, Oscar Smreker, 1888 (Zgodovinski arhiv Ljubljana)

Outside view of the plant and boiler room. Project design of Ljubljana water distribution system, Oscar Smreker, 1888 (Historical Archives Ljubljana)

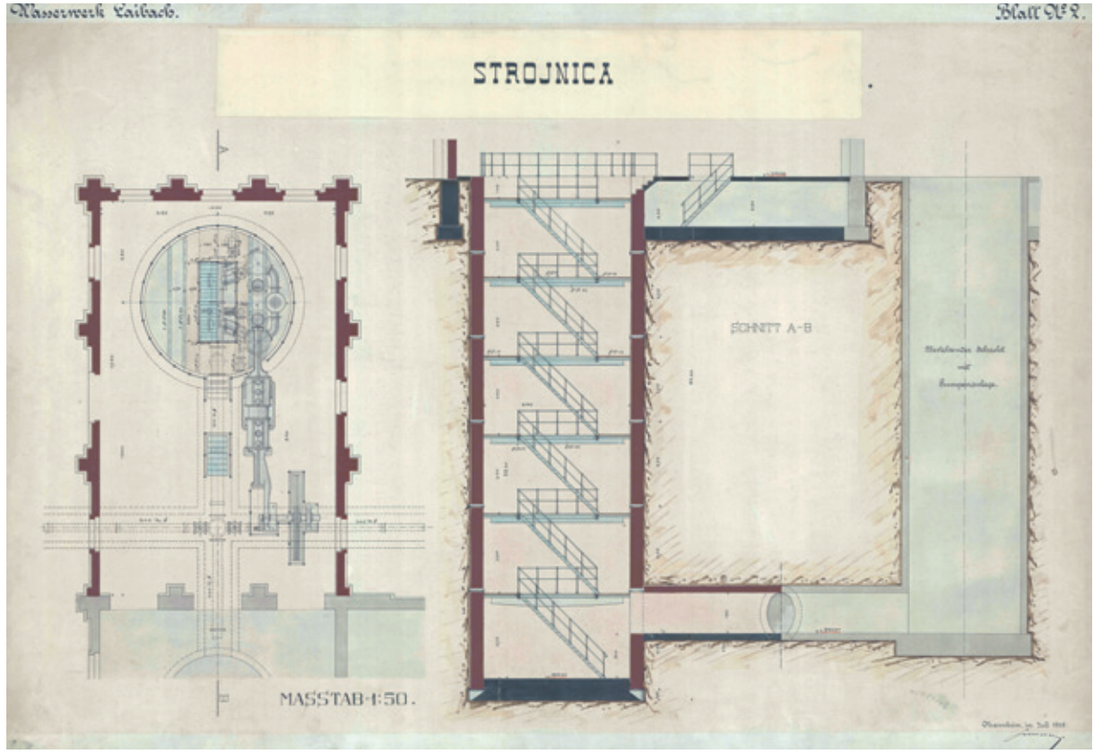
vodo. Vodnjaki so postali po poročanju Slovenskega naroda neuporabni. »Komu tu ne pride na misel v poslednjej dobi bolj množeči se gnojnični okus vode iz mnogih ljubljanskih vodnjakov?«[7] Leta 1876 je omenjena komisija kot rešitev predlagala zgraditev dveh novih vodnjakov – na Marijinem in Križevniškem trgu – vendar do nje ni prišlo. Zanimivo pa je, da vodovoda kot aktualne rešitve, ki jo je nekaj let prej (1873) dobil Dunaj, niso videli kot možno rešitev za Ljubljano.[8]

Razprave o reševanju problema pitne vode so se v prid vodovoda začele nagibati leta 1881. Na pot k uresničitvi projekta zgraditve vodovoda pa je Ljubljana dokončno

[7] Slovenski narod, 25. 6. 1875.
[8] Sonc 1934, 310.

Discussions about the solving of a problem about drinking water and the establishment of a water supply system occurred in 1881. The water supply system project in Ljubljana was finally set at the end of 1882, as, following the proposal of city councillor Ivan Hribar at the municipal council, a water section (governing body) was elected. By this act, the city councillors followed the new proposals of a permanent Health Council, established in 1879, which recommended the municipal council to 'focus on the installation of general water supply system'[9] instead of looking for locations of new wells.

[9] Tominšek-Rihtar 1997, 27.



Načrt strojnice v vodarni v Klečah pri Ljubljani. Projektni načrt ljubljanskega vodovoda, Oscar Smreker, 1888 (Zgodovinski arhiv Ljubljana)

Sketch of the plant water facility in Kleče near Ljubljana. Project design of Ljubljana water distribution system, Oscar Smreker, 1888 (Historical Archives Ljubljana)

stopila konec leta 1882, ko je bil na seji občinskega sveta na predlog (takrat še) mestnega svetnika Ivana Hribarja izvoljen vodovodni odsek. Mestni svetniki so s tem dejanjem sledili novim priporočilom stalnega zdravstvenega sveta, ustanovljenega leta 1879, ki je mestnemu svetu namesto iskanja lokacij za nove vodnjake priporočal, »naj se začne ukvarjati z mislijo o napeljavi splošnega vodovoda«.[9]

Hribar se je moral najprej soočiti z opozicijo v lastni komisiji. Kakor je zapisal v spominih, ga je najbolj presenetilo, da sta bila med njegovimi nasprotniki tudi zdravnika dr. Karel Bleiweis in dr. Viljem Kovač. Še posebej ga je, kakor piše, presenetil

Hribar first had to face the opposition in his own commission. As he wrote in his memoir, he was greatly surprised that there were also doctors among them, such as Dr Karel Bleiweis and Dr Viljem Kovač. He was especially surprised at the latter.[10] A decade previously, in 1875, Kovač, as the city doctor in his writing about the sanitary circumstances in the provincial capital had warned especially about the untenable circumstances being the reason for rising deaths, i.e. from improperly built cesspits and sewer system outflows to inappropriate wells for drinking water and public baths.[11] They both agreed

9 Tominšek – Rihtar 1997, 27.

10 Hribar 1928, 102.

11 Studen 1995, 48.

slednji.[10] Kovač je namreč slabih 10 let prej, leta 1875, kot mestni fizik oz. zdravnik v pisanju o sanitarnih razmerah v deželnem glavnem mestu opozarjal prav na nevzdržne razmere, ki so bile krive tudi za naraščajočo smrtnost – od neprimerno grajenih greznic in kanalizacijskih odtokov do neustreznih vodnjakov za pitno vodo in javnih kopališč.[11] Oba sta zagovarjala stališče, da ima Ljubljana dovolj dobro podtalno vodo in da je treba zgolj izkopati nekaj vodnjakov. Kot predsednik odseka se je Hribar nenadejane opozicije hitro rešil. Predlog o začetku predpriprav za projekt zgraditve vodovoda je dal na glasovanje na naslednji seji, kamor dr. Kovača ni povabil, dr. Karel Bleiweis pa se je »slučajno zakasnil«, in sklep o začetku predpriprav je bil sprejet.[12] Hribarjeve načrte je po drugi strani močno podpiralo Poročilo o kemijskih raziskavah pitnih voda iz leta 1886. Profesor Baltazar Knapič, avtor poročila, je poudaril tudi bistveno izboljšanje zdravstvenih razmer v mestih, ki so poskrbela za zgraditev vodovoda.[13]

Da bi delo pospešil in za projekt priboril široko javno podporo, se je predsednik vodovodnega odseka Ivan Hribar že leta 1884 odločil, da bodo naslednje seje javne. V dnevnem časopisju so meščani lahko prebrali naslednje: »Da bode mogoče vsacemu someščanu poučiti o tem, kako daleč so dospele predpriprave za vodovod, bodo odslej vse seje vodovodnega odseka javne ter se bodo po vseh v Ljubljani izhajajočih dnevnikih naznanjale vsaj po 24 ur prej.«[14] Takšno odločitev je Hribar verjetno sprejel tudi zaradi okrožnice iz istega leta, prek katere je bil mestni svet seznanjen s podatkom, da 47 % prebivalcev še vedno

that Ljubljana had groundwater of good quality and that it is only necessary to dig a few wells. As the president of that section, Hribar quickly eliminated the opposition. The proposal about the beginning of pre-preparations for the project about water supply system was put into a process of voting at the next meeting, to which Dr Kovač was not invited, while Dr Bleiweis 'missed the event accidentally' and the agreement about the beginning of pre-preparations was accepted.[12] However, Hribar's plans were strongly supported in the report on chemical investigations of different sources of drinking water from 1886. Professor Baltazar Knapič, the author of the report, also emphasised the essential improvement of health circumstances in the cities by taking care of a water supply system to be built.[13]

As early as 1884, to increase public support for the project, the president of a water section, Ivan Hribar, decided to make the meetings public. In the daily newspapers, citizens could read the following: 'To make every citizen aware of how well the pre-preparations for the water supply system were developed, from now on all the meetings of water section are going to be public and are going to be announced in all the newspapers in Ljubljana at least 24 hours in advance.'[14] Such a decision was probably made by Hribar because of the circular letter from the same year in which the city council was acquainted with the fact that 47% of inhabitants were still against the installation of a water supply system. By 1888, these numbers had changed significantly. In that year, the city council realised that the citizens were more interested in the project and expected at least 600 houses to be connected to the water supply system. The minutes of a city council from 1889 prove that it was necessary to make people aware of the project and great advantages of the water

10 Hribar 1928, 102.

11 Studen 1995, 48.

12 Hribar 1928, 102.

13 Tominšek – Rihtar 1997, 32.

14 Slovenski narod, 8. 7. 1884.

12 Hribar 1928, 102.

13 Tominšek-Rihtar 1997, 32.

14 *Slovenski narod*, 8.7.1884.

nasprotuje napeljavi vodovoda. Do leta 1888 so se te številke precej spremenile. Tega leta so na razpravi mestnega sveta ugotavljali, da so se meščani začeli za projekt bolj zanimati in da pričakujejo, da se bo na vodovod skoraj zagotovo priključilo 600 hiš. O tem, da je bilo ljudi treba seznanjati s projektom in predvsem z velikimi prednostmi vodovoda, govori tudi zapisnik mestnega sveta, kjer leta 1889 župan Peter Graselli poroča, da so ljudje že opustili bojazen, da voda iz vodovoda ne bo dobra. So pa se, kakor poroča, začele govorice, da vode ne bo dovolj in da bodo takrat »ostali na suhem«. Vedno več ljudi pa je zanimalo, koliko bo stala napeljava, koliko priključek, in končno, koliko bo stala voda.[15]

VODOVOD BO!

Kakor omenja zaključno poročilo o delovanju vodovodnega odseka leta 1888, je bilo tisti čas v Ljubljani le 12 javnih vodnjakov. »Prebivalstvo pomagalo si je pač s tem, da je zajemalo vodo iz zasebnih vodnjakov, a to je šlo le, dokler je bil dotok vode zadosten.«[16] Zasebnih vodnjakov je bilo 305, in kakor je na seji vodovodnega odseka leta 1886 poročal Ivan Hribar, je to pomenilo približno 33 vodnjakov na 100 hišnih številk. Poročilo omenja preiskavo posebne komisije za vodnjake pod vodstvom dr. Kovača, ki je ugotovila, da so tako javni kot zasebni vodnjaki v slabem stanju. Poročilo navaja, da je voda v samo 4 javnih vodnjakih deloma pitna. Za večino od tridesetih zasebnih, ki jih je komisija »kemično preiskala«, pa je prav tako ugotovila, da je voda nezdrava in nepitna.[17]

[15] Tominšek – Rihtar 1997, 36–37.
[16] Slovenski narod, 16. 7. 1888.
[17] Ibidem.

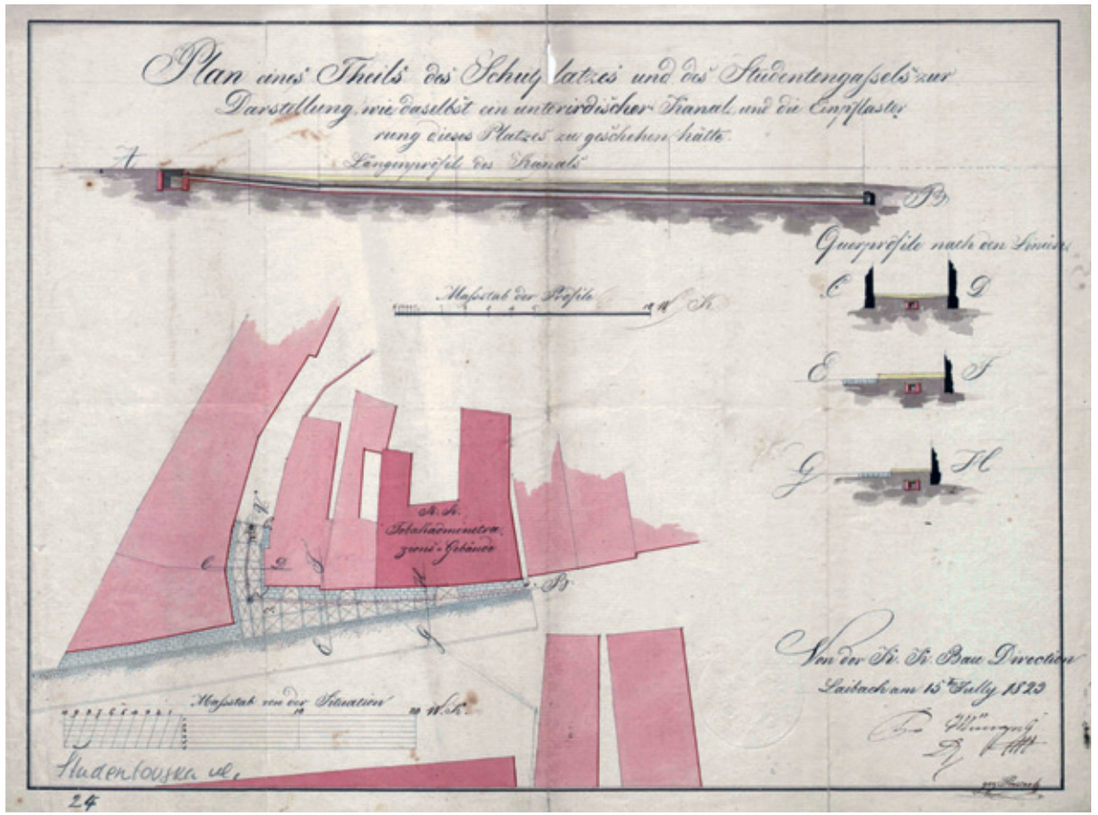
supply system. In a document from 1889, the mayor Peter Graselli reports that people were no longer afraid that water from the water supply system would be of poor quality. As he reported, rumours appeared that there is going to be not enough water. More and more people were interested in how much the installation and the connection would cost and, finally, how much water itself would cost.[15]

THE WATER SUPPLY SYSTEM IS COMING!

As mentioned in the final report about the function of a water section from 1888, there were only 12 public wells in Ljubljana at that time. 'The inhabitants drew water out of public wells, but this was only possible as the influx of water was sufficient.'[16] There were 305 private wells, as Ivan Hribar reported at the meeting of a water section in 1886, which reflected in 33 wells per 100 house numbers. The report mentions the investigation of a special commission for wells, led by Dr Kovač, acknowledging the fact that both public and private wells were in poor condition. It is mentioned in the report that water in only four public wells is partly drinkable. For the majority of the thirty private wells, the conclusion was given that water is also unhealthy and undrinkable.[17]

At the same time, the water section was considering two locations, i.e. among Ljubljansko polje in the vicinity of Kleče and Skaručna. The opinion that water in the vicinity of Kleče is just "filtered water from the Sava River", was soon refuted by the geologist Dionizij Štur. He was called by the municipality to help in defining the place to test the water. No sooner had the

[15] Tominšek-Rihtar 1997, 36-37.
[16] *Slovenski narod*, 16.7.1888.
[17] Ibidem.



Načrt dela Šolskega (danes Vodnikovega) trga in Študentovske ulice. Prikaz, kako naj bi bila videti podzemni kanal in tlakovanje tega dela, 1823 (Zgodovinski arhiv Ljubljana)

Plan of a part of Šolski (School) Square (today's Vodnik Square) and Študentovska (Student) Street. Illustration of a proposed underground channel and the paving of the area, 1823 (Historical Archives Ljubljana)

Vodovodni odsek je še v istem letu začel tehtati predvsem med dvema lokacijama, med Ljubljanskim poljem v bližini Kleč in Skaručno. Mnenje, da je voda v bližini Kleč samo »filtrovana savska voda«, so na podlagi mnenja geologa Dionizija Štura, ki ga je občina poklicala na pomoč pri določanju zajetja in analizah, kmalu zavrnili. Občina je v marcu leta 1887 načrtovala javni razpis. A še preden je »razglasila natečaj za izdelavo podrobnih načrtov, oglasila sta se pri mestnem magistratu gg. Friderik Passini, kot pooblaščenec tvrdke baron Karol Schwarz & Co. z Dunaja, in inžener Oskar Smreker iz Mannheima, ponujajoča se mestnemu zboru za izgotovljenje omenjenih načrtov«. Mestni svet je sprejel mnenje obeh, »da bi mesto potem javnega razpisa ne prišlo do

municipality '[…] announced a tender for making of detailed plans, two persons visited the city hall; Friderik Passini as a deputy of Karol Schwarz & Co. from Vienna and the engineer Oskar Smrekar from Mannheim who offered to a city assembly a proposal to finish the mentioned plans.' The city council agreed with both opinions, i.e. '[…] that the city would by using the public call, not get such plans, needed for the carrying out of works; and that it is not certain if the appropriate and skilled companies would be ready to cooperate in this case.' After discussion at the city council, at its meeting on the 28th of March 1887, the water section decided for the plans and costs to be

tacih načrtov, kakeršnih mu bode treba za oddajo izvršitvenih del, in da je poleg tega še vprašanje bili solidne, sposobne tvrdke hotele sploh udeleževati se natecanja«. Po razpravi v mestnem svetu je vodovodni odsek na seji 28. marca 1887 izdelavo načrtov in stroškov zaupal inženirju Oskarju Smrekerju. Ta je občini načrte predložil skoraj leto dni kasneje – 10. marca 1888. V naslednjih štirih dneh so se o načrtih posvetovali, 14. marca pa se je vodovodni odsek odločil, da bo imel ljubljanski vodovod svoje zajetje v Klečah. Stroški pa so bili ocenjeni na 485.486 gld.[18]

Gradnja se je pričela jeseni istega leta. Razpis za ponudbo za dobavo »a) železnih cevij in fasonskih delov, b) zatvornic in hydrantov in c) izvršenje polaganja cevij« pa so pripravili 27. septembra; kot rok za prijavo ponudb so določili 3. november. Gradnja se je torej pričela in pričakovali so, da bo vodovod dograjen do konca leta 1889, o čemer je bil prepričan tudi Hribar še aprila leta 1889, ko je v mestnem svetu že zagovarjal projekt elektrifikacije mesta.[19] Ta pričakovanja so se izkazala za preveč optimistična, saj je voda po omrežju prvič stekla 17. maja 1890, uradna slovesnost ob odprtju vodovoda pa je bila 29. junija 1890.

Časopisje je dokončno izvedbo pospremilo z velikim veseljem. Liberalni Slovenski narod se je najprej spomnil »zmagonosnih rimskih legij«, ki so prve tod okoli priskrbele vodovodno napeljavo in zdravo studenčnico. Ta »nedostatek« pa je v novejših časih uspelo odpraviti šele, kakor so pisali, narodno napredni stranki in njenemu veljaku Ivanu Hribarju. »Ogromno to delo bilo je silno težavno. Premagovati je bilo stare predsodke, prepričevati neverne Tomaže, katerih je

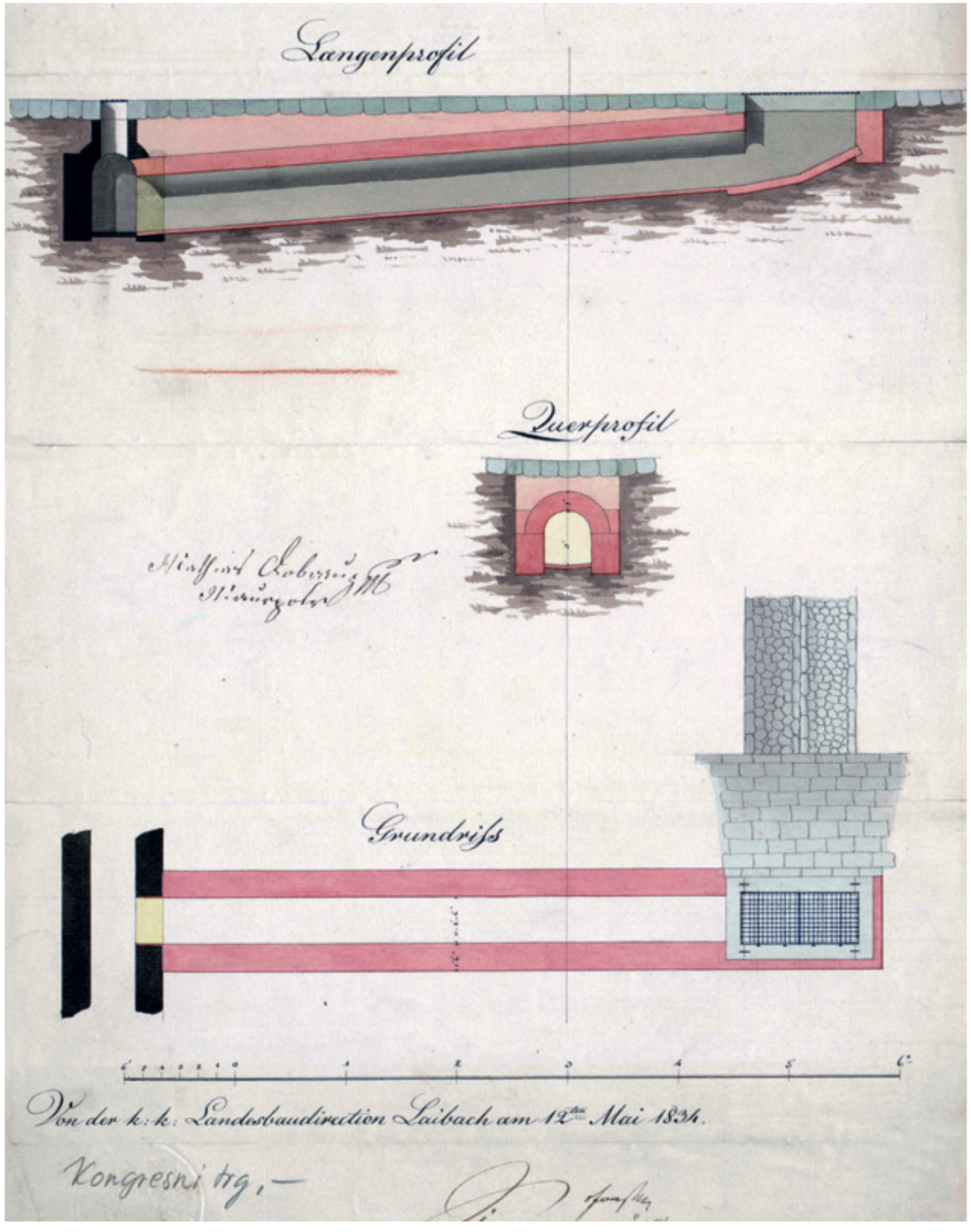
[18] Slovenski narod, 19. 7. 1888.
[19] Slovenski narod, 10. 4. 1889.

carried out by the engineer Oskar Smrekar. He presented his plans to the municipality almost a year later; on the 10th of March 1888. Over the following four days, they discussed the plans and, on the 14th of March, the water section decided that Ljubljana's water supply system draw out its water in Kleče. The costs were projected to be 485,486 florins.[18]

Construction started in the autumn of the same year. The call for tender of delivery of 'a) iron pipes and parts, b) sluices and hydrants and c) installation of pipes' was prepared on the 27th of September, while the deadline to apply the tenders was the 3rd of November. They expected the water supply system to be completed by the end of 1889. Hribar was still certain about that in April 1889, as he had already been promoting the project of electrification of the city.[19] These expectations were too optimistic because the water supply system became function on the 17th of May 1890 while the official opening was held on the 29th of June 1890.

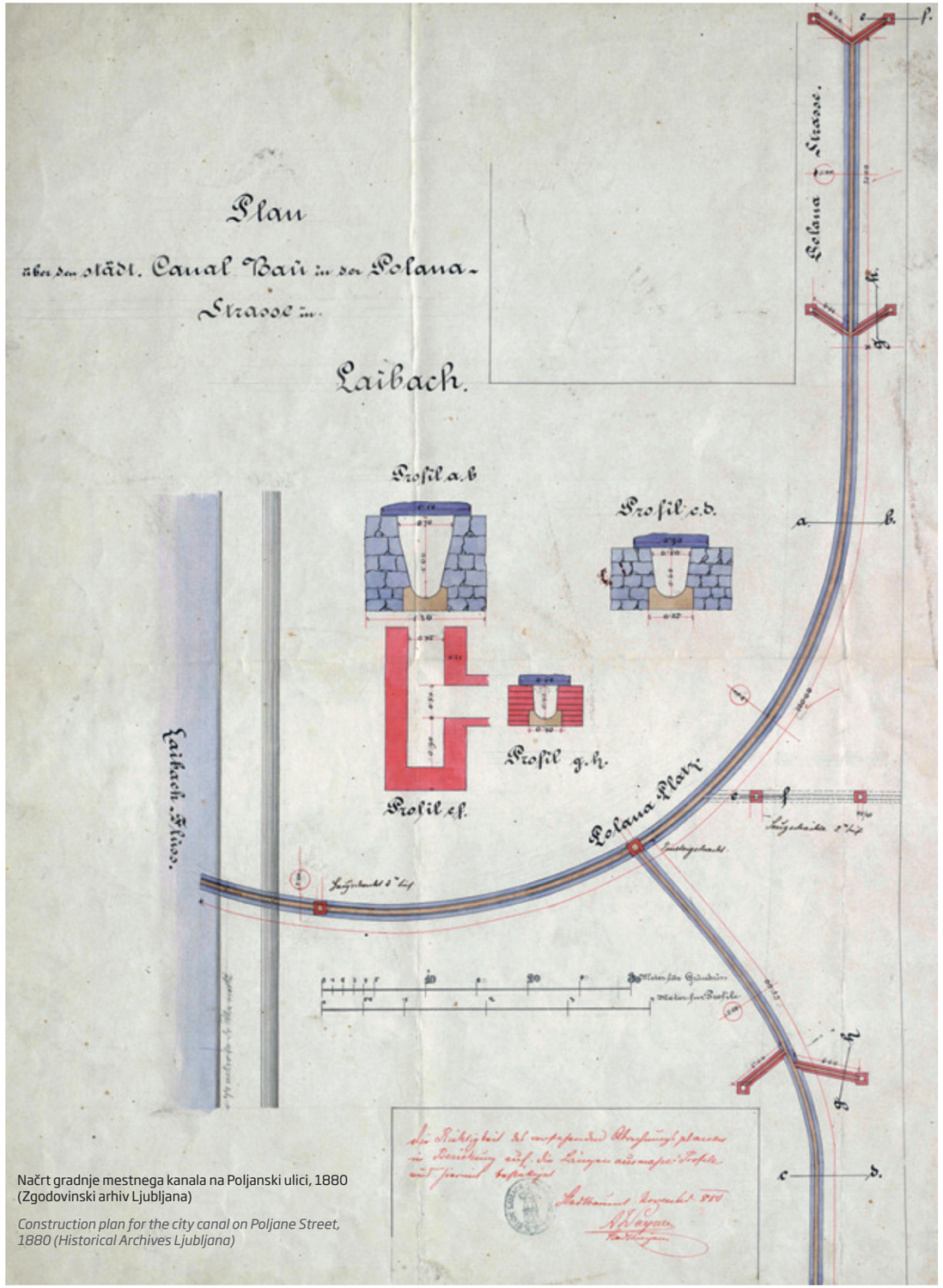
The newspapers gave enthusiastic coverage of the opening of the system. The liberal *Slovenski narod* newspaper first reminded the readers of 'victorious Roman legions', which were the first to provide the water supply systems and healthy spring water in the area of Ljubljana. In modern times, as it was written, water supply systems were restored by nationally advanced party and its man Ivan Hribar. 'This enormous work was extremely difficult. The old prejudices had to be overcome, and, unfortunately, there were too many distrustful people in every new company who had to be persuaded. […] The new water supply system with excellent hard water is going to be used by the inhabitants, in case of fire, the streets and squares are going to be washed, it is going to encourage the principles of modern hygiene, being useful for every family, every

[18] *Slovenski narod*, 19.7.1888.
[19] *Slovenski narod*, 10.4.1889.



Načrt kanala, zgrajenega pred stavbo Stanovskega gledališča na Kongresnem trgu, 1834 (Zgodovinski arhiv Ljubljana)

Plan of the canal in front of the Estates Theatre building on Kongresni (Congress) Square, 1834 (Historical Archives Ljubljana)



Načrt gradnje mestnega kanala na Poljanski ulici, 1880 (Zgodovinski arhiv Ljubljana)

Construction plan for the city canal on Poljane Street, 1880 (Historical Archives Ljubljana)

pri vsacem novem podjetji, žal, le preveč. /…/ Vodovodna mreža preskrbljevala bode prebivalstvo z izvrstno, trdo vodo, služila nam bode v slučaji požara, služila za škropljenje ulic in trgov, pospeševala smotre novodobne higijene, koristila bode vsaki rodbini, vsacemu gospodinjstvu.«[20] V Ljubljani so se tisto poletje začele na vodovod priklapljati prve hiše in septembra so v časopisju lahko že poročali: »Obnesel se je v preteklem, izredno suhem poletji, tako izborno, da bodo pač potihnili vsi klevetniki, ki so toliko zabavljali in prorokovali, da ne bode dovolj vode. Navzlic nečuveni suši in dasi nekatere stranke prav potratno ravnajo z vodo in puste pipe celo noč odprte, je vender vode bilo vedno v izobilji. Doslej je voda upeljana v kacih 500 hiš, v kratkem bode gotovo tudi v ostale hiše.«[21]

Vodovodno omrežje je bilo najprej dograjeno v mestnem središču, v primestne dele Ljubljane pa se je začelo širiti po potresu – leta 1896 po Opekarski cesti v smeri Mestnega loga, leta 1898 po Karlovški cesti v smeri Rudnika. Leta 1906 so sprejeli načrt za napeljavo druge glavne cevi iz Kleč do rezervoarja na Šišenskem hribu, a je bil zaradi težav pri dogovarjanju z okoliškimi občinami in posestniki realiziran šele leta 1910. Do začetka I. svetovne vojne sta se na vodovod priključili (oz. oddali prošnjo za priklop) še občini Vič in Moste.[22]

Čeprav je poraba vode šele leta 1910 presegla predvideno porabo 100 l na osebo na dan, se je uprava že od začetka ukvarjala s konstantno rastočo porabo. Poraba je naraščala predvsem v letih po potresu, ko se je mesto naglo razvijalo in hkrati širilo svojo vodovodno mrežo. Do leta 1910 je bilo v

20 Slovenski narod, 28. 6. 1890.
21 Slovenski narod, 27. 9. 1890.
22 Drnovšek 1984, 220.

housekeeping.'[20] That summer, the first houses were connected to the new water supply system and, in September, it was announced in the newspapers that 'The water supply system was so beneficial during last, extremely dry summer, that there were no more sceptics who were mocking of this project and predicting that there would not be enough water. Despite the worst drought and despite the fact that some clients use water in enormous quantities, leaving the water to run all night long, there was always plenty of water. Up to now, around 500 houses are connected to the water supply system and soon the remaining houses are also going to be connected to it.'[21]

The water supply system was firs built in the city centre, and was extended to other parts of the city after the earthquake; in 1896, to Opekarska cesta in the direction to Mestni Log and in 1898, at Karlovška cesta in the direction to Rudnik. In 1906, a plan for the installation of the second main pipe from Kleče to the reservoir at Šišenski hrib was accepted. Because of the problems linked to the agreements with the municipalities and landowners in the vicinity, it was only realised in 1910. By the end of World War I, the municipalities of Vič and Moste were connected to the water supply.[22]

Although the daily use of water per person exceeded the projected use of 100 litres no sooner than in 1910, the administration dealt with constantly rising use from the early beginning. Consumption especially increased in the years after the earthquake, as the city quickly developed and simultaneously extended its water supply system. By 1910, there were 1368 houses (77.3% of all houses) in Ljubljana connected to the water supply system. Among the citizens, the water supply system was quickly considered to be an

20 *Slovenski narod*, 28.6.1890.
21 *Slovenski narod*, 27.9.1890.
22 Drnovšek 1984, 220.

mestu na vodovodno omrežje priključenih že 1368 hiš ali 77,3 % vseh hiš v Ljubljani. Vodovod se je med meščani sicer hitro uveljavil kot nepogrešljiv del mestnega »servisa«, a pot do sodobnega pojmovanja higiene je bila še dolga. V istem času (1910) je bilo npr. v Ljubljani samo 6,1 % stanovanj opremljenih s kopalnico.[23]

»NA ŠTRBUNK«

Mestni možje so bili, iz razlogov, omenjenih na začetku, najprej osredotočeni na vodovodni projekt in preskrbo z zdravo vodo. Tudi Hribar je npr. na seji mestnega sveta zagovarjal stališče, da je »glavna stvar pridobiti dobro zdravo vodo. Kajti voda se ne pije samo, ampak tudi vživa pri raznih jedilih in, ako je voda zdrava, so tudi pripravljena jedila dobra in zdrava.«[24]

ZGRADITEV VODOVODA JE V VELIKI MERI PRISPEVALA K BOLJ ZDRAVEMU NAČINU ŽIVLJENJA V LJUBLJANI IN REŠITEV VODNEGA VPRAŠANJA JE BILA GOTOVO PREDNOSTNA, A LJUBLJANO JE ČAKALA ŠE ENA VELIKA NALOGA V PROCESU HIGIENIZACIJE MESTA – GRADNJA UREJENEGA IN CENTRALIZIRANEGA SISTEMA KANALIZACIJSKEGA OMREŽJA. TEGA SO SE MESTNE OBLASTI NAČRTNO LOTILE ŠELE Z GENERALNIM KANALIZACIJSKIM NAČRTOM LETA 1899, TOREJ V POPOTRESNI OBNOVI MESTA, KI JO JE KOT ŽUPAN VODIL IVAN HRIBAR.

[23] Studen 1995, 24–28.
[24] Slovenski narod, 7. 5. 1886.

indispensable part of city services, but the path to the current understanding of hygiene remained. At the same time (1910), only 6.1% of homes in Ljubljana were equipped with a bathroom.[23]

PIT TOILET

City councillors were, because of the reasons mentioned at the beginning of this article, first focused on the water supply system project. For example, at the meeting of the city council, Hribar had also been arguing for many years that 'the most important thing is to acquire good, healthy water. Because one may not use water just for drinking alone, but also for drinking when eating dishes and if water is healthy, the prepared dishes are going to be tasty and healthy.'[24]

BUILDING THE WATER SUPPLY SYSTEM SIGNIFICANTLY CONTRIBUTED TO A HEALTHIER WAY OF LIFE IN LJUBLJANA, BUT THERE WAS ONE MORE TASK FOR THE CITY IN THE PROCESS OF IMPROVING THE HYGIENE OF THE CITY: THE BUILDING OF WELL-REGULATED AND CENTRALISED SEWER SYSTEM. THIS SYSTEM WAS ORGANISED BY THE CITY AUTHORITIES, WHO WERE PREPARING A GENERAL SEWER SYSTEM PLAN IN 1898; IN THE PERIOD OF CITY RENOVATION AFTER THE EARTHQUAKE; THE PLAN WAS LED BY IVAN HRIBAR AS A MAYOR.

[23] Studen 1995, 24-28.
[24] *Slovenski narod* 7. 5. 1886.

KANALI PRED KANALIZACIJO

V Ljubljani so kanale, ki so odvajali odpadne vode, sicer začeli graditi v prvi polovici 19. stoletja. Prve kanale z okroglim betonskim dnom pa so sezidali na Resljevi cesti v letih 1882/83. Ljubljanski občinski svet se je sicer zavedal pomena ureditve kanalizacije in je leta 1860 v ta namen tudi ustanovil komisijo za kanalizacijo, a večjih premikov ni bilo vse do popotresne obnove mesta.[25]

Za to, da so se stvari premaknile, je pred potresom poskrbela še epidemija kolere, ki se je na Kranjskem in v Ljubljani predzadnjič pojavila leta 1886. Stanje v Ljubljani je bilo slabo in ob preteči koleri je ljubljanski mestni svet okrcal tudi takratni deželni predsednik Kranjske Andrej Winkler. Očital mu je, »češ da se je z zdravstvenim vprašanjem pečal le akademično, da je vodovodno vprašanje skozi leta in leta zastalo, da se je z izpraznjevanjem jam pnevmatičnim potem odlašalo kakor nalašč«, in poudaril še: »Dodati moram, da je visoko ministrstvo zdravstveno zanemarjenost mesta Ljubljane že ponovno najostreje grajalo in pripomnilo, da se mesto med vsemi deželnimi stolnimi mesti odlikuje z žalostnim svojstvom, da je že dolgo pravo in nezatirljivo gnezdišče kolere in njeno izhodišče za vso deželo.«[26]

Ivan Hribar je zato po uspešnem zagonu vodovodnega projekta hotel v Ljubljani izpeljati še druge večje projekte, potrebne za higienizacijo mesta, še pred potresom in preden je bil izvoljen za župana leta 1896. Ko so ravno dobro začeli gradnjo vodovoda, je na seji mestnega zbora 15. januarja 1889 kot zadnjo točko podal »samostalni predlog,

[25] Kos 1981, 159.
[26] Kobal 1911, 148–149.

CANALS BEFORE SEWER SYSTEM

Building canals for drawing off wastewater began in Ljubljana in the first half of the 19th century. The first canals with concrete round bottom were built at Resljeva cesta in 1882/1883. The municipal council of Ljubljana was aware of the intention to regulate the sewer system, establishing a commission to do so in 1860, but there were no significant changes until the renovation of a city after the earthquake.[25]

The situation changed before the earthquake because of an epidemic of cholera occurring in Carniola and Ljubljana for the second to last time in 1886. The conditions in Ljubljana were dire; due to the danger of cholera the Ljubljana city council was also blamed by the provincial president of Carniola, Andrej Winkler. He criticised it with the fact '[…] that it solved the health issue only in academic way, and that after many years solving of water supply system issue was stopped, that emptying of pits pneumatically was intentionally postponed". He also stressed that "I have to add, that high ministry once again blamed the health neglect of the city of Ljubljana in the strictest way and added that the city is famous among all the provincial capitals for a sad characteristic – being a real and huge nest of cholera and its starting-point for the whole country'.[26]

After the successful start of a water supply system project, Ivan Hribar wanted to realise some other greater projects needed to improve the hygiene of the city, before the earthquake and before being elected mayor in 1896. As they started building the water supply system, there was a meeting of a city assembly on the 15th of January 1889 where he presented the last topic as 'an independent proposal to establish and elect a special section for the carrying out of pre-preparations regarding the formation of toilets and sewer system. For this

[25] Kos 1981, 159.
[26] Kobal 1911, 148-149.

da se ustanovi in izvoli poseben odsek za izvršitev predpriprav glede uredbe stranišč in kanalizacije. V ta odsek voli mestni zbor 5 članov, zdravstveni svet jednega, poleg teh so člani odsekov g. župan, mestni fizik in načelnik stavbinskemu uradu. Odsek sme k sejam povabljati veščake, o svojem delovanji pa ima poročati vsacega pol leta.«[27] Hribar se je torej dobro zavedal prednosti urejenega in modernega kanalizacijskega sistema kot pogoja za urejene zdravstvene in bivalne razmere v mestu.

Kljub vsemu pa je občina gradnjo moderne kanalizacijske mreže prestavila. V humorističnem časopisu Brus, ki je leta 1889 ravno začel izhajati, so se na novico odzvali s karikaturo.

RAZMERE V MESTU PRED KANALIZACIJO

Potrebe po ureditvi kanalizacije so se sicer zavedali že prej in glede na opise razmer v Ljubljani, ki sta jih podala npr. zdravnika Viljem Lipič (1834) in že omenjeni Kovač (1875), je bilo prav »ravnanje« z različnimi odpadki in fekalijami krivo za onesnaženje vode v ljubljanskih vodnjakih. V kakšnih razmerah so živeli Ljubljančani sredi 19. stoletja, si je danes res težko predstavljati. Lipič v svojem delu Topografija mesta Ljubljane omenja stranišča Ljubljančanov na dvoriščih, odprtih preddverjih in hodnikih. Omenja pa tudi množico podgan, ki so lezle okrog teh pogosto nezavarovanih »stranišč«.[28]

Kot mestni zdravnik si je dr. Viljem Kovač ogledal greznice približno 600 hiš v mestu.

[27] Slovenski narod, 16. 1. 1889.
[28] Studen 1995, 44.

Karikatura v humorističnem časopisu Brus, št. 5, 1889

Caricature in Brus, a humour newspaper, num. 5, 1889.

section, five members should be elected by the city assembly, one member should be elected by health council and, among these members, the members of a section are also a mayor, a city physicist and a head of building office. The section is allowed to invite experts to its meetings and must report about its work every half of a year'.[27] Hribar was well aware of the advantage of regulated and modern sewer system as a condition for the health and living circumstances in the city.

Despite all that, the municipality postponed the building of a modern sewer system. *Brus*, a humour newspaper, issues a caricature regarding the news.

CIRCUMSTANCES IN THE CITY BEFORE THE SEWER SYSTEM

There had been an awareness of the need to build sewer system and, according to the descriptions of the circumstances in Ljubljana, given by doctors

[27] *Slovenski narod*, 16.1.1889.

Razmere je označil kot skrb vzbujajoče, saj je kot zdravnik vedel, da so neurejene greznice v primeru pojava nevarnih bolezni, kot je bila kolera, ena hujših nevarnosti za mesto. Sistem greznic je bil katastrofalen. »Človeški odpadki so padali v odprte greznice, da je dehtelo daleč naokrog, in ker so bile te greznice izvečine prav slabo izdelane, se je redka nesnaga iz njih prav lahko razlezla po zemlji. O kanalih ni bilo govora, gnoj in smeti so pospravljali in odvažali le neredno. Če pa je bilo kje kaj kanalov, so bili tesni in tako malo nagnjeni, da je nesnaga le slabo odtekala. Ob slabem vremenu se je često zgodilo, da se je nesnaga dvignila na ceste in trge in razširjala neznosen smrad.«[29] Podobno katastrofalno je bilo praznjenje greznic. »Fekalije so odvažali kmetje iz bližnje okolice v lesenih in odprtih sodčkih, t. i. Sailerjev ali graški sistem odstranjevanja odpadkov. Zdravnik Kovač pa je opažal, da je odvažanje bilo neredno in nesistematično. Kmetje so fekalije odvažali, kadar so imeli voljo in čas, zato so bile prenapolnjene greznice ena bolj običajnih neprijetnosti mesta. Zanimivo pa je, da je na istem mestu odsvetoval gradnjo modernega izplakovalnega kanalizacijskega sistema. Sistem naj bi bil predrag in sploh neizvedljiv, hkrati pa bi s tem šli v nič vsi odpadki, s katerimi kmetje gnojijo njive.«[30]

V že omenjenem spominskem zborniku Ljubljana po potresu so zato kot posebno velik dosežek izpostavili prav izboljšanje zdravstvenih razmer v popotresni Ljubljani. Pred potresom je bilo v malem provincialnem mestu že tako veliko težav. Staro mestno jedro je bilo omejeno z Gradom in Ljubljanico, tako da so ob vznožju hriba nastale tesne in majhne

[29] Kobal 1911, 91.
[30] Studen 1995, 41–42.

Lipič (1834) and Kovač (1875), different kinds of garbage and faeces were responsible for the pollution of water in the Ljubljana wells. The circumstances in which Ljubljana citizens lived in the middle of the 19th century are difficult to imagine. Lipič, in his work 'Topografija mesta Ljubljane' mentions the toilets of Ljubljana citizens in the yards, open entrance halls and corridors. He also mentions masses of rats creeping around these often unprotected toilets.[28]

As a city doctor, Dr Kovač examined cesspits of around 600 houses in the city. The circumstances were threatening because he knew that non-regulated cesspits were one of worse dangers for the city in case of the appearance of dangerous diseases, such as cholera. The system of cesspits was catastrophic. 'Human faeces was falling into opened cesspits; it stank awfully and because these cesspits were mostly not made properly, liquid dirt could easily flow out of them to the ground. There were no canals, manure and garbage were irregularly handled and driven away. If there were any canals, they were narrow, with little incline, so that the dirt could flow off only very slowly. In the case of bad weather, it often happened that the faeces rose to the roads and squares, and it stank awfully'.[29]

It is interesting that Kovač was against the building of a modern flushing sewer system. In his opinion, the system was too expensive and unfeasible while all the manure that the farmers used on their fields would be destroyed.[30]

The very difficult circumstances in the city were mentioned by doctors and the other witnesses from the 19th century. In the memorial work 'Ljubljana po potresu', they stressed the improvement of health conditions in Ljubljana after the earthquake. Before the earthquake, there

[28] Studen 1995, 44.
[29] Kobal 1911, 91.
[30] Studen 1995, 41-42.

ulice s prav takimi, v globino zidanimi hišami, ki niso imele ne dovolj zraka ne svetlobe. »Najslabše pa je bila pogojena kanalizacija. Skoraj brez izjeme so obstajale tako zvane komunske uličice.«[31] Tudi tisti dograjeni kanali, ki so vodili kar naravnost v Ljubljanico, niso ustrezali higienskim zahtevam nove dobe, pa tudi potrebam mesta niso zadostovali. Neurejeni sistem je svoje pomanjkljivosti največkrat pokazal ob daljših deževjih ali sušah.

GENERALNI NAČRT

Še avgusta leta 1899, ob že sprejetem načrtu ureditve sistema, so v Slovenskem narodu potarnali nad vonjem mesta. »Ljubljanica je vsled občutne suše nepričakovano upala. Stanje znaša 50 cm pod normalo. Gnusni kanali kažejo se vsled tega v mestu človeku, ob obrežju gredočemu, ter puhte svoj neznosni smrad iz votlin! Kanalizacija mesta je nujno potrebna, ali pa naj se kanali v Ljubljanico znižajo!«[32] Prav kanalizacijo, in sploh lepše »lice mesta«, je samo dober mesec prej obljubil Ivan Hribar v slovesni zaprisegi ob drugi izvolitvi za župana. V svojem govoru se je zato ozrl na vse storjeno v zvezi s higienizacijo mesta. »V zdravstvenem oziru se je v minulih treh letih prav veliko storilo. Ne le, da so se pregledale vse takozvane skupne uličice, in da so se konštovani nedostatki odpravili, skrbelo se je s prigovarjanjem in podučevanjem, kjer to ni šlo, pa z uradnim ukazom. Skoro neštevilne so bile uradne komisije, ki so se zaradi tega po mojem naročilu vršile. – Sezidalo se je tudi več novih kanalov. Da se pa kanalizačno vprašanje reši povsem racionalno, naročil se je splošni kanalizačni načrt, kateri je bil ravno te dni dogotovljen in, ki bode omogočeval sistematično popolnjevanje vse mestne kanalizačne mreže.«[33] Za higienizacijo mesta ni skrbel samo generalni načrt kanalizacij, temveč tudi bistveno strožji gradbeni predpisi, ki so predvidevali obvezno gradnjo stranišč z odtočnimi kanali, menjavo lesenih cevi z lončenimi oz. železnimi in tudi strožje predpise pri gradnji greznic.[34]

Osnovo novega sistema kanalizacije je za mesto postavil profesor na praški

[31] Govekar, Zarnik 1911, 92–93.
[32] Slovenski narod, 18. 8. 1899.
[33] Slovenski narod, 3. 7. 1899.
[34] Studen 2006, 142.

had already been many problems in the small provincial city. The old city centre was bounded by the Ljubljana castle and the Ljubljanica River; therefore, narrow and small streets were formed under the hillslope with the same houses built in depth having neither enough air nor light. 'The sewer system was in the worst condition. Almost without any exception, there existed the so-called small commune houses. Into this "ditch", the contents of toilets and different waste canals flowed out, and here all the other dirt was also collecting.'[31] Those canals, leading directly into the Ljubljanica River, were not appropriate in terms of hygiene and were insufficient for the needs of the city. The lack of regulation of the system made its deficiencies most obvious in the case of long-lasting rain and droughts.

GENERAL PLAN

In 1899, as the plan for the regulation of the system was already accepted, there were complaints because of the smell of the city in the *Slovenski narod* newspaper from August. 'The Ljubljanica River subsided unexpectedly due to the extreme drought. It is 50cm under the normal level. One may, therefore, see the awful canals in the city and near the river bank while the awful smell is coming out of the holes! The sewer system is definitely needed, or the canals leading to the Ljubljanica River should be lowered!'[32] The sewer system and a more beautiful 'image of the city' had been promised by Ivan Hribar just one month before, as he was sworn in following being elected the mayor for the second time in 1899. In his speech, he stressed the work done for the improving the hygiene of the city. 'In terms of health care there were many changes done in the last three years. Not only were all the so-called small common streets examined and the deficiencies corrected, people were taught about the situation, and where this was not possible, an official ordinance was given. There were numerous official commissions that were carried out by my order. Many canals were also built. To deal with a sewer system issue in a completely rational way, a general sewer system plan was ordered which was finished in these days and is going to enable a systematic supplementing of the whole city sewer system.'[33]

For the improvement of the hygiene of the city, not only the general plan of a sewer system

[31] Govekar, Zarnik 1911, 92–93.
[32] *Slovenski narod*, 18. 8. 1899.
[33] *Slovenski narod*, 3. 7. 1899.

Kanalizacija, konec 19. stoletja, arheološke raziskave Kongresnega trga (MGML, foto D. Badovinac)

Sewage, end of the 19th century, archaeological excavation on Kongresni (Congress) Square (MGML, photo D. Badovinac)

tehnični šoli Jan Hrasky, ki je že pred potresom načrtoval postavitev nekaterih betonskih cestnih kanalov jajčaste oblike, ki so omogočali večjo pretočnost. Njegov načrt je predvideval postavitev kanalizacije po mešanem sistemu in odvod vseh odpadnih voda – padavin, podtalnih vod in fekalij – po izplakovalnem sistemu, ki je bil po vpeljavi vodovoda in postopnem uveljavljanju angleških vodnih stranišč (water closet ali krajše WC) tudi najprimernejši. Načrt je predvideval, da bodo odpadne vode speljane po najkrajši poti do Ljubljanice oz. do zbirnih kanalov ali zbiralnikov na levem in desnem bregu. Odpadne vode pa bi odtekale v Ljubljanico pod mestom. Čistilnih naprav naj ne bi uporabljali, saj bi preveč onesnaževale zrak. To pa naj bi bilo, v primerjavi z razmeroma majhnim in hitro odpravljenim onesnaženjem reke, nevarneje.[35] Leta 1910 nam avstrijska statistika že sporoča, da je na kanalizacijo priključenih 605 objektov (34,2 %), še vedno je imelo 907 hiš (51,3 %) svojo greznico, za ostale hiše pa način odstranjevanja odpadkov ni bil znan.[36]

Da pa so meščani ponotranjili nove higienske zahteve in standard, je moralo miniti še kar nekaj časa. Norme vedenja in ravnanja so pač del širšega in dolgotrajnega procesa civiliziranja. Mesto je npr. strogo prepovedalo stresati, zlivati nočne posode in škafe ali napeljevati kakršnokoli drugo nesnago na ulice, a nekateri se za takšne prepovedi preprosto niso zmenili. »Marija Urbas, izdelovalka klobas in hišna posestnica na Starem trgu, je mestnemu policijskemu stražniku Ferdu Šaferju prijavila, da se je 13. oktobra 1909 odpravila na običajen sprehod ob

was required but also much stricter building regulations that foresaw the obligatory building of toilets with main sewers, replacing wooden pipes with earthen or iron pipes, and stricter regulations for building of cesspits.[34]

The basis for the new sewer system for the city was prepared by the professor at the technical school, Jan Hrasky, who had (before the earthquake) planned the construction of some concrete road canals of an egg-like form, enabling greater flow of water. In his plan, there was an installation of the sewer using a mixed system and draining of all kinds of wastewater (precipitation, underground water and faeces) by a flushing system that was the most suitable after the installation of the water supply system and gradual installation of toilets. It was planned that the waste water would be directed to the shortest way to the Ljubljanica River or to the collecting canals and reservoirs on the left or right river bank. Wastewater should have flowed off into the Ljubljanica River under the city. Purifying plants were not to be used because the air would be too polluted. This was considered to be more dangerous in comparison to the relatively small and quick purification of the river.[35] In 1910, the Austrian statistics reports recorded that there were 605 (34.2%) buildings connected to the sewer system, while 907 houses (51.3%) had their own cesspit, while the manner of handling wastes in case of the other houses was unknown.[36]

There was plenty of time for the citizens to become accustomed to the new hygiene regulations and standards. The norms of behaviour and treatment are certainly a part of a wider and long-lasting process of civilisation. For example, the city strongly prohibited pouring out the chamber pots and pails or any other kind of dirt on the streets, but some inhabitants

35 Studen 1995, 52.
36 Ibidem, 24–25.

34 Studen 2006, 142.
35 Studen 1995, 52.
36 Ibidem, p. 24-25.

Ljubljanici. Okrog 8. ure zvečer je sedla na klop na Dvornem nasipu, da bi se odpočila, ‹kar na enkrat prileti od drugega balkona voda na njo, da je bila vsa mokra …›.«[37]

were not afraid of such prohibitions. ‘Marija Urbas, a sausage maker and house owner at Stari trg complained to the city policeman Ferdo Šafer, stating she took a usual walk near the Ljubljanica river on the 13th of October 1909. Around eight o’clock in the evening, she sat down on a bench to rest and all of a sudden water was poured on her from the other balcony, and she was all wet […]’[37]

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37 Ibidem, 59.

37 Ibidem, p. 59.

SVETLANA MAKAROVIČ

***

Je kvatrni večer nocoj.
Lasje težki od vlage.
Je zrak svinčen. In vse se zdi,
da bo noč divje jage.
Kakor da nekaj šepeta
v sršečih gmotah smrek,
pod vetrom pa že šelesti
težak in moker sneg.

SVETLANA MAKAROVIČ

***

It is an ember night tonight.
Heavy from humidity is the hair.
It is leaden air. And it all seems
it will be the night of the wild hunt.
As though something is whispering
in the bristled spruce trees in packs
with snow already rustling under the wind,
all heavy and wet.

TRANSLATED BY ANDREJ PLETERSKI

PITNA IN ODPADNA VODA V LJUBLJANI – NEPOGREŠLJIVI SPREMLJEVALKI NAŠEGA VSAKDANA

DRINKING AND WASTE WATER IN LJUBLJANA – INDISPENSABLE IN OUR EVERYDAY LIVES

Brigita Jamnik

UVOD

Ljubljana je mesto, v katerem vode ni težko najti. Številni površinski vodotoki in izviri na Ljubljanskem polju in barju so že pred stoletji takratnim prebivalcem na območju sedanjega mesta zagotavljali ugodne pogoje za življenje in delo.

Dejavnosti oskrbe s pitno vodo ter odvajanja in čiščenja odpadne vode danes omogočata varno bivalno okolje in sta ogledalo urejenosti vsakega mesta, tudi Ljubljane. Oskrba s pitno vodo in javna kanalizacija sta na prvi pogled videti odmaknjeni od vsakdana prebivalcev in obiskovalcev Ljubljane, a sta še kako potrebni za varno in zdravo življenje v mestu. Brez njiju ne gre. Prebivalci se običajno ne sprašujejo o njunem obstoju, vse dokler jim njuno delovanje oziroma nedelovanje ne povzroča težav. Njuna urejenost in visoki tehnični standardi delovanja v Ljubljani pa pri nepoznavalcih, ko se ti pobliže seznanijo z njunim delovanjem, nemalokrat vzbudijo začudenje nad tehnično dovršenostjo, pri poznavalcih pa ponos, da tudi mesto Ljubljana že dolgo spada med komunalno sodobno urejena mesta. Sistema oskrbe s pitno vodo in javne kanalizacije sta plod več kot dvanajstih desetletij dela, v katerih so svoj pečat pustile številne generacije različnih tehničnih in drugih strok. Vsako pomlad se spomnimo 17. maja 1890, ko je Ljubljana z vidika oskrbe s pitno vodo postala sodobno mesto, saj je tistega leta pričel delovati javni vodovodni sistem.

Razvoj komunalnih sistemov javne oskrbe s pitno vodo ter odvajanja in čiščenja odpadne vode se je v Ljubljani načrtno pričel vzporedno z urbanističnim razvojem mesta po potresu leta 1895, torej na prehodu iz 19. v 20. stoletje.[1–3] V drugi polovici 19. stoletja so se prebivalci Ljubljane še oskrbovali z vodo iz javnih in zasebnih vodnjakov, ki so stali v neposredni bližini njihovih domov. Ko je mesto zraslo, je onesnažilo mestne vodnjake. Pomanjkanje pitne vode je bilo v Ljubljani v tistih časih občutno, čiste pitne vode je prebivalcem mesta primanjkovalo, meščani pa so obolevali za črevesnimi boleznimi. Vedenje, da je vzrok za neustrezne zdravstvene razmere tudi onesnažena voda, je med mestnimi svetniki že bilo razširjeno. Prelomno je bilo leto 1890.

Pred pričetkom delovanja vodovoda je bilo med meščani kar nekaj pomislekov o tem, ali je to res potrebno, saj je bila voda dotlej

INTRODUCTION

Ljubljana is a city where water is not difficult to find. Centuries ago, abundant surface streams and springs in the Ljubljana Plain and Moor provided favourable living and working conditions to those inhabiting what is now Ljubljana.

Today, the services relating to drinking water supply and wastewater treatment offer a safe living environment, reflecting how any city, including Ljubljana, is properly organised. Apparently operating far from the everyday life of those living in Ljubljana or visiting it, the drinking water supply and the public sewer systems are crucial for safe and healthy living in the city: they are simply indispensable. Ljubljana's inhabitants generally do not ask questions about them, as long as their operation (or non-operation) is not causing any trouble. However, when becoming more familiar with these two systems, their proper organisation and the high technical standards governing their operation, even non-experts are often amazed at the technical accomplishment reflected in them, whilst experts pride themselves on the fact that the city of Ljubljana has long been ranked among the cities with highly advanced utility services. The drinking water supply and public sewer systems are the results of over 120 years of committed work through which many generations of various technical and other disciplines have left an indelible impression. Ljubljana's public water supply system was put into operation on 17 May 1890, thus putting the city on the map of modern cities in terms of drinking water supply. Since then, this day is marked by its inhabitants each spring.

The municipal public drinking water supply and wastewater discharge and treatment systems started to grow in parallel with the city's urban planning development in the wake of a severe earthquake that struck Ljubljana in 1895.[1–3] Before that, i.e. in the second half of the 19th century, the inhabitants of Ljubljana still drew water from public and private wells situated close to their homes. However, the growing city soon polluted its water wells. At that time, drinking water shortages were severe, with the inhabitants falling ill to intestinal diseases. Although the city councillors had been aware of the fact that one of the reasons for the problematic health conditions was polluted water, the actual turning point occurred in only 1890.

Initially, inhabitants doubted whether a drinking water system was actually necessary, because water

Slika 1: Detajl z vodohrana na Rožniku spominja na začetke delovanja javnega vodovodnega sistema. Foto: arhiv JP Vodovod – Kanalizacija.

Figure 1: A detail from the water storage tank on Rožnik Hill from the beginnings of the operation of Ljubljana's public water supply system. Photo: the archives of JP Vodovod-Kanalizacija

zastonj, pa tudi dejstvo, da bo voda dotekala do hiš in tekla v hišah po ceveh, je vzbujalo nezaupanje in tudi zaskrbljenost, ali je bo res za vse dovolj. Ko pa so javni vodovod preizkusili, so se pomisleki razpršili in nanj so se želeli priključiti tudi na območjih, kjer vodovoda še ni bilo. A mestna oblast se je širitve javnega vodovoda lotevala racionalno in le tam, kjer je bilo to zaradi zadostne gostote poselitve smiselno. Želje meščanov so kar naenkrat pričele prehitevati finančne zmožnosti mesta in tudi po zgraditvi javnega vodovoda so se nekateri deli mesta še vedno oskrbovali iz mestnih vodnjakov, pa tudi gradnja novih se še ni čisto zaustavila.

Na to, da se je po mestu zaradi neurejenega odvajanja odpadne vode širil neznosen smrad, nas spominjajo redka pisna pričevanja. Današnje literarne ali filmske uprizoritve tega časa se temu, morda tudi namenoma, spretno izogibajo. Na prehodu v 20. stoletje so meščani morda še bolje kot pomen oskrbe s pitno vodo razumeli to, da je potrebna ureditev odvajanja odpadne vode v mestu, saj so neurejenost vonjali in opažali na vsakem koraku, čeprav se pomena odvajanja odpadne vode iz bivalnega okolja za zdravje ljudi še niso povsem zavedali.[3]

O OSKRBI S PITNO VODO

Pokrajina od Mednega pod Šmarno goro do vzhodne ljubljanske obvoznice je eno najgosteje poseljenih območij v Sloveniji in hkrati pomemben rezervoar podzemne vode za prebivalce glavnega mesta Slovenije in njegove okolice. Zaradi osrednje lege v državi in geografskih značilnosti leži v precepu številnih interesov rabe prostora – je območje, kjer se prepletajo interesi urbanizacije, industrije, prometa, kmetijstva in oskrbe s pitno vodo. Javna oskrba s pitno

was free of charge at that time. Moreover, they were suspicious of the fact that water would come into their homes and flow through pipes in their houses, and harbouring concerns about whether there would be enough of it for everybody. When the public water supply system was first put to use, the lingering doubts vanished. Connections to the system also started to be increasingly required in places where there previously had been no network. However, the city authorities undertook to expand the public network rationally and only in places where this was sensible in terms of population density. Demand very quickly outpaced the city's financial capabilities: even after the public water supply system had been put in place, certain parts of the city still had to rely on their local wells and new wells even continued to be constructed.

There are few written records testifying to the unbearable stench that spread across the city as a result of uncontrolled waste water discharge prior to the installation of the public network. Modern literary and film representations of that time skilfully avoid this topic, sometimes deliberately. At the turn of the 20th century, the inhabitants of Ljubljana were perhaps even more acutely aware of the fact that it was more important to regulate wastewater discharge than drinking water supply. Of course, they could smell and notice the lack of regulation at every step they took, although they seemed not to understand its implications for their health.[3]

ABOUT DRINKING WATER SUPPLY

The area stretching from Medno situated at the foot of the Šmarna gora hill to Ljubljana's east bypass ranks among the most densely settled areas in Slovenia and is simultaneously an important reservoir of groundwater for the inhabitants of the capital city and its surrounding area. Lying in

vodo je nujen pogoj za kakovostno življenje v mestu in bližnji okolici ter hkrati omejevalni in usmerjevalni faktor razvoja mesta, saj vodni viri, namenjeni oskrbi prebivalstva, ležijo v njegovi neposredni bližini in celo pod njim.[4] Ljubljano bi prav lahko imenovali tudi mesto na vodi, saj se v peščeno-prodnih plasteh skriva toliko podzemne vode, da bi lahko z njo kar 15-krat napolnili Blejsko jezero.[5]

V stotih letih se je Ljubljana iz kraja z 20.000 razvila v mesto s 300.000 prebivalci, se razširila in združila z bližnjimi naselji. Prvotna kmetijska raba prostora se je umikala poselitvi, v zadnjih desetletjih pa delež kmetijske dejavnosti ostaja skorajda nespremenjen, tudi kot posledica varovanja prostora za namene javne oskrbe s pitno vodo. Kmetijstvo in oskrba s pitno vodo v Ljubljani zato že desetletja živita z roko v roki. Varovanje vodnih virov je tudi robni pogoj za širjenje naseljenih površin in je zato hkrati priložnost za okolju in Ljubljančanom prijazne urbanistične rešitve, ki so še bližje zelenim poudarkom prostorskega razvoja, kot bi bile sicer.

Ljubljanski vodovodni sistem ima težko spremenljiv značaj in zato se večje spremembe v načinu njegovega delovanja zgodijo zgolj občasno. Če se koncept v celotnem obdobju delovanja ni pomembneje spremenil, saj vodarna Kleče ostaja najpomembnejše vodno zajetje v osrednjem vodovodnem sistemu mesta, pa sta se krepko spremenila način in obseg dela: dolžina omrežja ter število in velikost vodovodnih objektov in naprav v Ljubljani so se povečali, s tehnološkim napredkom sta se spremenila nadzor nad delovanjem sistema in njegovo vodenje, uporabljajo se sodobni materiali in oprema, pri odločitvah so nam v pomoč najnovejša računalniška orodja, tehnične rešitve imajo temelje v dolgoletni praksi in se nadgrajujejo z

the centre of Slovenia and featuring important geographical characteristics, it is the focus of numerous interests relating to the use of physical space: it is a hub of urbanisation, industry, traffic, agriculture and drinking water supply. Public drinking water supply is indispensable for a high quality of life in a city and its surrounding area. However, it is also a factor restricting and directing the city's development, as the water resources required for its water supply are situated close to it or even underneath it.[4] Ljubljana could easily be called a city on water, as the sand and gravel strata underneath it store in themselves as much groundwater as is required to fill Bled Lake 15 times.[5]

In the span of a century, Ljubljana grew from a town with a population of 20,000 to a city of 300,000, expanding in the process and joining with nearby settlements. The original agricultural use of land increasingly gave way to housing. Only in recent decades has the share of agricultural activity remained almost unchanged, which is partly due to the protection accorded to the public drinking water supply areas. Agriculture and the supply of drinking water in Ljubljana have thus been linked for decades. The protection of water resources is also a precondition for the expansion of any settled area. As such, it offers opportunities for environment- and inhabitant-friendly city-planning solutions that, moreover, are in line with the 'green' highlights of the spatial development.

Ljubljana's water supply system is particularly prone to alterations, which is why major changes to its operation have only occurred occasionally. If the overall concept hardly underwent any significant change during the entire term of operation (with the Kleče water catchment remaining the most important water reservoir of the city's central water supply system), the mode of work and its extent did change considerably: the length of the network along with the number and size of its facilities and installations in Ljubljana have increased, technological progress has

Slika 2: Reka Sava napaja vodonosne plasti vodonosnika Ljubljanskega polja. Foto: arhiv JP Vodovod – Kanalizacija.

Figure 2: The Sava River feeds the water-bearing strata of the Ljubljana Plain's aquifer. Photo: the archives of JP Vodovod-Kanalizacija

najnovejšimi spoznanji, terensko delo olajšujejo hitra in dobro opremljena vozila ter stroji, podatki so nam dostopni takoj, ko nastanejo, na voljo imamo več znanja in izkušenj, ki se prenašajo iz roda v rod. Načrtovanje izboljšav in sprememb v delovanju ter nadgradnji je nujna sestavina uspešnega vsakodnevnega upravljanja sistema oskrbe s pitno vodo.

Pitna voda je naše naravno bogastvo in neprecenljiva ter nenadomestljiva dobrina. Ljubljana je ena redkih evropskih prestolnic, ki se lahko pohvali s pitno vodo, ki priteče kar iz pipe, neobdelana s tehnološkimi postopki. To dragocenost lahko v Ljubljani ujamemo v kozarec. Ljubljančani pitni vodi zaupajo, saj je z njo zadovoljnih ali zelo zadovoljnih več kot $^{3}/_{4}$ uporabnikov.[6] Obenem je pitna voda tudi naša zvesta spremljevalka, saj jo vsakodnevno

modified the oversight and management of the system's operation, advanced materials and equipment have started to be used, with state-of-the-art application software supporting decision-making. Technical solutions are based on the long-standing experience and are continually upgraded with newly acquired knowledge; fieldwork is made easier by fast and well-equipped vehicles and machines, and necessary data is accessible as soon as it has been generated. Moreover, significant bodies of knowledge and experience exist, handed down from generation to generation. The planning of improvements and changes to the operation along with its upgrading is an indispensable part of regular and proper drinking water supply system management.

uporabljamo ne samo za pitje, ampak tudi pri pripravi hrane ter pri najrazličnejših opravilih v gospodinjstvu in industriji. Vsak prebivalec Ljubljane in okolice dnevno porabi 115–150 litrov pitne vode, ob upoštevanju industrijske in druge rabe pa znaša poraba na prebivalca okrog 200 litrov.

Današnji upravljavec vodovodnega sistema, JP Vodovod – Kanalizacija, upravlja čez 1000 km dolg vodovodni sistem, ki se oskrbuje iz štirih vodarn Ljubljanskega polja in vodarne Brest na Iškem vršaju, te pa obsegajo skupno 44 vodnjakov. Na Ljubljanskem polju delujejo vodarne Kleče, Hrastje, Šentvid in Jarški prod. Podzemna voda, ki se napaja iz reke Save in lokalnih padavin, se črpa iz vodnjakov, ki segajo od 30 do 100 m globoko. V vodnjake, od katerih ima največji premer 800 mm, so vstavljene potopne črpalke, ki črpajo od 15 l/s pa vse do 100 l/s, odvisno od izdatnosti vodnjaka in vodonosnika. Klasične črpalke z elektromotorjem v strojnici vodnjakov so pred desetletjem zamenjale potopne črpalke. Vodarna Kleče, ki se v dolžini več kot 1 km razteza od Dravelj v smeri proti vzhodu, proti poseljenim površinam Bežigrada, je vse stoletje ostala osrčje vodovodnega sistema mesta.

ALI STE VEDELI …

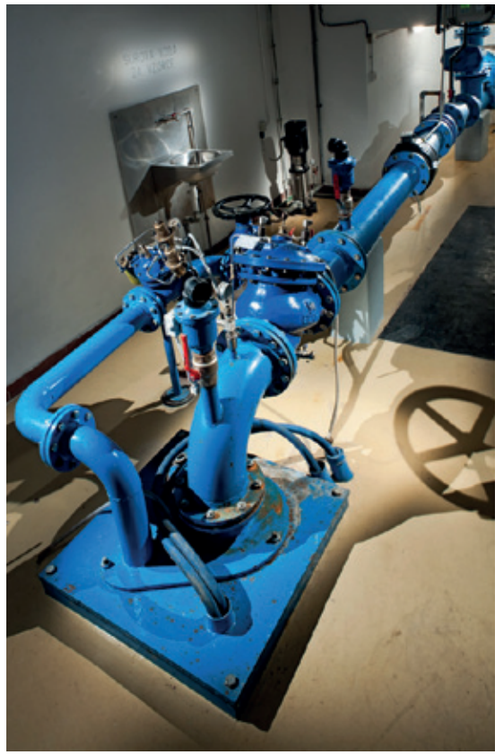
DA BI LAHKO MESTO LJUBLJANA IMENOVALI MESTO NA VODI? POD MESTOM JE V PEŠČENO-PRODNIH PLASTEH, KI JIH JE NANESLA REKA SAVA, SHRANJENE 400 MILIJONOV M³ PODZEMNE VODE. S TO VODO BI LAHKO 4-KRAT NAPOLNILI BOHINJSKO JEZERO IN 15-KRAT BLEJSKO JEZERO.

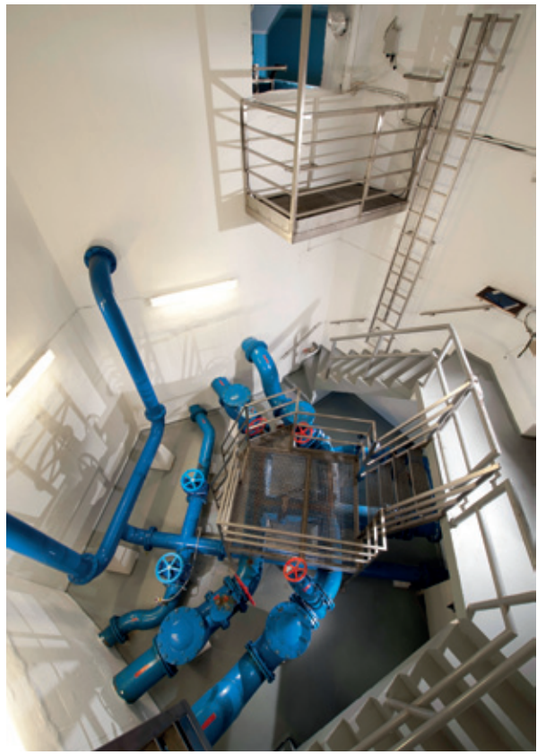
As a natural resource, drinking water is an invaluable and irreplaceable asset. Ljubljana ranks among the few European capitals that can boast of drinking water that has not previously been technologically processed, coming straight from taps. The people of Ljubljana have confidence in their drinking water, with over three quarters of consumers being satisfied or very satisfied with it.[6] Along with that, drinking water is always with us: it is used on a daily basis not only for drinking but also for preparing food and for a wide variety of tasks both in households and industry. Each inhabitant of Ljubljana and its surrounding area uses 115–150 litres of drinking water per day; if account is taken of industrial and other uses, the consumption per capita stands around 200 litres.

JP Vodovod-Kanalizacija, which is the current water supply system operator, manages a water supply system over 1,000 km long fed by the four waterworks situated in the Ljubljana Plain and the Brest waterworks situated in the Ig alluvial fan, comprising 44 wells in total. The waterworks of Kleče, Hrastje, Šentvid and Jarški prod operate in the Ljubljana Plain. The groundwater recharged from the Sava River and local precipitation is pumped from the water wells reaching 30 to 100 m deep. From 15 up to 100 l/s are normally pumped, depending on how abundant wells and aquifers are, by submersible pumps installed in the water wells (the largest of which has a diameter

DID YOU KNOW…?

THAT THE CITY OF LJUBLJANA COULD BE CALLED A CITY ON WATER? BENEATH ITS SURFACE, AS MUCH AS 400 MILLION M³ OF GROUNDWATER IS STORED IN THE SAND AND GRAVEL STRATA DEPOSITED BY THE SAVA RIVER. THIS QUANTITY WOULD SUFFICE TO FILL LAKE BOHINJ FOUR TIMES AND LAKE BLED 15 TIMES.





Slika 3: Notranjost vodnjaškega objekta (levo) in armaturna celica vodohrana (desno). Foto: Domen Pal/Branko Čeak/Jože Maček.

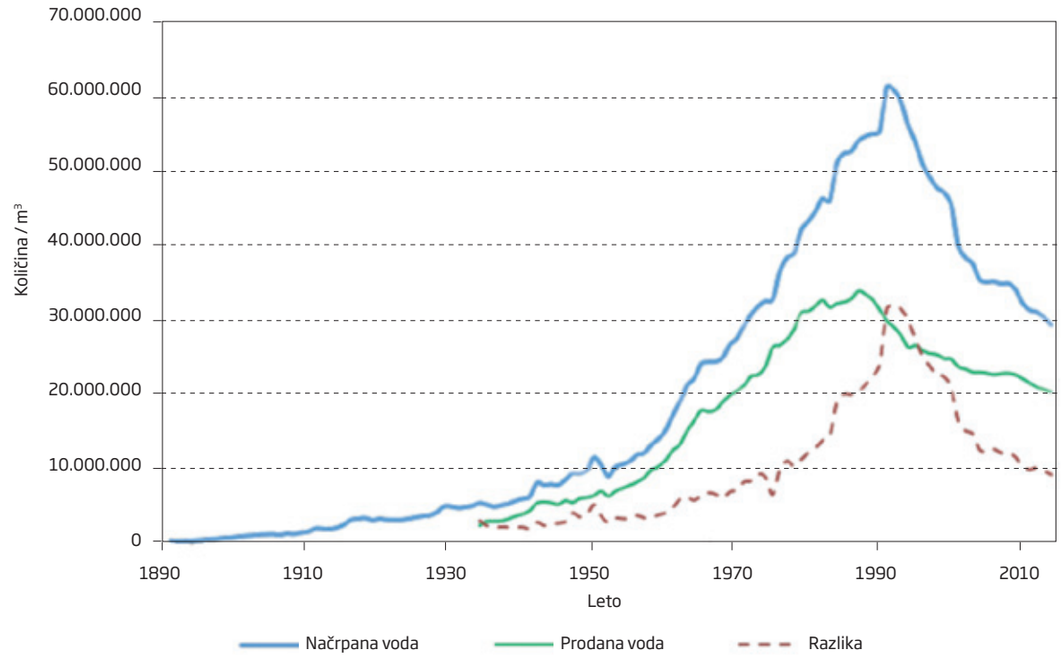
Figure 3: Interior of a water well facility (left) and the valve chamber of a water storage tank (right). Photo: Domen Pal/Branko Čeak/ Jože Maček

Vodarne so strogo varovano območje, obdano z zaščitno ograjo in pod stalnim nadzorom varnostne službe. Osebje je stalno prisotno le v vodarni Kleče, ostale vodarne so upravljane na daljavo. Neposreden dostop do črpališč je mogoč le v spremstvu pooblaščene osebe. Delovanje objektov je pod nadzorom ene osebe, ki upravlja vodovodni sistem iz nadzornega centra v vodarni Kleče. Na pretekle čase, ko je bilo v vsaki od vodarn stalno osebje, nas spominjajo upravne stavbe v preostalih vodarnah in sadna drevesa, ki so jih zaposleni na območju zajetij zasadili pred desetletji. Objekti so daljinsko nadzorovani in delujejo povsem samostojno. Visoko zmogljiv in zanesljiv krmilnik na podlagi vhodnih podatkov procese krmili povsem avtonomno. Podatki o trenutnem delovanju objektov, kot so vodnjaki, prečrpalnice in vodohrani, se prenašajo v nadzorni sistem. Vodovodni sistem je pod nadzorom tudi, ko mesto spi. Podatki o delovanju posameznih objektov se na 15 minut prenašajo v baze podatkov, ki se trajno hranijo. Operater s pomočjo nadzornega sistema neprekinjeno preverja delovanje vodovodnega sistema in na podlagi trenutnega stanja na omrežju izvaja potrebne ukaze, ki prispevajo k optimalnemu delovanju vodovodnega sistema. Delovanje črpalk vodnjakov je prilagojeno trenutnim potrebam v omrežju in tarifi električne energije.

Vodovod je eden največjih porabnikov električne energije v mestu. V času nizke električne tarife deluje večje število vodnjakov, ki presežke načrpane vode črpajo

of 800 mm). 'Classic' pumps driven by electric motors located in the machine rooms of water well facilities were superseded by submersible pumps a decade ago. The Kleče water pumping station, stretching for over 1 km from Dravlje to the east, i.e. towards the inhabited areas of the Bežigrad district, has remained the very core of Ljubljana's water supply system for a century.

Waterworks are tightly secured areas enclosed by protective fences and under the permanent surveillance of a security service. While the Kleče pumping station is attended by personnel at all times, the others are remotely operated. Access to the pumps is only possible if visitors are accompanied by an authorised person. The operation of the facilities is controlled by one person managing the water supply system from the control centre situated at Kleče. Reminiscent of the times when all water pumping facilities were permanently manned are the administrative buildings in the rest of the facilities and the fruit trees planted there decades ago by workers. The facilities are remotely controlled and operate autonomously. All processes are autonomously controlled by a high-capacity reliable controller based on input data. The current operation data relating to the facilities, such as water wells, re-pumping stations and water storage tanks, are regularly transmitted to the control system. Thus, the water supply system is under control even when the city sleeps. At 15-minute intervals, the data relating to the operation of individual facilities is transmitted to databases, which are permanently stored. With the help of the control system, the operator continuously monitors the water supply system's operation, exercising the necessary commands aimed at maintaining the system's optimal operation. The operation of the well



Slika 4: Načrpane, prodane in nedospele količine pitne vode

Figure 4: Amounts of pumped, sold and non-revenue drinking water.

v rezervoarje, t. i. vodohrane, s skupno prostornino okrog 20.000 m³. Okolica Ljubljane je hribovita, zato rezervoarji ležijo na pobočjih obrobja mesta, na primer na Rožniku, nad Črnučami in nad Pržanom. V Ljubljani ne poznamo vodnih stolpov, kot jih poznajo mesta, ki ležijo na ravninskih območjih. Višje ležečim predelom, npr. na Grajskem griču, se voda dobavlja s pomočjo prečrpovalnih postaj. Voda se na poti iz črpališč do uporabnikov v omrežju ne zadržuje dalj kot nekaj ur. Iz vodarn izstopa načrpana voda po cevovodih, od katerih ima največji premer 700 mm. Obratovalni tlak vodarn na izhodu iz vodarn doseže 5 barov. Na poti do uporabnikov se vodovodno omrežje širi in je vse bolj podobno velikanskemu razvejenemu drevesu; premer vodovodnih cevi se od primarnih cevovodov velikih premerov zoži na sekundarno omrežje in se pri uporabnikih skrči na 20 mm. Tlak, ki še zadošča za nemoteno oskrbo najbolj oddaljenih uporabnikov, znaša 2,5 bara. V vodovodnem sistemu je vgrajenih približno 40.000 vodomerov, ki so v lasti uporabnikov in katerih odčitki so podlaga za obračune porabljene vode.

Hkrati z rastjo prebivalstva v Ljubljani je v zadnjem stoletju naraščala tudi potreba po vse večjih količinah pitne vode. Poraba je začela intenzivno naraščati v prvih dveh desetletjih po drugi svetovni vojni. V tem času se je širila industrijska dejavnost, hkrati pa je močno naraščalo tudi število gospodinjstev v mestu. Krivuljama rasti količin načrpane vode in prodane vode se v času dvigovanja življenjskega standarda naklon močno poveča. Z rastjo življenjskega standarda se je namreč povečevala tudi poraba pitne vode na prebivalca. Količine načrpane vode se v zadnjih dveh desetletjih zmanjšujejo zaradi usihanja porabe v gospodarskih dejavnostih in vojaških ustanovah, pa tudi v gradbeništvu, gostinstvu in v gospodinjstvih.

pumps is adjusted according to both the current network needs and electricity rates.

The water supply system ranks among the largest consumers of electricity in the city. During cheaper rate periods, more water wells are in operation, repumping the surplus pumped water into reservoirs, i.e. water storage tanks, whose total volume is around 20,000 m³. As the surrounding area of Ljubljana is hilly, those reservoirs are located on the slopes on its outskirts, e.g. on Rožnik Hill, above Črnuče and above Pržan. Unlike cities situated in flat areas, Ljubljana does not have water towers. To higher-lying areas, such as the Castle Hill, water is supplied by means of repumping stations. On its way from the pumping stations to the consumers, water only spends a couple of hours in the network. Water exits the pumping facilities through pipelines, the largest of which has a diameter of 700 mm. Operation pressure of the exiting water is up to five bars. On its way towards consumers, the water supply network expands, increasingly resembling an immense tree-like structure. As regards water pipes, the large water mains diameters are first reduced to that of the pipe network for distribution to the consumers and eventually to 20 mm at the point of consumption. The pressure sufficient for regular supply to the most remote consumers is 2.5 bars. The water supply system is fitted with approximately 40,000 water meters, which are the property of consumers and whose readings allow for an accounting of the water consumed.

During the 20th century, the need for ever larger quantities of drinking water went hand in hand with the growth of population in Ljubljana. In particular, consumption started to grow considerably in the first two decades after World War Two. That time saw an expansion of industrial activity and, at the same time, a surge in the number of households in the city. During the time of an ever-rising living standard, the amounts of water pumped and sold grew significantly, with a rising living standard implying an increase in the consumption of drinking water per capita.

ALI STE VEDELI …

DA LJUBLJANSKI VODOVODNI IN KANALIZACIJSKI SISTEM SKUPAJ MERITA PREK 2.000 KM?

Vodarna Kleče je osrednji del sistema, saj je v letu 2014 prispevala kar 72 % vseh načrpanih količin, kar pomeni 21 milijonov m³ ali v povprečju 670 l/s. Sledita vodarni Brest in Šentvid z 12 % in 8 %, nato pa še Jarški prod s 5 % in Hrastje s 3 %. Največji porabnik pitne vode v Ljubljani so gospodinjstva, ki porabijo 68 % vode, sledijo trgovska podjetja (10 %) in ostala industrija (4 %).

Različni predeli Ljubljane dobijo vodo iz različnih vodarn – Šentvidčani iz vodarne Šentvid, Bežigrajčani iz vodarne Kleče, Črnučani iz vodarne Jarški prod, prebivalci Murgel in predela ob Tržaški cesti, zahodno od Dolgega mosta, iz vodarne Brest, vmes pa so območja, na katera v odvisnosti od tlačnih razmer priteka voda iz več vodarn.

Bdenje nad vplivi na varnost oskrbe s pitno vodo je stalna, vsakodnevna naloga upravljavca vodovoda. Varno, tehnično brezhibno in ekonomično delovanje vodovodnega sistema je mogoče le ob stalnem nadzoru omrežja, objektov in naprav. Upravljavec ima pomembno vlogo gospodarja, ki skrbi za premoženje, ki je v veliki meri skrito očem, položeno nekaj metrov pod tlemi ali vkopano v pobočja. Nadzor nad sistemom se izvaja vsak dan, in sicer s pregledovanjem objektov, naprav in trase vodovoda, s pregledovanjem delovanja zapiral in hidrantov, jaškov in naprav v njih ter odzračevalnih ventilov. S posebnimi napravami se spremljata pretok in tlak na posameznih točkah sistema.

DID YOU KNOW…?

THAT LJUBLJANA'S WATER SUPPLY AND SEWAGE SYSTEMS TAKEN TOGETHER HAVE OVER 2,000 KM IN LENGTH?

During the previous two decades, the amounts of water pumped have been on a downward trend, mainly due to receding consumption in economic activities and military institutions, along with construction, catering and households.

The Kleče pumping facility is the central part of the system: in 2014, its share amounted to as much as 72% of the total amount pumped, accounting for 21 million m³ or 670 l/s on average. It is followed by the Brest and Šentvid waterworks with 12% and 8%, respectively, Jarški prod with 5% and Hrastje with 3%. The largest consumer of drinking water in Ljubljana are households, using 68% of water, which are followed by commercial businesses (10%) and other industry (4%).

Different parts of Ljubljana receive water from different pumping facilities: Šentvid from the Šentvid pumping station, Bežigrad from the Kleče pumping station, Črnuče from the Jarški prod facility, the residential areas of Murgle and the areas along Tržaška cesta and to the west of Dolgi most from the Brest waterworks. The areas situated between these major regions receive water from several pumping stations, depending on the pressure conditions.

Monitoring the impacts affecting the safety of drinking water supply is a task performed by the management of the water supply system on a daily basis. Safe, technically flawless and economical operation of the water supply system is dependent on a permanent control of the network, facilities and equipment. The manager of the system performs a significant role in

Slika 5. Notranjost kanalizacije za padavinsko odpadno vodo. Foto: Domen Pal/Branko Čeak/Jože Maček.

Figure 5: The interior of the precipitation wastewater sewer. Photo: Domen Pal/Branko Čeak/Jože Maček

Razlike med izmerjenimi in pričakovanimi ali izračunanimi vrednostmi dokazujejo, da je treba območje, kjer je bila meritev opravljena, podrobneje pregledati. Terenske ekipe so v stalni pripravljenosti, da v primeru okvar kar najhitreje posredujejo.

Zmanjševanje izgub, ki v ljubljanskem sistemu znašajo okrog 30 % načrpane vode, je pomembnejša naloga za prihodnja leta. Vodovodne izgube so posledica starosti cevovodov in tesnilnih materialov, nekakovostnega materiala, korozije, poškodb kot posledic obremenitev iz prometa in gradbenih posegov v okolici vodovodne mreže, s čimer se bolj ali manj uspešno otepa vsak sistem oskrbe s pitno vodo. Mesto se je v prvih desetletjih po vojni hitro razvijalo, vgrajeni so bili

managing the assets, which – to a large extent – are hidden to the sight, lying several metres underground or are sunken in hill slopes. A daily supervision of the system is carried out visually, i.e. by checking the facilities, the pipelines and installations, the operation of closing devices and hydrants, manholes and the related facilities along with air evacuation valves. Special devices are used to monitor the rate of discharge and pressure of water at particular points of the system. When the gauged values differ from the expected or computed ones, the area of measurement concerned must be examined in detail. Field teams are on permanent standby to intervene as quickly as possible in case of breakdowns.

materiali s kratko življenjsko dobo, obstoječe omrežje pa se je nezadostno obnavljalo, tako da so nekateri deli omrežja stari 70 in več let. V zadnjih dvajsetih letih cevi iz nodularne litine, ki jih je v sistemu 32 %, zamenjujejo cevi iz litega železa (28 %), ki so bile vgrajene pred mnogimi desetletji, in nekakovostne plastične cevi (PCV, 17 %) izpred dveh do treh desetletij. Med pomemben material vodovodov se uvršča polietilen visoke gostote (14 %), v omrežju pa še najdemo tudi azbestno-cementne cevi (5 %), ki so se vgrajevale v začetku druge polovice preteklega stoletja. Veliko število okvar, ki se pojavljajo skorajda vsakodnevno, in posledično veliko število neželenih posegov v vodovodno omrežje povečuje tveganja za neskladnost pitne vode. Zmanjševanje vodovodnih izgub ne pripomore samo k zmanjšanim obratovalnim stroškom, ampak dolgoročno pomeni, da se zmanjšajo ali celo ukinejo tudi stroški, povezani z iskanjem kakovostnih rezervnih vodnih virov.

O ODVAJANJU IN ČIŠČENJU ODPADNE VODE

Kanalizacijski sistem je sestavni del komunalne infrastrukture, s pomočjo katere skrbimo za zmanjšanje vplivov človeka na okolje, vplivamo na varnost in kakovost bivalnega prostora ter zmanjšujemo tveganja, ki bi lahko ogrozila zdravje prebivalcev glavnega mesta in okolice.

Pitna voda takoj po uporabi postane komunalna odpadna voda, ki skupaj z industrijsko in padavinsko odpadno vodo

One of the most important issues to be addressed in the years to come is to reducing losses, which account for around 30% of the water pumped in Ljubljana's system. The water supply system leakage losses are due to old pipelines and sealing materials, materials of poor quality, corrosion, damage caused by traffic loads and construction interventions occurring in the vicinity of the water supply network, which are all the typical troubles each drinking water supply system must cope with. The city's rapid development in the first decades following WWII also meant that materials with a short life-span were used. As the existing network was not renovated at the necessary rate, some of its parts are 70 years old or more. Over the last 20 years, cast iron pipes (28%) built into the system several decades ago and low-quality plastic pipes (PVC, 17%) which are 20–30 years old have been superseded by ductile iron pipes, which currently account for 32% of the system. Significant materials used in water supply networks include high-density polyethylene (14%) along with occasional asbestos-cement pipes (5%) which were used in the early 1950s. A significant number of breakdowns occur nearly every day and, as a result, frequent undesired interventions to the network increase the risk for non-compliance of drinking water. Reducing the losses caused by water distribution system leakage not only helps streamline the operation costs but also, in a long run, helps minimise or even eliminate the costs relating to the search for high-quality reserve water resources.

ABOUT WASTEWATER DISCHARGE AND TREATMENT

The sewer system is a component part of the municipal infrastructure designed to reduce human impact on the environment, to enhance the safety and quality of the living environment and to reduce the risk of jeopardising the

Slika 6: Centralna čistilna naprava Ljubljana iz zraka. Foto: arhiv JP Vodovod – Kanalizacija, d. o. o.

Figure 6: Aerial view of the Ljubljana Central Wastewater Treatment Plant. Photo: the archives of JP Vodovod-Kanalizacija d. o. o.

potuje s pretežnega dela urbanih površin v javno kanalizacijo. O urejenem odvajanju odpadne vode pa lahko govorimo šele, ko se odpadna voda pred izpustom v okolje očisti v čistilni napravi, kjer jo mehansko in biološko prečiščeno, nadzorovano in skladno s predpisi, vrnemo v naravno okolje in s tem sklenemo krogotok vode.

Centralni kanalizacijski sistem mesta Ljubljane se zaključi s čiščenjem odpadne vode na Centralni čistilni napravi Ljubljana (CČN Ljubljana) z zmogljivostjo 360.000 PE, ki stoji pred sotočjem rek Ljubljanice in Save v Zalogu, odpadne vode mesta in okolice pa se čistijo tudi na lokalnih komunalnih čistilnih napravah. Na kanalizacijske sisteme je prek 28.000 priključkov priključenih več kot 270.000 prebivalcev ter številni industrijski in poslovni objekti.

Kanalizacijski sistem sestavljajo cevovodi različnih dimenzij, od 25 do 240 cm, in množica tehnoloških objektov, kot so črpališča, razbremenilniki, zadrževalni bazeni, združitveni objekti, revizijski jaški, lovilci olj in peskolovi ter čistilne naprave. Kanalizacijski sistemi so v splošnem gravitacijski, kar pomeni, da za odvajanje odpadne vode izkoriščamo silo teže, saj voda teče navzdol. Na posameznih ravninskih predelih in ob prečkanju vodotokov pa moramo odpadno vodo prečrpavati v višje ležeče glavne zbiralnike, kar opravljajo številna črpališča. Na kanalizacijskih sistemih deluje 45 črpališč z letno zmogljivostjo 7 milijonov m^3 odpadne vode.

Centralni kanalizacijski sistem je zgrajen pretežno v mešanem sistemu, kar pomeni, da skupaj s komunalno in industrijsko odpadno vodo odvajamo tudi padavinsko, v ločenem sistemu pa se odpadna voda odvaja ločeno po dveh kanalizacijskih omrežjih. V tem primeru kanalizacijsko omrežje za komunalno odpadno vodo in komunalna čistilna naprava v času padavin nista obremenjena z velikimi količinami padavinske vode. Za razbremenjevanje kanalizacijskega omrežja služijo zbiralniki in zadrževalni bazeni, ki preprečujejo čezmerno prelivanje odpadne vode prek razbremenilnikov v reko Ljubljanico. V centru mesta, kjer so pod urbanimi površinami številni vodi, pa ima mešani sistem prednost.

Kanalizacijsko omrežje poteka praviloma na večji globini od drugih komunalnih vodov. Upravljamo 363 km kanalizacije za komunalno odpadno vodo, 329 km za padavinsko odpadno vodo in 477 km mešanega tipa. Za zagotavljanje nemotenega pretoka odpadne vode je

health of the inhabitants of the capital and its surrounding area.

After being used, drinking water immediately turns into urban wastewater, which, together with industrial and precipitation wastewater, is led from the major portion of urban areas into public sewers. However, proper wastewater discharge is achieved when wastewater is processed in a treatment plant prior to discharge into the environment. Only after it has been mechanically and biologically treated is it returned to its natural environment in a controlled manner and in compliance with the regulations, thereby completing the water cycle.

The final stage of the central sewage system of the City of Ljubljana is the process of wastewater treatment, which occurs at the Central Wastewater Treatment Plant (WWTP). Serving 360,000 customers, the facility is situated just before the confluence of the Ljubljanica and Sava Rivers in Zalog. Wastewater from the city and its surrounding area is sometimes also treated in local wastewater treatment plants. By way of 28,000 connections, over 270,000 inhabitants and a number of industrial and business premises are connected to the sewage systems.

The sewage system consists of pipes of different dimensions, ranging from 25 cm to 240 cm, and a number of technological facilities, such as pumping stations, overflow structures, retention basins, combinable chambers, manholes, grease traps and catch basins as well as sewage treatment plants. As a rule, sewage systems rely on gravity, which means that they convey wastewater as water runs downwards. On certain flat areas and at points where streams or rivers are crossed, wastewater has to be re-pumped into higher-lying main collectors, which is done by numerous pumping stations. The sewage systems are fitted with 45 pumping stations with an annual capacity of 7 million m^3 of wastewater.

To a large extent, Ljubljana's central sewage system is a combined system of drainage, meaning that along with household and industrial sewage it also carries away precipitation wastewater. In contrast to this type of system, separate systems allow wastewater to be carried off individually through two separate sewage networks. In this latter case, the sewage system for urban wastewater and the related treatment plants are not burdened with large quantities of precipitation wastewater during heavy rainfalls. By preventing excessive overflows of wastewater from the overflow structures into the Ljubljanica River, collectors and retention basins are designed to lessen the burden on the sewage network. A combined system is the preferred choice to be used in the city centre, where there are many ducts underneath urban areas.

treba iz kanalizacijskega omrežja redno odstranjevati mulj, pesek in druge usedline, pri čemer uporabljamo sodobne čistilne stroje. Pri čiščenju kanalizacije manjših do srednjih premerov (do 1100 mm) se uporabljajo sistemi za čiščenje, ki z vodo pod visokim tlakom izpirajo sedimente z dna kanala, pa tudi obloge na stenah cevi. Ročnemu čiščenju kanalizacijskega omrežja večjega premera se ni mogoče povsem izogniti. Stanje kanalizacijskega omrežja se stalno nadzoruje, saj netesno omrežje lahko povzroči onesnaževanje okolja, istočasno pa obstaja tudi obratno tveganje: v kanalizacijo lahko vdira podzemna voda in hidravlično obremenjuje kanalizacijski sistem. Dostopno kanalizacijsko omrežje velikih premerov nadzoruje osebje, stanje nedostopnega omrežja pa posnamejo kamere, pritrjene na računalniško vodenega robota, ki je nadzorovan iz posebej za te namene opremljenega vozila. Podatki o stanju kanalizacijskega omrežja služijo za odločitve o interventnih posegih in načrtovanje obnov. Letno pregledamo 100 km kanalizacijskega omrežja.

Vsi objekti na kanalizacijskih sistemih so avtomatizirani in daljinsko vodeni iz osrednjega nadzornega centra. Daljinsko upravljanje je pogoj za hitro in učinkovito posredovanje v primeru okvar in napak na sistemu, periodičen prenos podatkov o obratovalnih pogojih pa je temelj za vsakodnevne odločitve glede upravljanja in vzdrževanja, pa tudi za načrtovanje razvoja kanalizacijskih sistemov.

Na CČN Ljubljana se dnevno očisti od 80 do 100 tisoč kubičnih metrov odpadne vode, s čimer pomembno zmanjšujemo obremenitve Ljubljanice in Save ter izboljšujemo kakovost življenja prebivalcev ob rekah in kakovost podzemnih voda dolvodno od Ljubljane. S postopki na čistilni napravi, ki je enostopenjska mehansko-biološka čistilna

As a rule, sewage networks run on a deeper level than the other municipal conduits. JP Vodovod-Kanalizacija manages 363 km of municipal sewage pipelines, 329 km of precipitation wastewater pipelines and 477 km of mixed pipes. To ensure the smooth flow of wastewater, silt, grit and other sediments need to be regularly removed from the network, with advanced sewer-cleaning equipment being used for this purpose. In the case of sewers with small to medium diameters (up to 1,100 mm), high pressure water cleaning systems are used to wash sediments from the pipe bottom as well as any incrustations of foul matter on the pipe walls. Manual cleaning of sewers with larger diameters cannot be avoided completely. The condition of the sewage network is constantly supervised, as leaks in the network can result in environmental pollution. There is also the opposite risk of groundwater bursting into sewers, causing hydraulic burdening of the sewage system. The sewage network of larger diameters that is accessible is monitored by personnel; the condition of the inaccessible portions of the network is recorded by cameras fitted on a computer-guided robot controlled from a dedicated vehicle. All decisions about emergency interventions and renovation planning are based on the data about the sewage network condition. Altogether, 100 km of the sewage network are examined annually.

All facilities relating to the sewage systems are automated and remotely controlled from the main control centre. Remote-controlling enables prompt and effective interventions in case of breakdowns or defects in the system, whereas the operational and maintenance decisions along with sewage systems development plans are all based on periodically transmitted data about operational conditions.

From 80,000 to 100,000 m^3 of wastewater is treated by the Ljubljana Central Wastewater Treatment Plant daily. The burden for the Ljubljanica and Sava Rivers is thus significantly relieved. Moreover, the quality of life of the residents of the areas along the rivers and the

ALI STE VEDELI …

DA LAHKO ENA ČAJNA ŽLIČKA NEVARNE SNOVI ONESNAŽI TRI OLIMPIJSKE BAZENE PITNE VODE?

naprava s sekundarno biološko stopnjo čiščenja, odstranjujemo iz odpadne vode neraztopljene snovi in ogljikove spojine, namenjena pa je tudi nitrifikaciji. Očiščena odpadna voda je najpomembnejši rezultat delovanja CČN Ljubljana.

Odpadna voda se ob vstopu na napravo najprej prečisti v mehanski, nato pa še v biološki stopnji čiščenja. V mehanski stopnji čiščenja s pomočjo lovilca kamenja ter grobih in finih grabelj iz vode odstranimo vse mehanske odpadke, večje od 6 mm, nato pa v lovilcu maščob in peskolovu odstranimo še maščobe in pesek, s čimer na leto izločimo približno 1.200 ton odpadkov. V biološki stopnji se v prezračevalnih bazenih z volumnom 39.000 m^3, kamor dovajamo stisnjen zrak, s pomočjo mikroorganizmov v aktivnem blatu razgradijo v vodi raztopljene organske snovi. V naknadnih usedalnikih se aktivno blato z usedanjem loči od očiščene vode. Očiščena voda prek iztočne kinete odteka v reko Ljubljanico. Usedlo blato se delno vrača v prezračevalne bazene za vzdrževanje potrebne količine mikroorganizmov, odvečno blato pa se naprej obdeluje v gniliščih, kjer poteka nadaljnja razgradnja organskih snovi v njem.

Odvečno blato zavzema največji delež odpadkov na čistilni napravi. Z nadaljnjimi postopki in primerno obdelavo ga spremenimo v sipek, higieniziran posušen odpadek v obliki peletov premera 2–4 mm, ki so primerni za snovno in energijsko

DID YOU KNOW…?

THAT ONE TEASPOON OF A HAZARDOUS SUBSTANCE CAN CONTAMINATE THREE OLYMPIC-SIZE SWIMMING POOLS OF DRINKING WATER?

quality of groundwater downstream of Ljubljana are improved. By means of the processes conducted at the wastewater treatment plant, which is a single-stage mechanical and biological treatment plant with a secondary stage of biological treatment, undissolved matter and carbon compounds are removed from the wastewater, and nitrification is carried out. The most significant output of the WWTP's operation is properly treated wastewater.

Mechanical treatment of the wastewater entering the treatment plant is followed by biological treatment. The mechanical treatment stage involves the removal of all solid waste particles exceeding 6 mm in a detritus tank and the use of coarse and fine screens. After that, the fat- and grease-skimming tank and the grit chamber are used to remove fats, sand and grit, by which around 1,200 tons of waste per year are separated. During the biological stage, which takes place in aeration tanks with a volume of 39,000 m^3 into which compressed air is introduced, organic substances dissolved in water are decomposed with the help of microorganisms living in the activated sludge. In the subsequent sedimentation tanks, the activated sludge is separated from the treated water by settlement. The water thus treated is then returned to the Ljubljanica through the outflow channel. Part of the sludge settled out is returned to the aeration tanks to maintain the necessary quantities of microorganisms, with excess sludge continuing to be treated in digesters where further decomposition of organic substances in the sludge takes place.

izrabo. Na leto nastane približno 8.000 ton osušenega blata.

Dograditev manjkajoče javne kanalizacije na že poseljenih območjih spada med prednostne okoljske projekte v Ljubljani. Ti projekti pa so tesno povezani tudi z načrti za gradnjo 3. faze Centralne čistilne naprave Ljubljana, ki obsegajo povečanje zmogljivosti naprave zaradi priključitve novih uporabnikov, ter za zgraditev terciarnega čiščenja in s tem povezano nadgradnjo obstoječih objektov in naprav.

ZAKLJUČEK

Stanje komunalne infrastrukture je pomemben kazalec razvitosti družbe. Od uspešnega gospodarjenja s premoženjem preteklih generacij ni odvisen samo življenjski standard sedanjih prebivalcev Ljubljane, ampak tudi to, kako visoka bodo potrebna vlaganja v vodovodni in kanalizacijski sistem čez čas, ko bodo vajeti gospodarjenja prevzeli naši otroci.

Znanstveniki so nedavno ugotovili, da je velik del vode na Zemlji starejši od našega osončja.[7] Kateri pojavi so vplivali na nastanek tako velikih količin vode, kot jih poznamo na našem planetu, je težko predstavljivo in tudi za znanstvenike še ne povsem pojasnjeno vprašanje. Vode na našem planetu ne bo zmanjkalo, saj nikamor ne uhaja. Zaradi napačnih odločitev in dejanj pa lahko zmanjka pitne vode. Zato si prizadevamo za trajnostne rešitve.

Prvi postulat deležnikov, odgovornih za oskrbo s pitno vodo in kanalizacijo v Ljubljani, se glasi: naravna pitna voda in varnost oskrbe s pitno vodo imata neprecenljivo vrednost. Zanju je treba

Surplus sludge accounts for the largest portion of the treatment plant's waste. By means of subsequent processing and appropriate treatment, it is turned into dry, loose and hygienic waste in the form of pellets with a diameter of 2–4 mm, suitable to be used as both an energy source and recycled into other material. Around 8,000 tons of dry sludge are produced annually.

The construction of a public sewage system lacking in previously settled areas is one of Ljubljana's priority environmental projects. These projects are also closely related to the plans for the construction of Stage 3 of the WWTP. They include an increase in its capacity aimed at enabling new users to be connected and the putting in place of tertiary treatment along with the related upgrade of the existing facilities.

CONCLUSION

The way in which municipal infrastructure is organised is an important indicator of how well a society is developed. Proper management of previous generations' assets is not only crucial for the living standard of Ljubljana's present inhabitants but also for the amount of investments in the water supply and wastewater discharge systems required in the future.

Scientists have recently discovered that a large portion of water on Earth predates our solar system.[7] It is difficult to imagine what phenomena might have caused such quantities of water to appear on our planet; scientists have not yet been able to answer these questions adequately. As water cannot escape from our planet, we will never run out of it. However, wrong decisions and actions may cause shortages of drinking water. That is why sustainable solutions have to be offered.

A guiding principle adhered to by the stakeholders responsible for the water supply and sewage

nenehno vlagati veliko delovnega napora in finančnih sredstev. Popolne varnosti žal ni v nobenem sistemu oskrbe s pitno vodo in kanalizacije, vendar je mogoče stopnjo varnosti povečati. Mesto Ljubljana je že dobro stoletje oskrbovano varno in z naravno pitno vodo, in to je ena izmed vrednot, ki bo omogočila kakovostno življenje tudi našim potomcem, a pod določenimi pogoji. Naravne danosti niso dovolj. Potrebujemo strokovno pravilne dolgoročne odločitve, znanja in izkušnje ter upoštevanje načel etičnosti in zakonodajnih predpisov, ki smo si jih napisali sami – tudi zato, da pred lastnimi neustreznimi ravnanji zavarujemo sami sebe.

Voda je del nas. Prav zato je voda naša in vaša, torej naša skupna odgovornost.

systems in Ljubljana is that natural drinking water and safe supply of drinking water are invaluable. They require ongoing commitments in terms of both work and finance. While absolute safety is, unfortunately, impossible to achieve in any water supply or sewage system, the degree of safety can always be increased. The city of Ljubljana has had a safe supply of natural drinking water for over a century. This is one of the assets that will also help improve the quality of life in the future, but only if certain conditions have been met. Natural conditions alone are not enough. What is required are expertise-based long-term decisions, knowledge and experience, compliance with both ethical principles and legislative provisions that we have ourselves laid down in order to protect ourselves from our own wrong actions.

Water is part of us. That is why the responsibility for water is our shared responsibility.

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LUCIJA STUPICA

Ozka pot

Ozka pot ob morski obali.
Nekdo hodi pred menoj,
nekdo je za mano. Sami.

V vodi labodi, race, galebi,
med nasedlimi hrbti
rožnatih kamnov.

Še naprej trgujem s koraki,
hoja je bližanje k sebi.
Po dežju gre kamenje v cvet,

sonce ga razpoči v bleščavi.
Moram sesti glasno,
hoja človeka utrudi.

Vse zunanje je notranje.
Tisti za mano me prehiteva.

LUCIJA STUPICA

A Narrow Path

A narrow path along the sea shore.
Someone goes before me,
someone is behind. Alone.

In the water swans, ducks, seagulls,
among the stranded backs
of pink-hued stones.

I go on trading in my steps,
to walk is to approach one's self.
After rain, the stones bloom out,

burst in the dazzling sunlight.
I have to sit down loudly,
one grows tired from walking.

All outward is the inward.
The one behind is overtaking.

TRANSLATED BY NADA GROŠELJ

MOČ VODE
THE POWER OF WATER

Irena Šinkovec

Moč vode je neizmerna. Nikjer ni bolj vidna in občudovanja vredna kot ob naravnih procesih. Človek jih je spremljal že od nekdaj: slapove, jezove, jame, plimovanje, valovanje, poplavljanje, spreminjanje rečnih strug ter silno energijo, ki so jo oddajali. Zato jo je skušal ukrotiti in prikrojiti za lastne potrebe, včasih uspešno, še večkrat neuspešno. V najstarejših obdobjih s strahospoštovanjem in darovanjem, danes prepogosto nerazumno in s trajnimi uničujočimi posledicami. Če so se prvi stalni naseljenci znali prilagoditi okolju in izkoriščati njegove naravne danosti, kot na primer koliščarji z Ljubljanskega barja, ki so svoje domove postavili na obrežje vodnih površin ter se zaščitili z od tal dvignjenimi bivališči, pa to ni več zadostovalo zgoščenemu prebivalstvu v urbanih naseljih, ki je zaradi bivalnih potreb in obsežnejših obdelovalnih površin marsikje preseglo meje naravnega. Voda je vse do zgraditve cestnih in železniških povezav pomenila tudi glavno komunikacijsko žilo ter omogočila velika odkritja in povezave med kontinenti. Segala pa je tudi onkraj profanega; številni nepojasnjeni procesi, ki si jih človek vse do časa razvoja znanosti ni znal razložiti, so bili po njegovem lahko le delo nadnaravnih sil.

Želja po uporabi silne energije tekoče vode je vodila do prvih tehniških izumov, med katere poleg melioracijskih sistemov najstarejših visokih civilizacij štejemo tudi izum kolesa, ki ga voda lahko vrti. Prvi vodni mlini izvirajo iz antične Grčije, v srednjeveški Evropi so jih uporabljali za raznovrstna mehanska dela. Od tu do hidroelektrarn ni bila več tako dolga pot. »Prišel sem, videl in bil prevzet,« je leta

The power of water is immeasurable – and nowhere is it so apparent and aweinspiring as in its natural processes. Man has always followed them: the waterfalls, dams, the tides, the waves, floods, shifting riverbeds, as well as the formidable energy released in these processes. Man has thus tried to tame water and tailor it to his own needs, sometimes successfully and more often unsuccessfully. In antiquity, he did so with awe and offerings; today he often does it senselessly and in a way that causes lasting damage. If the first permanent settlers knew how to adapt to their environment and utilize its natural potentials, e.g. the pile dwellers of the Ljubljana Marshes who built their homes on the banks of areas of water and protected them by raising them off the ground; adaptation was not enough for densely populated urban areas where the people's needs and extensive cultivated areas required to fulfil them often exceeded the bounds of natural feasibility. Until the construction of roads and railways, water was also the main communications artery and facilitated great discoveries and connections between continents. However, water also extended beyond worldly things: many unexplainable phenomena were deemed the work of supernatural forces that man was unable to explain until the time of the scientific revolution.

The desire to utilize the vast forces of running water led to humanity's first inventions in engineering – in addition to the land amelioration systems of the oldest developed civilizations, these also include the wheel, which can be turned by water. The first water mills date back to ancient Greece and were used for numerous mechanical purposes in medieval Europe. And the path from there to the hydroelectric power stations was not all that long. "I came, I saw and I was conquered,"

Ostanki kolišča na Ljubljanskem barju, okoli 3.600 pr. n. št. (arhiv MGML)

Remains of a pile dweller settlement in the Ljubljana Marshes, dated around 3,600 BC (MGML archives)

F. Kurz Goldenstein, Papirnica v Vevčah, 1857 (MGML foto M. Paternoster)

F. Kurz Goldenstein, Vevče paper mill, 1857 (MGML, photo M. Paternoster)

1935 ob odprtju Hooverjevega jezu izjavil ameriški predsednik F. Roosevelt, ko je zagledal do takrat nepredstavljivo gmoto betona, ki je zadrževala vodo jezera Mead.

Še mnogo večja pa ostaja človekova želja, da bi vodi, ki prekriva kar dve tretjini našega planeta, iztrgal vsaj delček zemlje. Osuševanje vodnih površin ima dolgo tradicijo, med pomembnejše izumitelje na tem področju pa moramo prav gotovo šteti Nizozemce.

said the President of the United States, F. D. Roosevelt upon the opening of the Hoover Dam in 1935, as he witnessed the hitherto unimaginable mass of concrete holding back the waters of Lake Mead.

Still greater is man‘s desire to wrest land from the water covering as much as two thirds of the planet. The drainage of water surfaces has a long history, and its important pioneers certainly include the Dutch.

MOČ RAVNE ČRTE: BEEMSTER[1]

Še danes velja za osupljiv podvig: ljudje so v 17. stoletju s pomočjo energije vetra znali v nekaj letih spremeniti jezera v tisoče hektarov zemlje. Ponos, ki so ga občutili ob tovrstnem tehničnem dosežku, se je odrazil tudi v oblikovanju krajine. Če obstaja kraj, kjer je mogoče v polnosti doživeti poezijo ravne črte, potem je to Beemster, najstarejši kos vodi iztrgane zemlje v provinci Noord-Holland. Gradnjo nasipov in izsuševanje zemlje so končali leta 1612 pod Leeghwaterjevim vodstvom. Ureditev tako pridobljene nove zemlje temelji na ravnih poljih ter povsem simetričnem rastru cest in kanalov, kot bi želeli posebej poudariti, da gre za delo človeka. Beemster s svojo strogo geometrično krajino vse do danes ostaja mojstrovina tehnologije in krajinskega oblikovanja 17. stoletja.

MORJU IZTRGANA ZEMLJA

Nižinsko Holandijo sestavljajo predvsem polderji, tj. morju iztrgana zemlja, ki leži pod višino morske gladine. Življenje in delo na takem zemljišču sta mogoča le, če je obdano z nasipi in če je raven vode ves čas pod nadzorom. V preteklosti je za to skrbelo več sto mlinov na veter. Pozneje, v 19. stoletju, so to delo opravljali parni stroji, danes pa v ta namen uporabljajo računalniško vodene električne črpalne postaje. Odvečno vodo črpajo iz jarkov v polderjih in jo po zapletenem sistemu kanalov vrnejo v ocean. Posebna oblika

[1] Za besedilo in slikovno gradivo se zahvaljujem Veleposlaništvu kraljevine Nizozemske v Ljubljani, partnerjem pri projektu Voda.

THE FORCE OF A STRAIGHT LINE: THE BEEMSTER[1]

It remains an amazing adventure; by using wind energy people in the seventeenth century turned lakes into thousands of hectares of land within the space of a few years. People were proud of this technical feat, and this pride was expressed in the design of the landscape. If there is one place where you can experience the poetry of a straight line, it is in the Beemster, the oldest of the reclaimed lands of Noord-Holland. The construction of the dikes and reclaiming of the land was completed in 1612 under Leeghwater’s supervision. The lay-out imposed on the empty land was one of straight fields and a perfectly symmetrical grid of roads and canals, as if to emphasise that man was now in charge here. With its strict geometric landscape the Beemster is still a masterpiece of seventeenth century technology and landscaping.

RECLAIMED LAND

Low-lying Holland consists mainly of polders, reclaimed land that lies beneath sea level. It is only possible to work and live on this land if dikes are built and the water level controlled. In the past this was done using hundreds of windmills. Later, in the 19th century, steam engines took over this job, and nowadays we have computerized, electric pumping-stations. Through a complicated canal system, the excess water is pumped from ditches in the polders and eventually brought to the ocean. The droogmakerij is a special type of polder: this is a polder that is built at the bottom of a lake from which the water has first been drained. Schermer

[1] I’d like to express great gratitude to the Embassy of the Kingdom of the Netherlands in Ljubljana for the materials and participating in the Water project.

Zemljevid Beemstra (v tistem času jezero) in okolice dve leti pred tem, ko so ga obdali z nasipi in osušili.
Kartograf: Pieter Cornelisz Cort (po naročilu snovalcev osuševalnega projekta), 1607
Vir: Nationaal Archief

Map of the Beemster (which is a lake at this time), and surrounding land two years before it was embanked and drained.
Cartographer: Pieter Cornelisz Cort commissioned by the initatiors of the draining project, 1607
Source: Nationaal Archief

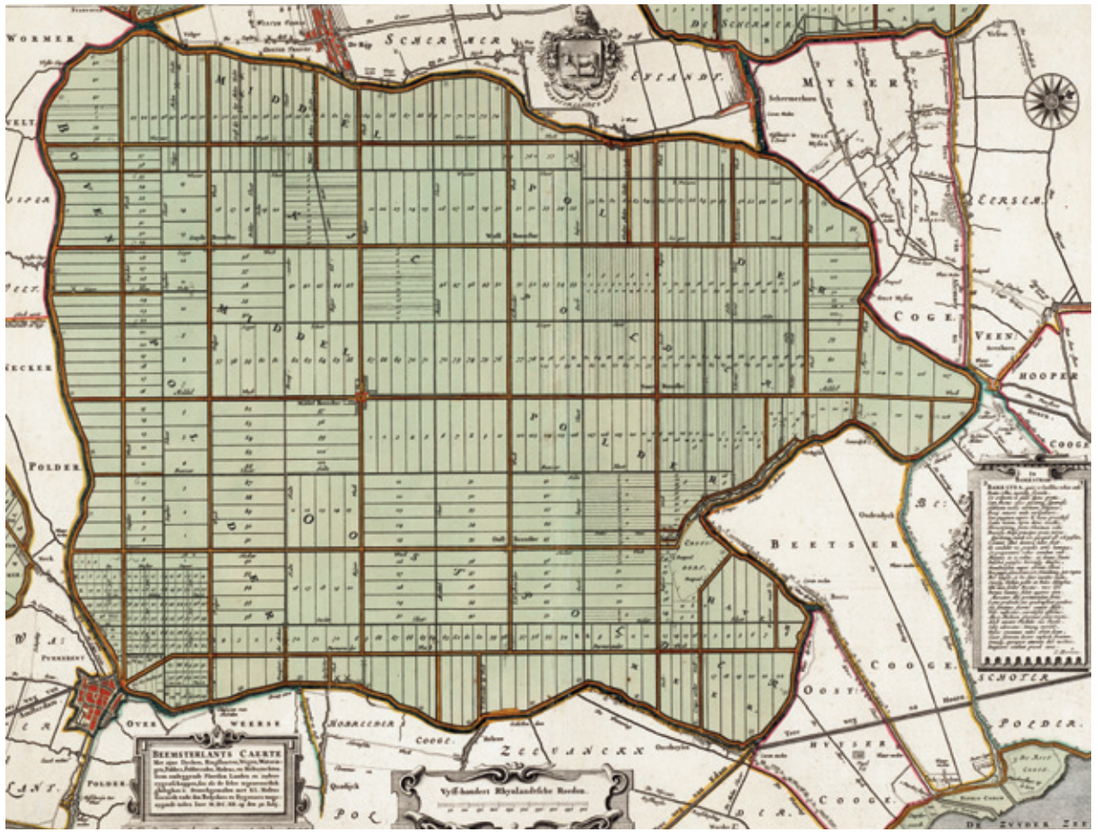
polderja je *droogmakerij*: to je polder, zgrajen na jezerskem dnu, ki ga je bilo treba najprej osušiti. Primera *droogmakerijen* sta Schermer in Beemster, mednje pa sodijo tudi sodobni polderji v IJsselmeeru (tj. jezero IJssel).

Beemster je bil zaradi zgodovinskega pomena in zaradi dejstva, da je izvirna podoba krajine tam ostala skoraj nespremenjena,

and Beemster are examples of droogmakerijen, as are the modern-day polders in the IJsselmeer, or Lake IJssel.

Because of its historical relevance, and because the original structure of the area is still largely intact, the Beemster was inscribed on the UNESCO World Heritage Site list in 1999. Justification for Inscription is as follows:

- Criterion (i): The Beemster Polder is a masterpiece of creative planning, in which the ideals of antiquity and the Renaissance were applied to the design of a reclaimed landscape.
- Criterion (ii): The innovative and intellectually imaginative landscape of the Beemster



Zemljevid Beemstra (v tistem času kopno) in okolice dve leti po tem, ko so ga obdali z nasipi in osušili.
Kartograf: Daniël van Breen, 1658
Vir: Kaartencollectie Provinciale atlas (zbirka kart iz pokrajinskega atlasa)

Map of the Beemster (which is land at this time), and surrounding land after it is embanked and drained.
Cartographer: Daniël van Breen, 1658
Source: Kaartencollectie Provinciale atlas (map collection provincial atlas)

leta 1999 vpisan na Unescov seznam svetovne dediščine. Utemeljitev se glasi takole:

- Merilo (i): Polder Beemster je mojstrovina kreativnega načrtovanja, pri katerem oblikovanje jezeru iztrgane zemlje temelji na idealih antike in renesanse.
- Merilo (ii): Inovativna in intelektualno domiselna krajina polderja Beemster je globoko in trajno vplivala na osuševalne projekte v Evropi in drugod.
- Merilo (iv): Nastanek polderja Beemster zaznamuje pomemben korak v oblikovanju medsebojne povezanosti med človeštvom in vodo v ključnem obdobju družbenega in gospodarskega razmaha.

Polder had a profound and lasting impact on reclamation projects in Europe and beyond.

- Criterion (iv): The creation of the Beemster Polder marks a major step forward in the interrelationship between humankind and water at a crucial period of social and economic expansion.

REGULACIJA LJUBLJANSKEGA BARJA IN LJUBLJANICE

Obsežna neprehodna močvirnata pokrajina Ljubljanskega barja in številne poplave, ki so ogrožale Ljubljano, so bile glavni razlog za pogoste razmisleke o možnostih osušitve in pridobitve pridelovalnih površin tudi v našem prostoru, Nizozemska pa je bila pri tem pozitiven zgled.

Že leta 1689 je J. V. Valvasor zapisal: »Močvirje, ki se razteza štiri milje v dolžino in tri v širino, bi se dalo najlepše izsušiti z umetnimi jarki, kakor na Holandskem; tako bi se moglo spremeniti v najlepšo zemljo, tudi blizu mesta, kjer je voda zajezena.«[2] Njegove zamisli so razen manjših posegov zaživele šele po dekretu o izsušitvi in kolonizaciji Barja, ki ga je izdala cesarica Marija Terezija leta 1769 in na podlagi katerega je nastal ambiciozni načrt regulacije Barja, ki ga je pripravil jezuitski pater Gabriel Gruber. Čeprav so starejši raziskovalci pripisovali obsežnejšo regulacijo struge Ljubljanice že Rimljanom, tega sodobne raziskave ne potrjujejo, temveč kažejo le na morebitne manjše popravke zavojev rečne struge. Prav tako ni sledov o obsežnejšem osuševanju in kultiviranju močvirskih površin.[3] Iz starih zapisov lahko razberemo, da je bilo Barje pred osuševanjem po površini prekrito s 30 do 65 cm visokim gostim mahom, ki je bil prepojen z vodo. Pod mahom je bila plast šote, ki je bila na nekaterih mestih debela več metrov. Teren je bil tako rekoč neprehoden, ponekod poraščen z nizkimi smrekami, bori, jelšami in resjem, ki je dodatno zadrževalo vodo.[4] Šele med letoma 1762 in 1769 je Zorn pl. Mildenheim z izkopom kanala do

[2] Valvasor 1689.
[3] Gaspari 2009, 104–106.
[4] Hohenwart 1838, 7–8.

THE AMELIORATION OF LJUBLJANA MARSHES AND LJUBLJANICA RIVER

Numerous floods threatening Ljubljana and the extensive impassable swamplands of the Ljubljana Marshes prompted frequent debates on whether the marshes could be drained to create arable land, and the Netherlands served as a good example.

As early as 1689, J. V. Valvasor wrote: “The swamp, measuring four miles long and three miles wide, could best be drained by artificial ditches such as those in Holland; it could thus be turned into a great land, even near the city where the waters could be dammed.”[2] However, except for minor developments, his ideas only came true with the decree ordering the drainage and colonization of the Marshes issued in 1769 by Empress Maria Theresa that formed the basis for the ambitious plan for the amelioration of the Marshes devised by the Jesuit priest Gabriel Gruber. Although researchers used to think that the riverbed of the Ljubljanica had already been extensively ameliorated by the Romans, current research doesn’t support this view and merely indicates possible minor corrections to the bends of the river. There is also no proof of extensive drainage and cultivation of the marshland.[3] Old writings indicate that prior to the drainage, the Marshes were covered by a dense layer of moss that was 30 to 65cm thick and saturated with water. Under the moss, there was a layer of peat that was up to a few metres thick in certain places. The area was virtually impassable, overgrown in some places by short spruce trees, pines, alders and heaths that further served to retain water.[4] Only in 1762–1769, when Zorn Mildenheim ordered the construction of a channel (Curnovec) emptying into the Ljubljanica, was the land below Tržaška successfully drained, which spurred the extensive developments that

[2] Valvasor 1689.
[3] Gaspari 2009, 104–106.
[4] Hohenwart 1838, 7–8.

Valvasorjeva Ljubljana (MGML, foto M. Paternoster)
Valvasor's Ljubljana (MGML, photo M. Paternoster)

Ljubljanice (Curnovec) uspešno osušil del zemljišča pod Tržaško cesto in s tem dal spodbudo za obsežnejša dela, ki so potekala v naslednjem obdobju. Z regulacijo Ljubljanice in zgraditvijo mreže kanalov naj bi obsežno močvirje spremenili v rodovitna polja,

followed. The amelioration of the Ljubljanica and the construction of a network of channels were supposed to turn the extensive marshland into fertile fields, and more importantly, to prevent frequent flooding that were particularly annoying in the city of Ljubljana itself. The riverbed of the

ČEPRAV LJUBLJANICA SAMA PO SEBI NI VELIKA, JE VENDAR ČESTO NARASLA DO PRESENETLJIVE VIŠINE. TAKO SE JE JESENI LETA 1190 ZARADI TRI TEDNE TRAJAJOČEGA DEŽJA TAKO RAZLILA, DA SO SE MORALI PO VSEM MESTU S ČOLNI VOZITI. NA MNOGIH KRAJIH SE JE DVIGNILA DO ZGORNJIH OKEN IN ZA MESTO JE NASTALA NEPOPISNA ŠKODA. NIČ MANJŠA NI BILA ŠKODA LETA 1537, KO JE BILO TREBA IZ NEKIH HIŠ SKOZI ZGORNJA OKNA STOPATI V LADJE. DA, LETA 1589 JE LJUBLJANICA ZARADI STALNEGA DEŽJA IN SNEGA TAKO NARASLA, DA JE NA VEČER O VSEH SVETIH ODNESLA VELIKO HIŠ IN LJUDI V NJIH DO BREGA, KJER SO JIH REŠILI.

J. V. VALVASOR, 1689

ALTHOUGH THE LJUBLJANICA IS NOT A MAJOR RIVER, ITS LEVEL HAS OFTEN RISEN SURPRISINGLY HIGH. IN AUTUMN 1190, THREE WEEKS OF RAIN THUS CAUSED IT TO SPILL OVER ITS BANKS AND FORCE EVERYBODY IN THE CITY TO GO AROUND IN BOATS. IN MANY PLACES, THE RIVER REACHED THE UPPER WINDOWS OF HOUSES AND CAUSED SEVERE DAMAGE TO THE CITY. THE DAMAGE WAS NO LESSER IN 1537, WHEN SOME HOUSES COULD ONLY BE EXITED BY STEPPING ONTO A BOAT FROM THE UPPER WINDOWS. YES, IN 1589, CONSTANT RAIN AND SNOW CAUSED THE LJUBLJANICA TO INCREASE SO MUCH THAT ON ALL SAINTS’ EVE, IT CARRIED OFF A NUMBER OF HOUSES AND PEOPLE IN THEM ALL THE WAY TO BREG, WHERE THEY WERE RESCUED.

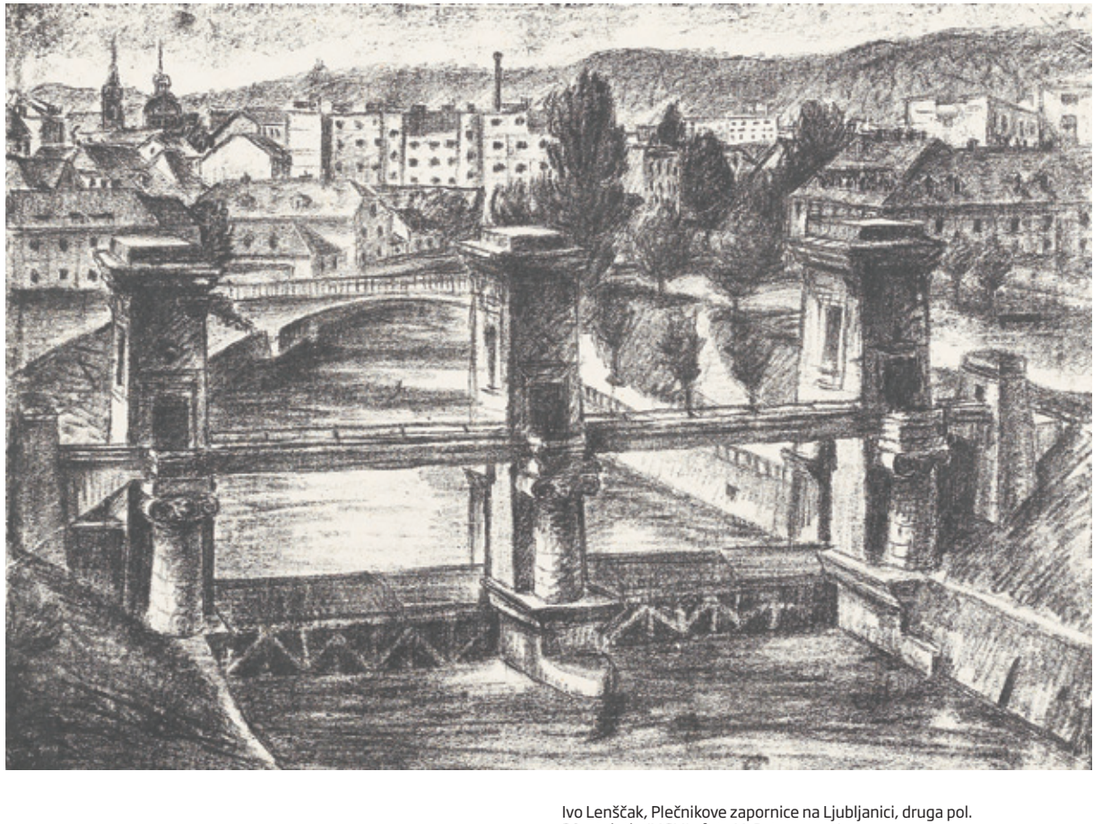
J. V. VALVASOR, 1689

Regulacija Ljubljanice, 1912-1913 (arhiv MGML)

Amelioration of the Ljubljanica, 1912–1913 (MGML archives)

Regulacija Ljubljanice, 1931 (MGML, foto I. Sivec)

Amelioration of the Ljubljanica, 1931 (MGML, photo I. Sivec)



Ivo Lenščak, Plečnikove zapornice na Ljubljanici, druga pol. 20. stoletja (MGML, foto M. Paternoster)

Ivo Lenščak, Plečnik's locks on the Ljubljanica river, late 20th century (MGML, photo M. Paternoster)

predvsem pa preprečili pogoste poplave, ki so bile najbolj nadležne v samem mestu Ljubljani. Poglobili so strugo Ljubljanice, med Golovcem in Grajskim gričem pa do leta 1780 izkopali Gruberjev kanal. Učinek kanala ni zadostoval za obsežnejšo osušitev Barja, čeprav so velik del površin že lahko uporabljali za travnike in njive, zato so leta 1824 sprejeli odlok o popolni osušitvi in pričeli dodatno poglabljati strugo Ljubljanice ter se lotili sistematičnega izkopa kanalov in jarkov na samem Barju, sočasno pa so zgradili tudi številne ceste in štradone, vključno z Ižansko cesto.[5] Čeprav regulacija ni uresničila vseh načrtov in je potekala tudi v naslednjih obdobjih, je mreža jarkov, kanalov in cest popolnoma preoblikovala

[5] Serše et al. 2005. Melik 1946.

Ljubljanica was dredged, and the Gruber Channel was dug between Golovec and the Ljubljana Castle Hill by 1780. The channel was not effective enough to thoroughly drain the Marshes, though it allowed a major part of the area to be used for meadows and fields. In 1824, an ordinance was thus instituted ordering comprehensive drainage, and the work began to deepen the Ljubljanica riverbed and to dig a system of channels and ditches in the Marshes, which was accompanied by the construction of numerous roads and paths, including Ižanska.[5] Although the amelioration works didn't achieve all their objectives and continued in the following periods, the network of ditches, channels and

[5] Serše et al. 2005. Melik 1946.

Regulirano Ljubljansko barje (Krajinski park Ljubljansko barje, foto O. K. Dolenc)

Ameliorated Ljubljana Marshes (Ljubljana Marshes Landscape Park, photo O. K. Dolenc)

barjansko pokrajino, ki ji daje pečat še danes, hkrati pa je omogočila tudi prvo kolonizacijo Ljubljanskega barja vse od časa kolišč.

Regulacije in poglabljanja Ljubljanice so se vrstili vse do končne poglobitve in betoniranja struge ter Plečnikove ureditve njenih nabrežij in zgraditve vodne zapornice za uravnavanje gladine na Ambroževem trgu v letih 1939–1944. Sodobno prenovljena nabrežja so strugo, ujeto v betonski kanal, ponovno oživila.

Stoletja trajajoče pobude za celovito osušitev in poselitev Ljubljanskega barja niso zamrle niti po drugi svetovni vojni. S širitvijo mestnih naselij in povečanim številom prebivalcev, predvsem v Ljubljani, so nastajali novi načrti, ki bi preprečili še vedno pogosto

roads completely transformed the landscape of the Marshes, making it what it is today and also facilitated the first colonization of the Ljubljana Marshes since the pile dwellers.

The amelioration and dredging works on the Ljubljanica continued until the final deepening wherein the riverbed was lined with concrete, and until Plečnik designed its embankments and the water locks used to regulate the river level were constructed on Ambrož Square in 1939–1944. The modern design of the embankments brought new life to the now concrete riverbed.

However, the centuries-old initiatives to thoroughly drain and settle the Ljubljana Marshes carried on even after the Second World War. As cities, particularly Ljubljana, expanded and became more populated, new plans were formulated to prevent the still frequent flooding of the settled areas due to a poorly designed drainage system and allow the creation of useful

Johann Varoni, Viadukt pri Borovnici, 1857
(MGML, foto M. Paternoster)

Johann Varoni, Borovnica viaduct, 1857 (MGML, photo M. Paternoster)

poplavljanje naseljenih območij zaradi slabo urejenega odtoka vode in omogočili pridobitev kakovostnejših površin za bivanje in ekonomsko izrabo. Leta 1959 je bil izdelan investicijski program za ureditev Barja, ki je prvič spodbudil tudi obsežnejše raziskovalno delo.[6] Danes je Ljubljansko barje uvrščeno v varstveno območje Natura 2000, leta 2008 je bilo razglašeno za krajinski park, leta 2011 pa še na Unescov seznam kulturne dediščine.

JUŽNA ŽELEZNICA

Zgraditev Južne železnice, ki je povezala Dunaj, prestolnico tedanje monarhije, in Trst, njeno največje pristanišče, zgradili

[6] Lah 1965.

land for settlement and economic exploitation. In 1959, an investment programme was formulated to regulate the Marshes, leading to the first bout of extensive research.6 Today, the Ljubljana Marshes are included among the Natura 2000 protected areas and has been a Landscape Park since 2008 and an UNESCO cultural heritage site since 2011.

SOUTH RAILWAY

Although the South Railway, connecting the then kingdom's capital – Vienna – with its primary port – Trieste – and constructed in a number of

[6] Lah 1965.

pa so jo v več fazah med letoma 1838 in 1857, je vodi sicer odvzela primat pri transportu, vendar je hkrati pomenila velik dosežek pri krotitvi vodnih površin, denimo pri premostitvah rek, še posebej pa premagovanju z vodo prepojenih območij. Poseben izziv je pomenilo Ljubljansko barje, saj izkušenj z močvirnato pokrajino niso imeli, zato so v prvi fazi opravili testne vrtine in odvodnjavanje. Leta 1851 so v Notranjih Goricah, Podpeči in na Žalostni gori odprli kamnolome za večletno zasipavanje in utrjevanje terena, ki so vidni še danes. Za nasip so porabili okoli 613.000 m^3 kamnitega materiala. Borovniško dolino so premostili z izjemno gradnjo: 561 m dolgim in 38 m visokim viaduktom, zgrajenim iz 4.000 hrastovih pilotov, 24 obokanih stebrov, 31.000 m^3 kamnitih blokov in 5 milijonov

phases between 1838 and 1857, replaced water as the primary mode of transport, it was also a feat that conquered the water with bridges over rivers as well as by crossing the water-saturated areas. The Ljubljana Marshes were a special challenge as the builders had no previous experience with swamplands – phase one thus consisted of the construction of test bores and drainage. In 1851, quarries opened in Notranje Gorice and Podpeč as well as on Žalostna gora (“Sad Mountain”) to provide material for the years of filling and stabilization, and they can still be seen today. The causeway required about 613,000m3 of rock. The Borovnica Valley was bridged by an extraordinary viaduct measuring 561m in length and built 38mabove the valley. In 1856, when it ws first used, the viaduct was considered the grandest building on the Southern Railway, built out of 4,000 oak piles, 24 arched pillars, 31,000 m^3 of stone blocks and 5 million bricks.[7]

Deblak s kolišča Stare gmajne pri Vrhniki, okoli 3.200 pr. n. št. (foto IZA ZRC SAZU)

Logboat from the Stare gmajne pile dweller settlement, dated 3,200 BC (photo IZA ZRC SAZU)

WATERWAYS

Prehistoric paths were waterways. Land was harder, slower and more dangerous to traverse. Skilled craftsmen carved boats out of single tree trunks and used them to travel great distances.

In Roman times, most of the communication was still conducted by water, as evidenced by the archaeological finds of various boats. Particularly prominent among them are two cargo ships found in Ljubljanica. The first one was discovered by the workers digging out the drainage channel in Lipe in 1890 and measured as much as 30 m in

[7] Mohorič 1968, 31–34; Brilej 1999, 64. Bogić 2007.

Ostanki rimske ladje iz Lip na Ljubljanskem barju (MGML, foto M. Paternoster)

Remains of the Roman ship from the Lipe in the Ljubljana Marshes (MGML, photo M. Paternoster)

Ostanki rimskega deblaka v strugi Ljubljanice na Vrhniki (foto D. Badovinac)

Remains of a Roman logboat in the Ljubljanica riverbed in Vrhnika (photo D. Badovinac)

opek. Leta 1856, ko je po novi progi zapeljal prvi vlak, je viadukt veljal za najmogočnejši objekt Južne železnice.[7]

VODNE POTI

Prazgodovinske poti so bile vodne poti. Težje prehodno kopno je pomenilo počasno in manj varno gibanje. Spretni obrtniki so čolne izdolbli iz enega debla in z njimi prepotovali tudi daljše razdalje.

Tudi v rimskem času je glavna komunikacija potekala po vodah, kar nam razkrivajo najdbe različnih plovil. Med njimi izstopata dve tovorni ladji iz struge Ljubljanice. Na prvo so naleteli delavci pri kopanju odtočnega kanala v Lipah že leta 1890;

length, 4.8 m in width and 0.6 m in height.[8] The second ship, which is still stuck in the river bank at Verd by Vrhnika, was discovered by archaeologists conducting underwater research in 2008. The ship was dated to the late 1st century BC or early 1st century AD.[9]

Navigation and trade along the Ljubljanica river got a particular boost in the Middle Ages and the modern age. Boats carved from a single tree trunk were covered by wooden canopies that protected the boatmen from inclement weather and also allowed them to spend the night on the boats. Bigger boats were made out of multiple boards and could carry heavier loads. They were up to

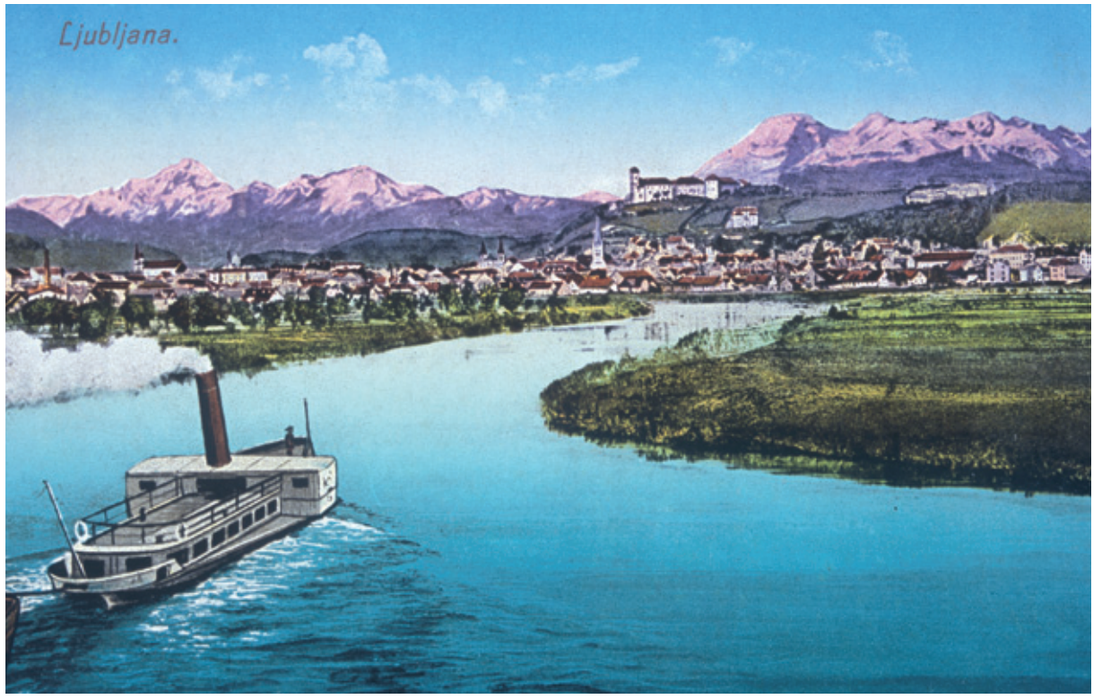
7 Mohorič 1968, 31–34; Brilej 1999, 64. Bogić 2007.

8 Gaspari 2009a, 107–109.

9 Gaspari, Erič 2012, 293–298.

Čolnarji na Vrhniki (Valvasor, 1689)

Boatmen in Vrhnika (Valvasor, 1689)



Razglednica z motivom Ljubljanice (arhiv MGML)

Postcard of Ljubljana with the steamboat (MGML archives)

Razglednica z motivom čolnarjev, 1905 (arhiv MGML)

Postcard with boatmen on the Ljubljanica, 1905 (MGML archives)

v dolžino je merila kar 30 m, v širino 4,8 m in v višino 0,6 m.[8] Drugo ladjo, ki je še vedno ujeta v brežino struge na Verdu pri Vrhniki, so odkrili arheologi pri podvodnih raziskavah v letu 2008. Ladja je datirana na konec 1. stoletja pr. n. št. oz. začetek 1. stoletja n. št.[9]

Plovba po Ljubljanici in trgovanje ob njej sta se še posebej razmahnila v srednjem in novem veku. Čolni, izdolbeni iz enega debla, so bili pokriti z lesenimi strehami, ki so čolnarje ob slabših vremenskih razmerah varovali, pod njimi pa so lahko tudi prenočili. Velike čolne so stesali iz več desk, na njih so lahko prevažali tudi težje tovore. Dolgi so bili do 20 m in široki 2,5 m. V Ljubljani se vodna pravica, na podlagi katere je mesto lahko pobiralo davke od

20 m long and up to 2.5 m wide. Water rights, giving the city the right to tax the heavy river traffic, are mentioned in association with Ljubljana as early as in 1293. The river remained an important traffic route until the construction of the Southern Railway through Ljubljana in 1857. In 1840, a steamboat began cruising the Ljubljanica, however, it only operated for three years due to poor revenues.

SOCIAL LIFE BY THE WATER

Mirror images and the burbling of water have always attracted people, and things are no

[8] Gaspari 2009a, 107–109.

[9] Gaspari, Erič 2012, 293–298.

ČEPRAV REKA SAMA NA SEBI NI VELIKA, KER NIMA PADCA IN JO ZGRADBE V MESTU LJUBLJANI TAKO REKOČ ZAPIRAJO, ZAJEZUJEJO IN JO SKORAJ KAKOR JEZ OVIRAJO, JE VENDAR DO VRHNIKE TAKO GLOBOKA, DA SE DA VOZITI PO NJEJ GOR IN DOL Z VELIKIMI LADJAMI, KI NOSIJO PO TRI STO CENTOV BLAGA, ZAKAJ TU V LJUBLJANI NI REKA NITI ZA MINUTO STOPINJE NIŽJA KO NA VRHNIKI, ČEPRAV STA TA DVA KRAJA ŠTIRI MILJE NARAZEN; TO LAHKO POTRDIM Z LASTNO SKUŠNJO IN MERJENJEM. REKA TOREJ LEŽI TAKO REKOČ VODORAVNO. OMEMBE JE ŠE VREDNO, DA SEGA PLOVNOST REKE LE DO IZVIRA NA VRHNIKI, NE PA POD LJUBLJANO, KER PREPREČUJEJO TO MLINI, JEZOVI, OTOKI IN VODNE GLOBINE.

J. V. VALVASOR, 1689

intenzivnega rečnega prometa, prvič omenja že leta 1293. Vlogo pomembne prometnice je reka obdržala vse do zgraditve Južne železnice skozi Ljubljano leta 1857. Leta 1840 je po Ljubljanici zapeljal celo parnik, ki pa je zaradi slabega zaslužka plul le tri leta.

DRUŽABNO ŽIVLJENJE OB VODI

Zrcalne podobe in žuborenje vode so ljudi privlačili že od najstarejših časov in tudi danes ni nič drugače. Zbiranje ob nabrežjih rek in jezer, druženje ob skupnih opravilih, razkazovanje ob vodnjakih in fontanah in

ALTHOUGH THE RIVER ITSELF IS NOT BIG, AS IT HAS A VERY LOW GRADIENT AND IS PRACTICALLY SHUT IN BY THE BUILDINGS OF LJUBLJANA, DAMMING IT AND OBSTRUCTING IT LIKE A DAM, IT IS NEVERTHELESS SO DEEP UPSTREAM TOWARDS VRHNIKA THAT IT CAN BE NAVIGATED BY LARGE SHIPS CARRYING THREE HUNDRED QUINTALS OF GOODS, AS THE RIVER IN LJUBLJANA IS NOT A MINUTE OF A DEGREE LOWER THAN IN VRHNIKA, DESPITE THE CITIES BEING FOUR MILES APART; I CAN CONFIRM THAT FROM MY OWN EXPERIENCE AND MEASUREMENTS. THAT IS TO SAY, THE RIVER IS VIRTUALLY LEVEL. IT SHOULD ALSO BE NOTED THAT THE LJUBLJANICA IS ONLY NAVIGABLE UPSTREAM, TO ITS SOURCE IN VRHNIKA, AND NOT DOWNSTREAM FROM LJUBLJANA, WHERE NAVIGATION IS PREVENTED BY MILLS, DAMS, ISLANDS AND DEEP WATERS.

J. V. VALVASOR, 1689

different today. People gather on riverbanks and lake shores, work together, show off next to wells and fountains and finally bathe and swim in natural water resorts and constructed swimming areas, which have become a place of relaxation and sharing of ideas and wisdom. In addition to the two opposing banks of a river, bridges have always connected people who met on them, while rivers offered a speedy way to escape the city centres or perhaps just socialize and unwind on boats of all kinds. The Ljubljanica has always been an active river. Dinners and balls on boats as well as fishing and picnics on the riverbanks have been going on since Valvasor's times.

In the 19th century, balls on the Ljubljanica river were a common occurrence. Boats mounted

Hubert Maurer / Franz Wolf, Pristanišče na Bregu ob Ljubljanici, 1826 (MGML, foto M. Paternoster)

Hubert Maurer / Franz Wolf, Boat landing at Breg on the Ljubljanica, 1826 (MGML, photo M. Paternoster)

nenazadnje kopanje v naravnih zdraviliščih ter umetno zgrajenih kopališčih - vsi ti kraji so postali kraji izmenjave idej in znanj ter sproščanja. Mostovi so poleg dveh brežin reke povezovali tudi ljudi, ki so se na njih srečevali, reke pa so ponujale priložnost za hiter pobeg iz mestnih središč ali zgolj druženje in

LJUBLJANSKIM PREBIVALCEM NUDI VELIKO ZABAVE, KER SE V POLETNEM ČASU ZVEČER PO VEČERJI VOZIJO Z VSAKOVRSTNO GODBO SEM TER TJA PO NJEJ: REKA SE PLAZI MILO IN TIHO TER NE MOTI S ŠUMENJEM UBRANIH ZVOKOV.

J. V. VALVASOR, 1689

THE RIVER OFFERS MUCH ENTERTAINMENT TO THE PEOPLE OF LJUBLJANA WHO TRAVERSE IT AFTER DINNER IN THE SUMMER MONTHS TO AND FRO WITH VARIOUS BANDS: THE RIVER FLOWS GENTLY AND SILENTLY, NEVER DISTURBING THE URBAN SOUNDS WITH ITS NOISE.

J. V. VALVASOR, 1689

Razglednica z motivom ribnika Tivoli, okoli 1900 (arhiv MGML)

Postcard of the Tivoli pond, around 1900 (MGML archives)

Pogled na stavbo načrtovane Ljudske kopeli v Ljubljani, 1899. Danes Mestno igrišče (Zgodovinski arhiv Ljubljana)

Illustration of the planned Public Baths in Ljubljana, 1899. Today the City Playground (Historical Archives Ljubljana)

Razglednica z motivom kopališča Ilirija, 1920-1941 (arhiv MGML)

Postcard of the Ilirija public baths, 1920–1941 (MGML archives)

Fotografija skupine otrok na kopanju, 1923-1960 (arhiv MGML)

Photo of a group of children bathing, 1923–1960 (MGML archives)

OB VROČIH POLETNIH DNEH, KO MOČILNIK USAHNE, KO JE TEMNO RÉTOVJE SKORAJ PRAZNO IN KO MILA ZELENA LJUBIJA SANJA SVOJE TIHE SANJE GLOBOKO POD VRBAMI, UPADE LJUBLJANICA ZA CEL SEŽENJ IN OŠABNA VRHNIČANKA JE SAMO ŠE POTOK. VES LEVI DEL STRUGE JE SAM BEL PROD, OD SONCA SPALJEN. TAKRAT SE PRIČNE ENAJSTA ŠOLA POD MOSTOM TER SE NEHA OB PRVIH JESENSKIH NALIVIH. MNOGOKAJ SEM ŠTUDIRAL V SVOJEM ŽIVLJENJU, ALI TAKO BOGATE IN KORISTNE UČENOSTI, KAKOR JO DAJE SVOJIM UČENCEM ENAJSTA ŠOLA POD MOSTOM, NISEM ZADOBIL NIKJER IN NIKOLI. KAKŠNA ČUDA PREČUDNA HRANI TA GOLI, POSUŠENI PROD! OČEM, KI JIH IŠČEJO, SRCEM, KI VERUJEJO VANJE, SE KAŽEJO ČUDA OB VSAKEM POGLEDU, OB VSAKEM KORAKU.

IVAN CANKAR, MOJE ŽIVLJENJE, 1920

DURING HOT SUMMER DAYS, WHEN THE MOČILNIK RUNS DRY, WHEN THE DARK RÉTOVJE IS ALMOST EMPTY AND WHEN DEAR GREEN LJUBIJA DREAMS HER QUIET DREAMS FAR BENEATH THE WILLOW TREES, THE LEVEL OF THE LJUBLJANICA FALLS BY ALMOST TWO METRES, TURNING THE HAUGHTY LADY OF VRHNIKA INTO A MERE BROOK. THE ENTIRE LEFT SIDE OF THE RIVERBED IS NOTHING BUT WHITE PEBBLES, BURNT BY THE SUN. THEN THE ELEVENTH SCHOOL OPENS UNDER THE BRIDGE AND CLOSES AGAIN AT THE FIRST AUTUMN SHOWERS. I HAVE STUDIED A GREAT DEAL IN MY LIFETIME, BUT SUCH RICH AND USEFUL WISDOM AS THE SCHOOL UNDER THE BRIDGE CONFERS TO ITS PUPILS I HAVE NEVER FOUND ELSEWHERE. WHAT BEWILDERING WONDERS ARE HIDDEN BENEATH THESE NAKED, DRY PEBBLES! AT EVERY LOOK AND EVERY STEP, THE MYSTERIES REVEAL THEMSELVES TO THE INQUISITIVE EYES AND FAITHFUL HEARTS.

IVAN CANKAR, MOJE ŽIVLJENJE, 1920

zabavo na vseh vrstah plovil. Na Ljubljanici je bilo od nekdaj živahno. Večerje in plesi na čolnih ter ribolov in pikniki na obrežjih so se vrstili že od Valvasorjevih časov.

V 19. stoletju se je na Ljubljanici pogosto plesalo. S podestom povezane ladje so postale priročno plesišče ali zgolj poletna terasa z glasbeniki in mizami za goste. Na ladjah so se ljudje zbirali ob velikih praznikih in dogodkih ter visokih obiskih cesarjev in drugih pomembnežev. Zabavne dogodke so dopolnjevala še tekmovanja čolnarjev. Ljubljanski športni klub , ki je bil ustanovljen leta 1906, si je poleg kopališča uredil še

with boards became a convenient dance floor or a summer terrace with musicians and tables for the guests. People gathered on the boats on important holidays and events and during visits by emperors and other important people. The entertainment was complemented by rowing competitions. The Ljubljana Sports Club, established in 1906, installed rowing machines next to the swimming area and hosted regattas as well as competitions with canoes, sailing boats and other vessels.10 The Ljubljanica remains an active river today. Despite being squeezed into a channel in the city centre, its restored

10 Mavri 2009, 181–188.

veslaške naprave ter na Ljubljanici organiziral regate in tekmovanja s kanuji, jadrnicami in drugimi čolni.[10] Tudi danes je Ljubljanica živahna reka. Čeprav je v mestnem središču stisnjena v kanal, daje s prenovljenimi nabrežji in bližnjo zeleno preprogo Ljubljanskega barja prestolnici prav poseben pečat.

ONKRAJ

Grški filozof Empedokles je menil, da voda skupaj z ognjem, zemljo in zrakom, sodi med štiri prvinske elemente. V hinduizmu velja za enega od petih elementov (voda, ogenj, zemlja, prostor in zrak), prav tako

ŽIVI STUDENCI TEKÓ. V DUPLINI ŠE VRATA SO DVOJNA,
ENA DRŽIJO NA SEVER, DOSTOPNA LJUDEM UMRLJIVIM,
DRUGA NA JUG ZA BOGOVE: SKOZ TA NE HODIJO V ŠPILJO
BEDNI SINOVI ZEMLJÉ, TU POT JE SAMO ZA NESMRTNE.

HOMER, ODISEJA
PREVOD ANTON SOVRÈ

tudi v kitajski filozofiji (voda, kovina, les, ogenj in zemlja). Pogosto je opredeljena kot stvariteljica sveta in njegovih prebivalcev, pa naj gre za površinske ali podzemne sile, ki iz globokega brezna in kaosa ustvarjajo življenje. Moč in čar vode se zato odražata v številnih daritvah, žrtvovanjih, mitih in verovanjih - v vseh zgodovinskih obdobjih in po vsem svetu.

[10] Mavri 2009, 181–188.

embankments and the nearby green covering of the Ljubljana Marshes provide a special flair to the capital.

BEYOND

The Greek philosopher Empedocles believed water was one of the four ultimate elements, together with fire, earth and air. In Hinduism, water is considered one of the five elements (water, fire, earth, aether and air), just as it is in Chinese philosophical thought (water, metal, wood, fire and earth). It's often considered the creator of the world and its inhabitants, and thought of as the power of either the surface or

A WELLSPRING FLOWS FOREVER. THE CAVE HAS TWO WAYS IN,
ONE FACING THE NORTH WIND, A PATHWAY DOWN FOR MORTALS;
THE OTHER, FACING THE SOUTH, BELONGS TO THE GODS,
NO MAN MAY GO THAT WAY …
IT IS THE PATH FOR ALL THE DEATHLESS POWERS.

HOMER, THE ODYSSEY
TRANSLATED BY ROBERT FAGLES

the underworld, creating life from the deep abyss and chaos. The power and fascination of water are thus reflected in numerous offerings, sacrifices, myths and beliefs – in all historical periods and all over the world.

Even today, the Marshes retain part of their mystery and the supernatural atmosphere that has given rise to numerous myths and legends. The Ljubljanica is associated with one of the versions

Jazon in Argonavti (risba po motivu iz grške vaze, M. Jančič)

Jason and Argonauts (drawing after scene of the greek vase, M. Jančič)

Bronasti meč, pozna bronasta doba (MGML, foto M. Paternoster)

Bronze sword, Late Bronze Age (MGML, photo M. Paternoster)

Ljubljanskega barja z Ljubljanico se je od nekdaj držal delček skrivnostnosti in nadnaravnosti, iz katerih so se rodile številne legende in miti. Z Ljubljanico je povezana ena od različic mita o argonavtih in Jazonu ter njihovi znameniti poti od Črnega do Jadranskega morja. Argonavti naj bi pripadali eni generaciji pred trojansko vojno, ki je datirana v leto 1.270 pr. n. št.[11]

Ljubljanica, ki je danes razglašena za kulturni spomenik državnega pomena, skriva v svoji strugi mnogo zapisov preteklosti iz različnih časovnih obdobij. Številne najdbe najdragocenejših predmetov moške noše in orožja nam govorijo o pomenu reke onkraj profanega življenja. Na območjih velike koncentracije najdb lahko prepoznamo posebna daritvena mesta, ki jih povezujemo z očiščevalnimi obredi, zahvalnimi daritvami božanskim silam ali s pogrebnimi rituali.[12] Bogate in najpogosteje nepoškodovane kovinske najdbe iz rek, jezer in močvirij so značilnost pozne bronaste dobe na širšem evropskem območju.

Strah pred neznanim, ki se skriva v vseh oblikah vode in naravnih procesih,

of the myth of Jason and the Argonauts and their famous journey from the Black Sea to the Adriatic. Argonauts supposedly belonged to the generation that lived before the Trojan War, which has been dated to 1270 BC.[11]

The Ljubljanica riverbed is today considered a cultural monument of national importance, and it hides marks of many different historical periods. Numerous finds of precious objects of male attire as well as weapons indicate that the river's importance also reached beyond worldly life. In areas with concentrated findings, we can recognize special sites used for offerings and associated with purification rites, offerings of gratitude to the deities and funeral rites.[12] Abundant and usually undamaged metal finds in rivers, lakes and swamps are characteristic of the Late Bronze Age in the greater European area.

Already in antiquity, the fear of the unknown, hiding in water in all its forms as well as in natural processes associated with it, excited people and their imagination. Depictions and the worship of

11 Šašel Kos 2009, 110–113.

12 Šinkovec 1996, 125–163; Turk, Gaspari 2009, 62–67.

11 Šašel Kos 2009, 110–113.

12 Šinkovec 1996, 125–163; Turk, Gaspari 2009, 62–67.

Napisna plošča, začetek 2. stoletja (MGML, foto M. Paternoster)

Plate with an inscription, early 2nd century (MGML, photo M. Paternoster)

povezanih z njo, je že v najstarejših obdobjih burila duhove in domišljijo. Upodobitve in čaščenja vodnih božanstev so znani tudi v našem prostoru. Čaščenje Ekvorne (Equrna), keltske boginje, ki so ga od staroselcev prevzeli tudi rimski priseljenci, je ohranjeno v številnih posvetilih, ki so jih zapisovali ljudje iz visokih in nizkih družbenih slojev. Imenovana je bila tudi barjanska boginja, zavetnica Ljubljanice in

water deities are also known in the area of today's Slovenia. The worshipping of the Celtic goddess Equrna, which Roman settlers adopted from the indigenous population, is preserved in numerous dedications written by nobles as well as commoners. She was also called "the marsh goddess" and was a patron of the Ljubljanica

Marmorna glava vodnega božanstva Aheloja, sredina 1. stoletja (MGML, foto M. Paternoster)

Marble head of the water deity Achelous, mid-1st century (MGML, photo M. Paternoster)

vode, in je imela velik vpliv.[13] Njena podoba ni znana, njeno ime pa danes nosi ena od ljubljanskih umetnostnih galerij.

Marmorna glava vodnega božanstva Aheloja (Achelous) izvira iz ruševinskih plasti rimske Emone in je datirana v 1. stoletje. V antični Grčiji so ga častili kot rečno božanstvo reke Achelous, ki teče v zahodni Grčiji. V naše kraje se je njegovo čaščenje z vojaškimi pohodi in trgovino razširilo iz rimskega imperija. Njegove upodobitve lahko povežemo z varovanjem pred nevarnostjo rek in močvirij.[14]

and water, and very influential.[13] Her likeness is unknown, while her name is now used by one of the art galleries in Ljubljana.

The marble head of the water deity Achelous was found in the archaeological layer of the Roman Emona and dates back to the 1st century. In ancient Greece, he was worshipped as the river deity of the Achelous river running through western Greece. Military campaigns and trade brought his worship to the Roman Empire and then to our area. His depictions are associated with protection from the dangers of rivers and swamps.14

Achelous may be compared to the aquatic creatures often depicted in legends and art. Among these, the vodyanoy, in any of his countless

13 Šašel Kos 1992, 5–12.
14 Mussini 1998, 261–270.

13 Šašel Kos 1992, 5–12.
14 Mussini 1998, 261–270.

PREDEN SE DOCELA POSLOVIMO OD LJUBLJANICE, MORAMO ŠE POROČATI, DA BIVA V NJEJ STRAH, IMENOVAN POVODNI MOŽ, IN DA SE VEČKRAT PONOČI PRIKAŽE. TAKO JE ZNAN, DA VSE VSAK ČOLNAR IN RIBIČ NA LJUBLJANICI KAJ O NJEM POVEDATI. PO SPLOŠNEM PRIPOVEDOVANJU JE NEKOČ TUDI PRI BELEM DNEVU STOPAL IZ VODE IN SE PRIKAZOVAL V ČLOVEŠKI POSTAVI. TAKO SE JE LETA 1547 PRVO NEDELJO V JULIJU POJAVIL KOT LEPO OPRAVLJEN, ZAL IN POSTAVEN MLADENIČ NA STAREM TRGU PRI VODNJAKU, KJER JE BILA ZBRANA VSA SOSESKA TER SE S POŠTENIM PLESOM RAZVESELJEVALA. PRIJEL JE DEKLICO URŠULO ŠEFERJEVO, SE Z NJO PRECEJ SEZNANIL, NAPOSLED MIMO STIŠKEGA DVORCA PROTI REKI ZAPLESAL TER Z NJO VANJO SKOČIL. KAJ JE TREBA SODITI O TEM STRAHU, SE DA LAHKO UGANITI. ČEPRAV NE GRE ZANIKATI, DA SO V MORJIH IN DRUGIH VODAH ČLOVEKU PODOBNA BITJA NAD IN POD ZEMLJO (TO BI SE Z NEŠTETIMI ZGLEDI DALO DOKAZATI IN SI TEGA NIHČE NE BO UPAL ZANIKATI RAZEN TISTEGA, KI JE V ZGODOVINI DOCELA NEIZKUŠEN), VENDAR NI MOGOČE UVRSTITI MEDNJE LJUBLJANSKEGA POVODNEGA MOŽA. VSA TA VODNA BITJA NISO ČLOVEKU SOVRAŽNA, TEMVEČ SE Z NJIH LE NORČUJEJO. V TEM SE RAZLIKUJEJO OD LJUBLJANSKEGA POVODNEGA MOŽA; BOLJ PO PRAVICI BI SE LE-TA DAL ŠTETI MED HUDIČEVE STRAHOVE KAKOR MED VODNARJE."

J. V. VALVASOR, 1689

BEFORE WE SAY OUR FINAL GOODBYES TO THE LJUBLJANICA, WE MUST ALSO REPORT THAT BENEATH ITS WATERS DWELLS AN APPARITION CALLED VODYANOY WHO OFTEN COMES OUT DURING THE NIGHT. IN FACT, HE IS SO WELL KNOWN THAT EVERY LJUBLJANICA BOATMAN AND EVERY FISHERMAN HAS A STORY TO TELL ABOUT HIM. ACCORDING TO COMMON KNOWLEDGE, HE USED TO COME OUT OF THE WATER IN BRIGHT DAYLIGHT AND APPEAR AS A HUMAN FIGURE. AND THUS, ON THE FIRST SUNDAY IN JULY 1547, HE APPEARED AS A WELL-DRESSED, FAIR AND HANDSOME YOUNG MAN BY THE WELL ON THE STARI TRG (OLD SQUARE), WHERE THE ENTIRE NEIGHBOURHOOD HAD GATHERED TO DANCE IN HONEST MERRIMENT. HE GRABBED A GIRL CALLED URŠULA ŠEFERJEVA AND GOT TO KNOW HER PRETTY WELL, AND FINALLY DANCED WITH HER PAST THE STIČNA MANSION TOWARDS THE RIVER AND JUMPED IN, TAKING HER WITH HIM. IT'S NOT HARD TO KNOW WHAT TO THINK OF THIS APPARITION. THOUGH IT CANNOT BE DENIED THAT HUMAN-LIKE CREATURES LIVE IN THE OCEANS AND OTHER WATERS, BOTH ABOVE GROUND AND BELOW (INNUMERABLE EXAMPLES COULD BE GIVEN TO PROVE THIS, AND NOBODY WILL DARE DENY IT EXCEPT FOR THOSE THOROUGHLY INEXPERIENCED IN THE MATTERS OF HISTORY), HOWEVER, THE LJUBLJANA VODYANOY CANNOT BE COUNTED AMONG THEM. THESE BEINGS ARE NOT HOSTILE TO PEOPLE, MERELY MAKING FUN OF THEM. THAT'S WHERE THEY DIFFER FROM THE LJUBLJANA VODYANOY; HE COULD MORE ACCURATELY BE COUNTED AMONG THE DEVIL'S APPARITIONS THAN AMONG WATER-MEN."

J. V. VALVASOR, 1689

Aheloja lahko primerjamo z vodnimi bitji, ki so pogosto upodobljena v legendah in umetnosti. Med njimi s številnimi različicami prav gotovo izstopa lik povodnega moža, ki ga najbolje poznamo iz pesnitve največjega slovenskega pesnika Franceta Prešerna. Strašljiva podoba Aheloja pa prej spominja na Valvasorjev opis povodnega moža.

V večini verskih tradicij je voda osnova fizičnega in duhovnega življenja. Simbolizira očiščenje, plodnost in ponovno rojstvo. Vsaka celina pozna verovanja, povezana s poplavami, ki so bile lahko uničujoče ali pa so pomenile preživetje. Pri Sumercih so veljale za rezultat boja med bogovi, pri Aztekih in Majih so razmejevale obdobja, pogosto pa so bile tudi simbol konca sveta. Noe je svojo barko zgradil po božjem ukazu, da naj reši svojo družino in zemeljske živali pred vesoljnim potopom. Prav tako so v vseh kulturah znane svete reke, izviri, zdravilni vrelci in vodnjaki. Kovanec za srečo, ki ga vržemo v vodnjak, je del te tradicije.

variants and best known from the ballad written by France Prešeren, the greatest of all Slovenian poets, is certainly one of the most prominent. However, Achelous 's terrifying likeness is closer to Valvasor's description of the vodyanoy.

In most religious traditions, water is the basis of physical as well as spiritual life, a symbol of purity, fertility and rebirth. Every continent is home to beliefs about floods, either destructive ones or those that ensured survival. The Sumerians considered them the result of confrontations between the gods, while the Aztecs and Maya believed them to be from separate ages; they were also often considered the symbol of the end of the world. Noah built his ark after being commanded to do so by God, so that he would save his family and the land animals from the Great Deluge. Similarly, every culture has its sacred rivers, wellsprings, hot springs of healing and wells. A coin dropped into a wishing well is part of this tradition.

Steklenička za blagoslovljeno vodo, 18. stoletje (MGML, foto M. Paternoster)

Holy water vial, 18th century (MGML, photo M. Paternoster)

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TOMAŽ ŠALAMUN

Jon

kako zahaja sonce?
kot sneg
kakšne barve je morje?
široko
jon si slan?
slan sem
jon si zastava?
zastava sem
vse kresnice počivajo

kakšni so kamni?
zeleni
kako se igrajo kužki?
kot mak
jon si riba?
riba sem
jon si morski ježek?
morski ježek sem
poslušaj kako šumi

jon je če teče srna skozi gozd
jon je če gledam goro kako diha
jon so vse hiše
slišiš kakšna mavrica?
kakšna je rosa?
spiš?

TOMAŽ ŠALAMUN

Jonah

how does the sun set?
like snow
what color is the sea?
large
Jonah are you salty?
I'm salty
Jonah are you a flag?
I'm a flag
the fireflies rest now

what are stones like?
green
how do little dogs play?
like flowers
Jonah are you a fish?
I'm a fish
Jonah are you a sea urchin?
I'm a sea urchin
listen to the flow

Jonah is the roe running through the woods
Jonah is the mountain breathing
Jonah is all the houses
have you ever heard such a rainbow?
what is the dew like?
are you asleep?

TRANSLATED BY TOMAŽ ŠALAMUN AND ELLIOTT ANDERSON

VODA IN UMETNOST
WATER AND ART

Barbara Savenc

Narcis, ki se ogleduje v vodni gladini, in Ikar, v globine morske vode padajoči mladenič, se z vodo vsak na svojem koncu usode srečujeta tragično

povezana. Če si ju predstavljamo z očmi Francesca Robbe in Alojzija Kogovška, spoznamo, da ima tudi voda v umetnosti svoje pomembno mesto. Kot lahko vidimo pri Robbi in njegovi fontani v dvoriščni arkadi Mestne hiše v Ljubljani, ima voda za gledalca globok simbolni pomen. Medtem ko je pri Narcisu ujeta v kompozicijo, se moramo pri Kogovšku in njegovi mali plastiki Ikarja iz zbirke Muzeja in galerij mesta Ljubljane, ko sledimo tekočim linijam obrisa fantovega telesa, ki navpično strmoglavlja v morje, opreti na lastno, literarno podkovano miselno projekcijo. Voda je lahko motiv in ključno vsebinsko izhodišče. Z njim se sooča umetnik, ko začenja proces snovanja, sledeč naročniku ali v ustvarjalni težnji prepuščen sam sebi, že tudi v dialogu z bodočim gledalcem.

Morje, reke in jezera, tudi dež in sneg, številne pojavne oblike vode, so téma umetnin že stoletja; a vendar nikakor že od začetka v središču umetnikove pozornosti ali celo v samem ospredju upodobitve. Razmišljanje o vodi in njeni vlogi v umetnosti nas sooči z dejstvom, da razmislek pove več o nas kot posameznikih in družbi ter o našem odnosu do vode kot pa o njej sami. Umetnost je tako tista gladina, na kateri se zrcalijo človekov odnos do sveta, njegovo razumevanje in sprejemanje življenja: kaj je zanj in za nas pomembno in kako razumemo središčno *bit* svojega obstoja – vodo.

Voda se pojavi kot upodobitveni predmet že na slikah iz antičnega Egipta in Rima, dolga

Narcissus viewing his reflection on the smooth surface of a pool; Icarus, a young boy plunging into the depths of the sea: they are both facing water,

tragically connected, yet each on his own side of destiny. In trying to see them through the eyes of the artists Francesco Robba and Alojzij Kogovšek, respectively, one recognises that water has a specific and significant place in art. Robba's Narcissus fountain, situated in the atrium of Ljubljana's Town Hall, proves that water has a profound symbolic meaning for viewers, for it is fully integrated with the composition. In contrast, when considering Kogovšek's small-scale sculpture of Icarus (part of the collection of the Museum and Galleries of Ljubljana), and when viewing the smoothly flowing body lines of a boy diving vertically into the sea, one has to draw on one's own knowledge of literature. Water can serve either as a motif or as an indispensable substantive basis. It is this basis that helps an artist begin to create, either in line with what has been commissioned or relying entirely on his own creative aspirations. It is this basis that already at that stage enables the artist to engage in a dialogue with prospective viewers.

Water in many forms, such as the sea, rivers and lakes, along with rain and snow, has been featuring as the theme of works of arts for centuries; yet in the beginning, it was neither the focus of the artist's interest nor the central object of his representations. When considering water and its role in art, one realises that such considerations are much more indicative of ourselves (both as individuals and as society at large) and our attitude to water than of water itself. Art is thus the smooth surface reflecting man's attitude to the world, his understanding and embracing of life: that which is important to us and how we understand the core *essence* of our existence – water.

Alojzij Kogovšek, Ikar, 1936, mavec (MGML, foto M. Paternoster)
Alojzij Kogovšek, Icarus, 1936, plaster (MGML photo M. Paternoster)

Ivan Vavpotič, Trnovski pristan, 20. stoletje, olje na platnu, (MGML, foto M. Paternoster)

Ivan Vavpotič, Trnovski pristan, 20th century, oil on canvas, (MGML, photo M. Paternoster)

stoletja so svetopisemske in druge zgodbe na raznolike in presenetljive načine predstavljale njeno lepoto in pomen: kot razpirajoče se valove Rdečega morja in prosojno čisto reko Jordan, kot vodni curek, ki ga iz svojega čebra izliva sveti Florijan. A voda je celovitosti motiva podrejena, šele kasnejša stoletja, kot nam kaže umetnostna zgodovina, so ji omogočila, da je postala samostojen motiv in se v svoji naravni ali preoblikovani pojavi, ujeti v vodnjake in steklene kozarce in vaze, predstavila pogledu kot portretiranka.

Kdaj torej – in zakaj – se je vodna gladina prerinila v središče slikarjevega in gledalčevega zanimanja?

Depictions of water in art first appeared in the ancient Egyptian and Roman images. For centuries to follow, the beauty of water and its significance were rendered in biblical and other narratives in the most diverse and unique ways: as the parting waves of the Red Sea and the crystal clear Jordan River, as a jet of water poured from his bucket by Saint Florian. At that stage, water was still clearly subordinated to the overall motif. As art history tells us, it was only during later centuries that water was allowed to become a motif in its own right and to be presented to the viewer, like a true subject of a painting, either in its natural or transformed state, i.e. caught in water wells, glasses and vases.

When, and why, did water come in the foreground of the interest of both artists and viewers?

Contrary to what is usually thought, it is not natural for the Sava and Ljubljanica Rivers to have

Tako samoumevno, kot se nam običajno zdi danes vse na svetu, le ni, da sta tudi reki Sava in Ljubljanica ujeli slikarjevo pozornost, da jima je namenil glavno vlogo. Najprej je voda v človeških očeh in misli izgubila pomen svetišča, kraja, kamor se človek vrača z obredjem in kjer postavlja znamenja – v slovenskem prostoru o tem davnem in prvinskem gibalu pričajo svetemu Juriju posvečene cerkve. Šele od sredine 16. stoletja, ko se je zdelo, da sta deroča reka in globina morja izgubili svojo strašljivo in skrivnostno, za človeka usodno moč, se v ospredje naročil in slik premakne – danes običajna – posvetna vsebina. Tedaj se lepi okljuk reke razlije čez ospredje platna in začne počasi z njega izrivati štafažo, človeški in živalski lik, v umetnosti od njenih začetkov središče in stičišče pozornosti. Začne se postopen proces, v katerem so krajina in s tem jezero, reka ali morje zavzeli osrednji pogled; a za to so bile nujne še nekatere družbene spremembe. Preusmeritev pozornosti lahko najprej opazimo na severu, na današnjem ozemlju Nizozemske. Zanimanje za krajino in s tem tudi za vodne površine se ni začelo oblikovati s prodornimi posamezniki, ampak je bilo nuja, potreba, da naj slikar ujame popularni okus, potem ko je bilo cerkvenih naročil zaradi ikonoklazma in protestantizma, ki nista bila naklonjena upodobitvam, vse manj. S premikom širšega družbenega zanimanja in premoženja je človek postal naročnik in kupec upodobitev krajine, v kakršni je živel, takšne, kot jo je prilagodil svojemu načinu življenja, urejene po njegovih lastnih predstavah – ukročene, z urejenimi rečnimi bregovi, pristanišči, kanali in mlini. Krajina kot motiv ali slikovna oblika obstaja od 17. stoletja. Pred tem stoletjem ji je bilo v hierarhiji motivov, utemeljeni s francosko kraljevo akademijo, namenjeno mesto nekje na dnu lestvice, saj upodabljanje flore in favne

captured the artist's attention, making him accord the main role to them. First, man had to cease regarding water as performing the role of a holy place to which man kept returning with rituals and where he erected shrines: in Slovenia, churches dedicated to St. George bear witness to this ancient and primeval drive. Only after 1550, when torrential rivers and depths of the sea seemed to have lost their fearful and mysterious power that had been fatal to man, secular subjects, nowadays perfectly usual, moved in the foreground both in commissions and paintings. As a result, beautifully meandering rivers started flowing right through the centre of picture planes, gradually driving out *staffage* along with human and animal figures, which had all been central to art from its very beginnings. However, for the landscape with its lakes, rivers or seas to be capable of taking central stage, certain social changes were required.
The shift in attention first occurred in northern Europe, in what is now the Netherlands. Interest in landscape, that is also in bodies of water, did not simply grow in the most spirited individuals but was rather a result of the fact that painters had to adapt to and follow popular taste, at a time when ecclesiastical commissions became increasingly scarce as a result of iconoclasm and Protestantism, which did not favour depictions of any kind. After a profound shift in society at large and in private wealth, individuals started to commission and purchase depictions of the landscape in which they lived, which they had transformed to suit their way of life, laid out in accordance with their own ideas: a tamed landscape with regulated riverbanks, ports, channels and mills. It can thus be said that landscape as a motif and genre has been with us since the 17th century. Before that, its position in the hierarchy of motifs established by the French *Académie Royale* was somewhere at the bottom, for depictions of flora and fauna had nothing to do with learned narratives and required no familiarity with anatomy. Whereas exerting a decisive influence on landscaping, communities that started to be formed in the north also acquired a strong social position,

Neznan avtor, Josepha Rudesch, 1818, olje na platnu (MGML, foto M. Paternoster)

Unknown author, Josepha Rudesch, 1818, oil on canvas (MGML, photo M. Paternoster)

ni bilo povezano z učenimi pripovedmi in ni zahtevalo poznavanja anatomije. Mestne skupnosti, ki so se oblikovale na severu, so odločilno zarezale v oblikovanje pokrajine, s svojo novo družbeno veljavo pa pripomogle, da so se izoblikovali novi motivi, enakovredni svetopisemskim: ob omenjeni krajini (z vodnimi površinami) še tihožitje in žanr. V jedru je to pomenilo pomemben premik od zapletenih in težko razumljivih vsebinskih prepletov, črpanih iz verskih besedil in mitologije. Vitalen in dotlej še neviden in neprimerljiv izbruh raznolike produkcije slik, zlasti in najprej v Holandiji, je bil odmev na njeno množično uničevanje le malo prej. Obstajala je zahteva po oprijetju posedovanega, kar se je pokazalo v novih temah in motivih slik kot alegorija imetja. S slikami so bile sedaj okrašene stanovanjske hiše in javne stavbe, med njimi pa so izstopali portreti, ki so poudarjali ponos trgovca, z morsko obalo in ladjami v njegovi lasti v ozadju, vedute mest, ki so bila priča vzponu uspešnih posameznikov, z rekami, ob katerih so bila zgrajena, in preobložena tihožitja, v katerih so se stari evharistični simboli potapljali v izobilju nakopičenega sadja in cvetja, posodja, steklenih kozarcev in vaz – z vodo. Krajina in z njo veduta z morsko obalo, rečnimi obrežji in jezeri, nekdaj v ozadju številnih religioznih upodobitev, je že z Joachimom Patinirjem začela prevladovati nad svetim dogodkom. S flamskim slikarjem Petrom Pavlom Rubensom je krajina z rekami postala nenadoma eden najbolj priljubljenih motivov. Posebej v Holandiji so tedaj mnogi raje že dajali prednost motivom, ki so zajemali širino osebne, lastne in neposredne izkušnje – krajini, tihožitju, žanru kot prizoru iz resničnega življenja – pred Rembrandtovimi slikami, ki so zahtevale globlji vpogled, bogato in široko poznavanje vsebin, ki je segalo od antičnih do mitoloških in seveda religioznih tem.

which helped them introduce new motifs into art which were equal to biblical ones: apart from landscape (including various bodies of water), one has to mention still life and genre art. At its core, this change implied a significant shift away from elaborate and hardly comprehensible topics taken from religious texts and mythology. A highly animated and unprecedented eruption of a vastly diverse painting production, taking place first and foremost in Holland, was also a reaction to the mass destruction of that same production that had recently been ravaging there. Underlying this production was the need to cling to what one possessed, which was reflected in new themes and motifs of paintings that featured as an allegory of one's material possessions. Paintings started to adorn private homes and public edifices. Featuring most prominently among them were portraits emphasising self-confident merchants, with a seashore and ships owned by them in the background; views of towns bearing witness to a rise of prosperous individuals, with the rivers they were built on; and over-abundant still lifes in which previous Eucharistic symbols were lost in the profusion of the piled up fruits and flowers, vessels, glasses and vases – often filled with water testifying to contacts with faraway lands. Landscape and – along with it – views of seashore, riverbanks and lakes, which had formerly only served as a background for religious motifs, started to prevail over religious scenes; Joachim Patinir was the first artist to paint in this manner. In the works of the Flemish painter Paul Rubens, landscapes with rivers suddenly took the position of one of the most popular motifs. Especially in Holland at that time, preference was increasingly given to the motifs spanning the entirety of the artists' personal and direct experience, i.e. landscape, still life, genre art depicting scenes from real life, to Rembrandt's paintings whose understanding required a more profound insight, close familiarity with the subjects ranging from ancient and mythological to religious themes.

In the mid-19th century, the naturalist observation also encouraged Slovenian painters to take an

V sredini 19. stoletja se z naturalističnim opazovanjem zanimanje za krajino kot motiv uveljavi tudi pri slovenskih slikarjih. Najprej pri Lovru Janši, nato se k domači pokrajini obrne Matevž Langus, v svojih portretih ljubljanskih meščanov, kjer dobi svoje mesto tudi reka Ljubljanica. Voda se kot motiv še zadržuje v ozadju, a na skupinskem portretu Jožefa Tominca prav tako kot dame pritegne pomemben delež naše pozornosti steklena posoda z vodo, v kateri plavajo zlate ribice. Lepa je veduta Ljubljane in njene reke, s še neurejenimi obrežji, na sliki Pavla Künla. Reka Sava se v istem obdobju predstavi na slikah Marka Pernharta, in z njim se začenja v slovenski likovni umetnosti nepretrgana vrsta pogledov na vodo, v njenih raznolikih oblikah; na reke in jezera Antona Karingerja, Jožefa Petkovška in Ferda Vesela, še posebej pa z generacijo naših t. i. impresionistov, s katerimi se v spomin vtisnejo tudi krajine in vedute s snegom. Zdaj sta narava in človek ustvarjena s skupnim, enotnim optičnim in psihičnim momentom: v enotni abstrakciji celote. Samostojna in kot glavna protagonistka slike se reka predstavlja tudi v 20. stoletju, na primer pri Francetu Pavlovcu, Francetu Godcu ali Francetu Kralju.

Ob naštevanju slikarjev in s spoznavanjem njihovega značilnega načina slikanja je na mestu vprašanje, ali ima voda v umetnosti še kakšno drugo vlogo kot le motivno.

Če se ozremo na sam začetek zgodovine umetnosti, se voda kot eden od štirih elementov ne pokaže le kot umetnikova téma, ampak na polju ustvarjanja kot tista, ki jo je človek od samega začetka zaznaval kot svojo sopotnico in sodelavko. Povezava med vodo in umetnostjo nikakor ni prisiljeno zavezništvo, je smiselno in tesno prepletena pri njenem izviru, ko se k vodi obrne pogled nekako samoumevno, spotoma. Voda je tista, ki je bila vselej pri roki, tam, kjer je

interest in landscape as a motif. The first to turn to the local landscape was Lovro Janša, who was later followed by Matevž Langus. In the portraits of Ljubljana's citizens painted by Langus, the Ljubljanica River was first accorded its place. Unlike those portraits in which water as a motif is still mainly contained to the background, the viewer's attention in a group portrait by Jožef Tominc is not only drawn by the ladies but also by a water-filled glass container with golden fish swimming in it. A view of Ljubljana and its river with still unregulated banks is rendered beautifully in a painting by Pavel Künl. Simultaneously, the Sava River was painted by Marko Pernhart, who ushered in a continuous line in Slovenian art of views of water in its manifold forms: of rivers and lakes painted by Anton Karinger, Jožef Petkovšek and Ferdo Vesel and, in particular the generation of Slovenian impressionists who gave rise to views of snow-covered landscapes. Thus, artistic renderings of both nature and man started to originate from the same optical and psychical impulse. Rivers were also featured in their own right and as the main protagonists of paintings in the 20th century, for instance with France Pavlovec, France Godec or France Kralj.

When mentioning individual painters and describing their typical manners of painting, it seems appropriate to ask whether water has played any other role in art apart from that of a motif.

If we take a look at the very beginnings of the history or art, we will soon see that water as one of the four elements not only served as a theme: man has always considered water to be his companion and collaborator in the realm of creating art. Never considered as a forced alliance, the connection between water and art is logical and sensible from its very beginning, because it was only natural for man to turn to water. Water was always at hand, always part of the environment in which man lived, and that is why it was precisely water that enabled artistic creation: during the Stone Age (the Palaeolithic), saliva helped dilute pigment to paint cave paintings; in the New Stone

Josip Codelli, Kodeljevo, 1810, lavirana risba s črnim tušem na papirju (MGML, foto M. Paternoster)

Josip Codelli, Kodeljevo, 1810, ink and wash on paper (MGML, photo M. Paternoster)

človek živel, in tako je prav voda tista, ki je omogočila umetniško ustvarjanje: voda je v kameni dobi (paleolitiku) pomagala slini razpršiti pigment za t. i. jamske slike in voda je bila tista, ki je v mlajši kameni dobi (neolitiku) omogočila glini njeno gibkost in mehkobo, da so jo lahko spretne roke oblikovale v želene oblike – keramiko.

Potem ko je človek odkril, da lahko z vodo topi pigmente, pridobljene z drobljenjem kamnin in rastlin, nato pa jih nanese v

Age (Neolithic), it provided clay with sufficient flexibility and softness that it could be formed by skilled hands into desired shapes – pottery.

The discovery of the fact that pigments obtained by crushing stones and plants could be dissolved in water and then applied as desired – sometimes under the influence of inner visions, with the unconscious functioning as a negative image preceding the real image – gave rise in Antiquity to the occurrence of fresco painting. To make frescos, pigments have to be dissolved in (lime) water and then quickly applied to freshly laid wet plaster. Thus, water allowed for art to be born even before man – a creator – started to consider himself an artist, free and equal to

želeni obliki – nekdaj pod vplivom notranjih videnj, nezavednega kot negativa pred resničnim obstojem na sliki – je v antiki nastala tudi že tehnika freske. Zanjo je treba pomešati pigmente in (apneno) vodo, nato pa hitro, še na svež omet nanesti podobo. Tako je voda omogočila, da se je rodila umetnost, še preden je človek sebe – ustvarjalca – pojmoval kot umetnika, svobodnega in enakovrednega stvarniku, v razsežnosti neomejene duhovne zmožnosti, in je bila posrednica pri zavedanju in ustvarjanju vzporednega sveta, odseva človekovega čustvovanja. Brez vode ne bi nastale mnoge umetniške tehnike na področju slikarstva, ki so danes pojmovane kot klasične. In prav voda, pravzaprav njen delček – kapljica – je tudi v temelju sprememb in preoblikovanja načina slikanja in tudi videza slik v 18. in predvsem v 19. stoletju. Krajinsko slikarstvo je tedaj doživelo presenetljiv premik, od podcenjenega motiva, zakoreninjenega v klasični tradiciji, v glavno sredstvo za umetniško eksperimentiranje. Pripomoglo je k oblikovanju moderne umetnosti in s poudarkom na samem aktu slikanja se je v ospredje premaknila uporaba vode in njene lastnosti – razlivanja. Kmalu se zanimanje slikarjev obrne k starodavnim in izvirnim slikarskim tehnikam, kot sta akvarel in lavirana (pero)risba, s katerima se povsem spremeni dotedanje gledanje na sliko. Že s svojim imenom pričata o svojem temeljniku – vodi – ki določa sliki in risbi videz in prepoznavni učinek. S tem nastopi tudi možnost, da se začne razbiranje in občudovanje povsem lastnih in osebnih likovnih jezikov oziroma rokopisov. Z njim voda ohranja na novo osvojeni primat nad končnim videzom podobe, umetnik pa dokazuje svoje soglasje in dialog – z vodo.

Omenjeni slikarski tehniki sta lahko nastopili potem, ko je svoj pomen pridobila skica, od 16. stoletja pojmovana kot znak

the Creator, existing in the realm of unlimited spiritual power. Moreover, water was a medium in the process of raising awareness about man's emotional life. Were it not for water, it would not have been possible to invent some painting media that are now considered classic. It was water, in particular, a tiny bit of water – a drop – that was underlying the changes to the manner of painting and the final appearance of paintings in the 18th and especially in the 19th century. At that time, landscape painting experienced a surprising move forward, evolving from an undervalued motif with its roots still in the classic tradition into the principal medium facilitating artistic experiments and ultimately helping modern art to be formed. With the emphasis shifting to the very act of painting, the use of water and its characteristics, in particular, its ability to disperse, moved to the forefront. It was not long until artists turned their attention to ancient painting techniques, such as watercolour and wash drawing (pen and wash), which completely changed the traditional notions of picture. Their very names are suggestive of their basis – water – which determines the appearance of a painting or a drawing and their characteristic effect. Having made it possible for various artists' personal visual languages to be perceived and admired by the general public, water thus retains its newly achieved influence over the image's final appearance.

These two painting media could only appear after the sketch, considered a sign of genius and originality since the 16th century, had fully established itself. The sketch was the first impression that, according to the idea prevailing at that time, could not bear witness to the artist's intellectual and artistic mastery until it had been processed and turned into a finished painting. Accordingly, the changes were brought about by the emergence of *esquisses*, i.e. first sketches made in oil as studies for finished pieces: an *esquisse* was a small-scale sketch dashed off quickly in order not to lose the artist's *première pensée* or the initial concept of his motif, in order to fix the main composition and determine

genija in izvirnosti. Skica je prva impresija, ki je po tedanjem mnenju šele z obdelavo in v končni sliki predstavila umetnikovo intelektualno in slikarsko mojstrstvo. Temelj sprememb je bilo torej uveljavljanje *esquisses* ali pripravljalnih skic v olju kot študij za končna dela: bile so majhnega merila, zasnovane na hitro z namenom, da ohranijo umetnikov *première pensée* ali začetni koncept motiva, da utemeljijo glavno kompozicijo in določijo barvo, vse s široko, tekočo in sproščeno potezo nemešanih barv. Prvi, ki je začel raziskovati okolico, pri čemer je na kraju samem risal, dejansko skiciral na prostem in se zanesel na moč opazovanja, v duhu renesanse, je bil Claude Lorrain. Pri uveljavljanju sprememb je bilo pomembno, da sta se z akademskim študijem sprva v Franciji razcepila in oblikovala dva toka, od katerih je po letu 1715 prevladal tisti, s pristaši Rubensovega načina slikanja. Skupaj z beneškimi slikarji so poudarjali vrednost barvne poteze kot neposrednega odseva temperamenta, saj naj bi nagovarjala čute in bila naravna, in takšna lahko k razbiranju naslikanega pritegne tudi nepoučenega gledalca. Šele v obdobju romantike, po letu 1820, se z nasprotovanjem zglajeni površini slike začneta uveljavljati sproščena izvedba in možnost slikarske ekspresije oziroma osebne vizije – dosežena z videzom skice in vidno potezo. Načelo skicoznosti se ujame z zanimanjem za krajino in študijem narave neposredno, s *plein air études* ali malimi študijami, ki so ujele glavne tone neba, zemlje in vode v določenem trenutku. Pri takšnem snovanju, beleženju vtisov, je pridobivalo veljavo laviranje. Izpeljanka iz francoščine pomeni izpiranje, redčenje kritno položene vodene barve, ki se lahko uporablja za senčenje in toniranje risbe. Neredko je laviranje povezano s perorisbo, eno najstarejših risarskih tehnik, s trstičnim, gosjim ali kovinskim peresom. Izvaja se s čopičem, pomočenim v vodo ali razredčeno

the colour, all this being done with a broad, smoothly flowing and relaxed stroke of non-mixed colours. The first artist to undertake to explore the outside environment, drawing on the spot, actually sketching in the open air and, in so doing, relying on the power of observation in the spirit of Renaissance, was Claude Lorrain. In the course of these changes taking place, it was important that two streams were formed, initially in France, within the framework of academy studies. After 1715, precedence was taken over by the group involving supporters of Rubens' manner of painting. The group was also joined by Venetian painters who emphasised the importance the colour stroke as a direct reflection of temperament had in appealing to the senses. They maintained that the colour stroke was natural and, as such, enabled even unenlightened viewers to grasp what had been painted. It was not until the time of Romanticism, i.e. after 1820, that the artists refusing to produce images with polished surfaces enabled a breakthrough of loose execution, ushering in the possibility of expressing the artists' personal vision – achieved through a sketch-like appearance and a clearly discernable stroke. The focus on sketch-like qualities was as fully in line with the interest in landscape and first-hand study of nature as it was with the practice of *plein air études* or small-scale studies aimed at capturing the principal shades of the sky, earth and water in a given moment. Being indispensable in the process of such planning and recording impressions, the technique of wash could only gain ground. The technique of wash implies diluting water-based paint for the purposes of shading or tingeing. When the wash is applied in combination with drawing, it is called pen and wash, which is one of the oldest drawing techniques requiring the use of a reed pen, a quill or a nib. A wash is accomplished using a brush dipped into a pool of water or diluted paint previously used to draw. A wash is applied to a dry support or, if a line should disperse fully into a tinged surface, to a wet support. The technique of wash can be used with drawings made with

I. Heinisch, Marijin trg, 19. stoletje, akvarel na papirju (MGML, foto M. Paternoster)

I. Heinisch, Mary's Square, 19th century, watercolour on paper (MGML, photo M. Paternoster)

risalno tekočino, s katero smo risali. Laviramo čez posušeno risbo ali sproti, da se črta povsem prelije v ploskev. Običajno se uporablja pri risbi, ustvarjeni s sepio, rjavkastim barvilom sipe, bistrom in tušem, risalnima tekočinama iz zelo drobnih saj.

V slovensko umetnostno zgodovino so uvrščene lavirane perorisbe iz opusa Franceta Kavčiča, mojstra tudi takšne, s pomočjo vodne kaplje omehčane in prosojno ustvarjene podobe. Čeprav laviranje v našem prostoru ni nikoli ujelo več pozornosti, lahko tehniko opažamo v številnih opusih in celo pri amaterskih slikarjih, o čemer priča lavirana risba s tušem – s svojo sijajno monokromnostjo – Josipa Codellija. Risba predstavlja dvorec družine (Kodeljevo), pred njim pa ob stojalu verjetno stoji tudi sam slikar s prijateljem. Na risbi, ki je signirana in

sepia, a brown pigment derived from the common cuttlefish, or ink, a drawing liquid made of very fine soot.

The history of Slovenian art knows pen and wash works from the oeuvre of France Kavčič, a master of images softened and made translucent with the help of water. Although the technique of wash was never especially popular in Slovenia, its individual achievements can be observed in bodies of work of many artists and even amateur painters: one of the best examples is a splendidly monochrome ink and wash by Josip Codelli. The drawing represents the family manor along with an outbuilding and a chapel (Kodeljevo), with the artist himself and a friend of his standing at the easel. The drawing, which is signed and dated 28 August 1810, features a particularly fine rendering of an open sky with scattered clouds on it. The technique of wash was again used by several painters of the 20th century, including Marij Pregelj. In a couple of drawings intended for a never-realised guidebook of Slovenia to be published in Paris, Pregelj captured various motifs, among them, landscapes along with figurative scenes, such as a woman wearing

datirana 28. avgusta 1810, je posebej nežno in pretanjeno naslikano široko nebo z razpršenimi oblaki. K tehniki laviranja so se vračali tudi mnogi slikarji v 20. stoletju, med njimi Marij Pregelj, ki je v podobah, namenjenih kot ilustracije za neuresničen turistični vodnik po Sloveniji, ujel različne motive, med katerimi so krajine, a tudi figuralni prizori, kot na primer v hrbet upodobljena žena z ruto pri nošenju veder, polnih vode.

Svobodna poteza, ki jo lahko opažamo v omenjenih delih, se je začela iz skice počasi prenašati v končna dela v sredini 18. stoletja, ne da bi pri tem izgubila svojo vidnost in prepoznavnost. Tedaj je nastopila vrsta umetnikov, ki so za slikanje krajin uporabljali akvarel, a ne le kot pripravljalno študijo, pač pa so ga pojmovali kot samostojno likovno delo. K temu so pripomogle risbe s tušem, ki so bile kolorirane z akvarelom, slikarsko tehniko, pri kateri drobno zmleti pigmenti med slikanjem lebdijo v vodi, na papir pa se vežejo absorpcijsko (obarvajo vlakno). Risbe so v 19. stoletju prispevale k uveljavitvi akvarela z njegovimi lastnostmi in k nadaljevanju prej omenjenih teženj v evropskem slikarstvu.

Pomembno vlogo je pri tem imelo na začetku še lazurno slikanje, grajenje barve z nalaganjem povsem tankih in prosojnih plasti slikarskih barv druge vrh druge. In prav z akvarelom so se pojavile določene teme in pristopi, ki so pomembno vplivali na obdobje romantike.

Akvarel so Angležem prvič predstavili severnjaki, ki so ga uporabljali kot sredstvo za zapisovanja na kraju samem, k njegovemu trajnemu slovesu pa je prvi pripomogel Albrecht Dürer. Po svojem obisku Benetk leta 1454 je ob vrnitvi v Nürnberg, obogaten z novim konceptom

a kerchief and carrying buckets full of water depicted from behind.

The free stroke, which can be observed in the aforementioned works, was gradually being transferred from sketch to finished works in the mid-18th century, without losing its visibility or recognisability in the process. That time saw the appearance of a group of British artists who used watercolour for painting landscapes. Instead of regarding their works as studies, they decided to consider them as artworks in their own right. Underlying such developments was the emergence of ink drawing tinted by watercolour. Watercolour is a painting technique in which finely ground pigments float in water while being applied to the support medium, most typically paper, and are subsequently absorbed by it (dyeing the fibres in the process). Especially in the 19th century, tinted ink drawings made it possible for the watercolour with its characteristics to assert itself, thereby significantly supporting the abovementioned trends in European painting.

A second paint layer was either applied after the first one had dried or wet watercolour paints were mixed directly on paper in order to achieve soft transitions. The whiteness of the paper was utilised as light (or the colour white). In this context, a special role was played by lazure painting, i.e. the creating of colour by placing thin and transparent overlays of paint one over another. It was thus watercolour that made possible certain themes and approaches that, in their turn, had a significant impact on oil sketching and during the period of Romanticism.

Watercolour was first presented to the British by northern Europeans who used it as a medium for on-the-spot recording, with Albrecht Dürer being the first to bring it to lasting fame. Having returned to Nuremberg from a visit to Venice in 1454, Dürer brought home a new concept and understanding of life and the artist's position in it. What he also brought with him was a series of amazing watercolours. They could be called

in dojemanjem sveta in umetnikovega položaja v njem, s poti prinesel presenetljive akvarele – lahko bi jih označili kot študije po modelu – italijanskih gora, a nikakor ne v smislu topografije, pač pa v njihovi brezčasni svežini in organski celovitosti, z zaokroženim in mirnim ritmom. Naslednji, ki so pripomogli k uveljavitvi akvarela in ga naredili za svojega, so bili Angleži. Od sredine 18. stoletja je postal akvarel sredstvo resnega umetniškega izraza v rokah nadarjenih, kot sta bila Alexander Cozens in njegov sin John Robert Cozens. Polni potencial akvarela je bil tako prepoznan v 19. stoletju, ko so razpon njegovega subjekta, tehnike in ekspresije precej razširili, na čelu z Williamom Turnerjem, verjetno najslavnejšim akvarelistom svojega časa. Pri tem je pomembno dodati, da so prav okrog leta 1850 slikarji v Barbizonu in gozdu Fontainebleau v Franciji zapustili svoje ateljeje in začeli skicirati neposredno na prostem, *en plein air*, in slednjič končnost in skicoznost povezali v enotno podobo

AKVAREL, KI JE BIL UPORABLJEN ŽE ZA SLIKANJE V EGIPČANSKIH ROKOPISIH, KNJIGAH MRTVIH, SE JE ZAČEL POČASI UVELJAVLJATI ŠELE S SREDNJEVEŠKIMI EVROPSKIMI SAMOSTANSKIMI ROKOPISNIMI »ŠOLAMI«, NA TEMELJU NOVEGA, IZ KITAJSKE PRINESENEGA IZUMA, PAPIRJA, Z MINIATURAMI OZIROMA ILUMINACIJAMI, OD 14. IN 15. STOLETJA DALJE. ŽE TEDAJ JE NASTAJAL SKORAJ IZKLJUČNO NA BELIH VPOJNIH PAPIRJIH, KAMOR SE NANAŠA NOVA BARVNA PLAST, KO JE SPODNJA ŽE SUHA, ALI PA Z MEŠANJEM MOKRIH AKVARELNIH BARV NA PAPIRJU, DA SE USTVARIJO MEHKI PREHODI, PRI ČEMER SE KOT SVETLOBA (BELA BARVA) IZKORIŠČA BELINA PAPIRJA.

studies after a model – of the Italian mountains. Yet the emphasis was not on topography: the mountains were rendered in their timeless freshness and organic integrity, displaying their undulating and gentle rhythm. The next to reach for watercolour and make it a significant medium were the English. From the mid-18th century onwards, watercolour became a medium of genuine artistic expression in the hands of talented individuals such as Alexander Cozens and his son John Robert Cozens. Watercolour's full potentials were thus recognised in the 19th century, when the extent of the medium's subject, technique and expression was significantly broadened, especially by William Turner, perhaps the most famous watercolourist of his time. In this context, it has to be added that it was around 1850 that also the French painters in Barbizon and Fontainebleau forest left their studios, starting to sketch in the open air, i.e. *en plein air*. Those artists eventually managed to integrate the qualities of finished works and the sketch-like qualities into one single image, thereby acting as predecessors to Impressionism. In order to be able to paint in such a manner, artists used floating studios built on boats, which allowed them to view rivers and their banks from a new perspective. Similar developments were underway in Normandy, across the English Channel, where painters, after

WATERCOLOUR, WHICH HAD BEEN USED FOR PAINTING IN ANCIENT EGYPTIAN MANUSCRIPTS, E.G. THE BOOK OF THE DEAD, BEGAN SLOWLY TO BREAK THROUGH IN MEDIEVAL EUROPEAN MONASTERY-BASED 'SCHOOLS' OF MANUSCRIPT ILLUMINATION, BASED ON A NEW INVENTION BROUGHT FROM CHINA, I.E. PAPER, FROM THE 14TH AND 15TH CENTURY ONWARDS. EVEN AT THAT TIME, WATERCOLOUR WAS CREATED ALMOST EXCLUSIVELY BY USING ABSORPTIVE WHITE PAPER AS THE SUPPORT MEDIUM.

– predhodnico impresionističnih. Slikarji so si za takšno slikanje izdelovali plavajoče ateljeje na majhnih čolnih, da so si lahko ogledovali obrežja in reko na nov način. Podobno se je dogajalo v Normandiji, vzdolž Rokavskega preliva, kjer so slikarji zavzeli svoj prostor na obalah in plažah ter se posvetili novemu motivu – nedeljskemu prostočasju in lokalnim prizorom, bežno zabeleženim, tudi z akvarelom. Vse te neformalne kompozicije sproščenih, nevezanih potez in nemešanih barv je v bistvu omogočila prav voda: osebni odgovor na doživljanje narave je nastajal v akvarelu brez preprek med idejo in izvedbo, skrajno moderno, s skrajno ekonomijo sredstev.

Med akvareli v zbirki Muzeja in galerij mesta Ljubljane na eni strani pozornost pritegnejo dela I. Heinischa, z drobnimi in nadvse natančno položenimi barvnimi kapljami vode, in na drugi strani skoraj abstraktno učinkujoče krajine Hermana Gvardjančiča.

Z vse večjo priljubljenostjo akvarelov in akvareliranih vedut, ki ohranjajo topografsko risbo, pri zbiralcih, kupcih in turistih, premožnih popotnikih, novi ciljni skupini na t. i. grand touru po Evropi, so podjetni trgovci pospešeno spodbujali izdelavo cenejših grafik kot spominkov na mesta, kot so bile Benetke, za kar se je po letu 1720 prvi odločil Canaletto. Za reproduciranje akvarelov je postala v 18. stoletju priljubljena akvatinta.

Prve znane akvatinte so bile ustvarjene v 17. stoletju, a je zanimanje za to različico jedkanice poniknilo v pozabo, dokler je niso na novo razvili v Franciji, s spodbudo, da bi našli boljše možnosti tiska in poustvarjanja tonalne kompleksnosti akvarela in laviranih risb. Ime povezuje dela, za katera je značilno stopnjevano ploskovno jedkanje, ki je omogočalo ustvarjanje senc in »večbarvni« odtis. Poimenovanje izpostavlja sposobnost

having come out to the shores and beaches, were absorbed by a new motif – Sunday leisure in the open air and local scenes – sketched casually, also using watercolour. What actually made possible all those simple compositions of relaxed and loose strokes along with unmixed colours was water: entirely personal responses to the experience of nature were created in watercolour, surpassing any limits between the idea and the realisation, in an extremely modern manner and with a remarkable economy of means.

As regards watercolours from the collection of the Museum and Galleries of Ljubljana, one has to mention the works by Heinisch, featuring tiny and minutely arranged coloured water drops, and Herman Gvardjančič's landscapes whose ultimate effect is almost that of abstraction.

With an increasing popularity of watercolours and tinted views (in which topographic drawings are retained) with collectors, buyers as well as tourists, i.e. well-off travellers undertaking the *Grand Tour* of Europe, ambitious merchants started to encourage the production of cheaper versions of prints as souvenirs of cities like Venice. The first to embark on this undertaking after 1720 was Canaletto. Aquatint gained particular popularity in reproducing watercolours of English landscapes in the 18th century.

The first known aquatints had been made in the 17th century, but this variant of etching then sank into oblivion. Rediscovered in France, it offered better possibilities for the printing and reproducing of the tonal complexity of both watercolour and wash drawing. Aquatint is a technique involving the process of progressive etching in the surface of a plate, which facilitates the creation of shades and tonal prints. The technique's very name is indicative of its ability to retain in the finished print the effects of the original wash or watercolour: it seems that the final result of etching is actually the original drawing or watercolour. The tradition of aquatint was the strongest in Britain where the demand for

Tinca Stegovec, Pred zapornicami, 1960, jedkanica in akvatinta na papirju (MGML, foto M. Paternoster)

Tinca Stegovec , Before the gates, 1960, etching and aquatint on paper (MGML, photo M. Paternoster)

medija, da v odtisu ohrani učinke laviranja in akvarela, da se zazdi, kot da je pred nami izvirna risba oziroma akvarel. Najmočnejšo tradicijo so ustvarili angleški umetniki – tam je bilo povpraševanje po imitaciji akvarela v 19. stoletju nezmanjšano – z založništvom topografske risbe in ilustracij v knjigah (kljub drugod priljubljenejši litografiji). Od slavnih mojstrov akvatinte izpostavimo le Francisca Goyo. Na Slovenskem je grafika, odvisna od števila jedkanj, dobro zastopana, v prekrasnih in mojstrsko natančnih, upravičeno rečeno popolnih odtisih jo v kombinaciji z jedkanico vidimo v opusu Tince Stegovec. Predstavimo le tisto z naslovom Pred zapornicami, ki kaže skupino ljudi z odprtimi dežniki v trenutku pred prihodom vlaka.

imitations of watercolour images did not subside until the 19th century thanks to the widespread publishing of topographic drawings and book illustrations (with lithography being prevalent in other parts of Europe). The most renowned masters of aquatint included Francisco Goya. In Slovenia, printmaking depending on the number of etchings is well-represented: the lovely and minutely accomplished, almost perfect prints by Tinca Stegovec can be mentioned as an example of a combination of aquatint and etching. The print entitled *Pred zapornicami* (Before the Railway Gate) portraying a group of people with open umbrellas waiting for the train to pass is especially noteworthy. Marked as the first of three prints, signed and dated November 1960, the work was purchased during an exhibition staged in the Jakopič Pavilion in February 1961.

Ali je vodi v 20. stoletju uspelo na novo vzpostaviti in predstaviti svojo vrednost kot navdih?

Ko je 20. stoletje izzvenelo, voda ni izgubila svoje vloge, niti pozornosti, ki ji jo namenjamo – tudi v umetnosti. Vse bolj neposredno v središču naših pogovorov je v svoji najbolj prvinski obliki, takšna pa se nam kaže tudi v umetniškem delovanju. Še naprej sta v sodobne oblike samoumevno vpeta starodavni val in meander. Oddaljeno odmevajo oblike, spominjajoče na gibanje vode, v kiparstvu in na pljusk spominja razlivajoča se barva na različnih slikarskih nosilcih. Vodne površine, kot so se v prvi impresiji ali z lokvanji Clauda Moneta usidrale v naš spomin, še naprej spodbujajo nastanek novih slik. Prav tako barva vode, ki jasno stopa v ospredje na abstraktnih slikah. Človek je s svojim ustvarjalnim zanosom podzavestno in nazorno predstavil svoj odnos do narave in tudi vode v vrtovih in parkih, v človeški volji podvrženih ureditvah in tudi takšnih, kjer se zdi, da ima narava svojo lastno voljo, a se v bližnjem pogledu razkrije vrtnarjev ali arhitektov dotik. Mestni parki morda najbolje odražajo trenutek in skupno sobivanje z reko, ki teče skozi mesta, njenimi obrežji. Vprašanje, do kolikšne mere se lahko narava razbohoti v svojem gibanju, preden nas prevzameta strah in spomin na poplave in žled ter se začnejo novi in pogosto prehitri posegi, je in bo večno. Umetniška dela, angleško poimenovana *earth* in s*ite works* (*land art*), vključujejo naravo in z njo reke in morje neposredno, jih predstavljajo kot njih same.

Did water in the 20th century manage to re-establish and re-present its value as a source of inspiration?

With the 20th century coming to an end, water in art lost neither its role nor the attention we pay to it. It has remained in the very centre of our considerations, and it has been increasingly seen in its most elementary forms. Thus, the ancient wave and meander still feature prominently in contemporary artistic practices which, at the same time, echo the shapes reminiscent of the flowing water (in sculpture) and of the splashing water (on various types of painting support media). Water surfaces that had caught our attention with Claude Monet's very first impression and with his water lilies continue to encourage the production of new works. Similarly persistent is the colour of water, which has been clearly brought to the forefront in a number of abstract paintings. Relying on his creative impulse, man has attempted to present his attitude to nature, and to water, both subconsciously and openly in gardens and parks the layouts of which were sometimes wholly subordinated to man's will and sometimes – seemingly allowing the nature to have the last word – the gardener's or architect's touch is only discernible upon closer examination. Urban parks and embankments perhaps best reflect a town's co-existence with the river flowing through it. The question as to the extent to which nature can be allowed to run wild before we start, filled with fear and memories of the past floods and ice storms, to undertake new and daring interventions into it, will always be with us. Artworks produced within the art movement called Land Art present nature, including rivers and seas, directly, i.e. as what they really are. The 1970s, in particular, can be regarded as a period in which art started to evade galleries and museums, wanting to be visible and accessible to everybody; artists designed their works either in the wilderness, integrating bodies of water in new artistic compositions, or in urban

V sedemdesetih letih preteklega stoletja je nastopilo obdobje, ko si je umetnost želela predstaviti se vsem in biti dostopna povsod, ne več ujeta v galerijah in muzejih; umetniki so svoja dela snovali v divjini, z vodnimi površinami kot sestavnim delom novih umetniških kompozicij; na podoben način so nastajala tudi v urbanih okoljih. V svetovno znanih primerih, kot sta spiralna kompozicija Roberta Smithsona ali *Running Fence* Christa, sta stopili v ospredje hkrati želja in nujnost, da se z novimi umetniškimi oblikami pokažejo možnosti zaščite in ohranitve narave, ali vsaj tistega, kar je od nje ostalo. Kajti kljub fotogenični podobi Smithsonove spirale je pomembno vedeti, da je umetniška intervencija nastala na obali in gladini morja, kjer je umetnik odkril pozabljene ruševine objektov naftnih družb.

V Sloveniji je na področju odkrivanja izgubljenega človekovega stika z naravo prvi začel delovati Marko Pogačnik. V krogu skupine OHO je v poletnih mesecih 1969–1971 izvajal umetniške intervencije v naravi – ob rekah in na morski obali. Milenko Matanović pa je v Ljubljanico spustil nekaj deset metrov dolgo kompozicijo, sestavljeno iz palic, povezanih z vrvjo, in *Kačo* je oblikoval tok reke. Na tradicijo te znamenite slovenske skupine se navezuje skupinski projekt *Voda in kipi* (1993–1995). Že leta 1988 se je trienale Ekologija in umetnost (EKO) v Mariboru osredotočil na problem vode znotraj široke ekološke problematike; takrat so bili znova predstavljeni kinetični objekti Slavka Tihca iz leta 1968, ki izkoriščajo naravne pojave, kot sta valovanje in rečni tok. Na tem mestu si zasluži omembo tudi projekt Jiřija Kočice in Žiga Okorna *Čolnarna v Tivoliju* (Ljubljana 1991). Spomnimo pa še na Andreja Zdraviča, Marjetico Potrč in tudi na skupino ProstoRož ter njene intervencije v Ljubljani v letih 2004/2005.

environments. Globally renowned examples, such as Robert Smithson's *Spiral Jetty* or Christo's *Running Fence*, presented themselves as a wish and a need to utilise new artistic practices in order to offer possibilities for protecting and preserving the nature, or at least what had remained of it. Despite the photogenic quality of Smithson's spiral, it is important to know that his artistic intervention was located on the seashore where the artist had previously discovered the ruins of former oil facilities.

In Slovenia, the first artist to attempt to re-establish humanity's lost contact with the nature was Marko Pogačnik who, within the framework of the OHO Group, carried out numerous artistic interventions in the nature, on the riverbanks and seashores, in the summer months of the 1969–1971 period. Belonging to the same group, Milenko Matanović created a composition several tens of metres long called *Kača* (The Snake) made of wooden poles connected by a rope and placed it into the Ljubljanica River. The 'snake' imitated the river's meandering movements. The tradition of the OHO Group was later revived by the *Voda in kipi* (Water and Sculptures) project in 1993–1995. As early as 1988, the Ecology and Art (EKO) triennial in Maribor focused on the issue of water within the framework of the broader field of ecology; on that occasion, the kinetic objects by Slavko Tihec from 1968, which depend on natural phenomena such as waves and flowing rivers, were presented for the second time. In this context, one has to mention the *Čolnarna v Tivoliju* (Tivoli Boathouse) project designed by Jiři Kočica and Žiga Okorn in Ljubljana in 1991, Andrej Zdravič, Marjetica Potrč and the ProstoRož Group with the interventions undertaken in Ljubljana in 2004/2005.

In zdaj?

Le zdelo se je, da voda za človeka ni več nepremagljiva sila. Voda lahko še naprej posega v življenje. Ohranila je tudi svojo skrivnostnost. In le zdelo se je, da je življenje danes drugačno; nove generacije Argonavtov usodno povezane z naklonjenostjo voda, zdaj sredozemskega morja, opominjajo, da je voda še naprej tudi naše zunanje gibalo, nikakor ne le notranji pogon. Vodi se posvečajo kot svoji temi še naprej tudi sodobni umetniki, kot napoveduje in predstavlja bienale sodobne umetnosti v Istanbulu (2015) z naslovom *SALTWATER: A Theory of Thought Forms*.

Razstava v Mestnem muzeju predstavlja dela iz lastne zbirke, številna redko razstavljena. Z njimi se želi vrniti k razmisleku o vodi kot motivu in vprašanju, kaj nam pove o nas samih. Z akvareli pa pokazati, da je človek lahko tudi vešč dialoga, harmoničnega sobivanja in iskanja ter soustvarjanja z vodo; kot zaveznika pri čudežni igri, s *sprezzaturo*, neprisiljeno lahkotnostjo, uravnotežena in odgovorna drug do drugega.

Herman Gvardjančič, Krajina, 1980, akvarel na papirju (MGML, foto M. Paternoster)

Herman Gvardjančič, Landscape, 1980, watercolour on paper (MGML, photo M. Paternoster)

And now?

Water has only apparently ceased to be an invincible power. Water can continue to interfere with the life. Water has retained its mysteries regardless of the significantly changed lives of men. Perhaps our lives have only apparently changed: new generations of Argonauts, their lives fatally dependent on water's benevolence, now the Mediterranean Sea, remind us that water remains to be an important external factor, along with its role as an internal impulse. Today, water continues to be the theme for numerous contemporary artists, which is also proved by the upcoming biennial of contemporary art to be held in Istanbul (2015): *SALTWATER: A Theory of Thought Forms*.

The present exhibition at the City Museum, displaying the works from the museum's collection, among them rarely presented works, is aimed at encouraging viewers to think about water not only as a motif but especially about what it really is. As proven by the medium of watercolour itself, man is capable of engaging in a dialogue, of entering into a harmonious co-existence and even partnership with water: water and man can create alliance in a wonderful harmony, displaying a *sprezzatura*, or effortless casualness, stable balance and mutual responsibility.

ALEŠ ŠTEGER

***

Pet trditev,
To je vse, kar so
Naplavila leta.

Prva: ljubil sem te,
Še preden sem obstajal.

Druga: moje življenje
Je kaplja črnila v brezmejno noč.

Tretja: Ni konca,
Le zasneženi vrhovi gora.

Četrta: Morje se ne
Meni za nas.

Zadnja: Ni konca,
Le ledeniki umirajo.

ALEŠ ŠTEGER

***

Five assertions,
This is all
The years washed up.

First: I loved you
Even before I existed.

Second: my life
Is a drop in the boundless night.

Third: There is no end,
Only snow-covered mountain peaks.

Fourth: The sea does not
Care about us.

Last: There is no end,
Only the glaciers are dying.

TRANSLATED BY BRIAN HENRY

VODA IN ZNANOST
WATER AND SCIENCE

Irena Šinkovec v sodelovanju s Slovenskim društvom za zaščito voda
in JP Vodovod – Kanalizacija

Irena Šinkovec in collaboration with the Slovene Water Pollution Control Society
and JP Vodovod – Kanalizacija

EKSPERIMENTALNA SOBA

Izvedbo eksperimentalne sobe je omogočila Mestna občina Ljubljana, Oddelek za varstvo okolja

Ob razstavi smo za obiskovalce pripravili zanimivo eksperimentalno sobo, ki je namenjena naravoslovnim temam, k raziskovanju in preizkušanju pa vabi predvsem otroke in šolske skupine. Zanje pripravljamo posebne izkustvene delavnice s področja fizike, kemije, biologije in

EXPERIMENTAL ROOM

The experimental room was made possible by the Municipality of Ljubljana, Environmental Protection Section

Alongside the exhibition, we have set up a compelling experimental room for our visitors, dealing with natural science topics, research and experimentation, and intended particularly for schoolchildren. The latter will be able to attend special experiential workshops in physics, chemistry, biology and ecology. Because water

Ob vodi (foto: M. Paternoster)

By the water (photo: M. Paternoster)

predvsem ekologije. Voda je namreč zelo posebna snov. Voda izpred milijard let obstaja še danes, je bistvo živega: vse življenje na Zemlji se je razvilo v njej in vse življenje na Zemlji je odvisno od nje. O njej so napisane številne knjige, raziskovalci pa se vsak dan znova srečujejo s presenetljivimi novimi odkritji. Nekaj temeljnih zakonitosti o vodi, ki je vedno na poti in se pojavlja v več oblikah, si lahko ogledate na razstavljenih modelih. Posebna pozornost je namenjena čiščenju odpadne vode, na katero prepogosto pozabljamo.

is such a unique substance. The same water that existed billions of years ago still exists today and is the essence of life: all life on Earth has developed in water and all life on Earth depends on it. Numerous books have been written about it, and researchers studying it come across surprising new findings virtually on a daily basis. You can observe some of the fundamental laws that govern the behaviour of water, a substance always on the run and existing in many forms, in the exhibited models. Special attention is given to the treatment of waste water, the water we all too often forget.

Voda v oblakih (foto: M. Roš)

Water in the clouds (photo: M. Roš)

Vrela voda (foto: M. Roš)

Boiling water (photo: M. Roš)

Ledena pravljica (foto: M. Roš)

Frozen fairy tale (photo: M. Roš)

Sneg (foto: I. Šinkovec)

Snow (photo: I. Šinkovec)

Na vodi (foto: M. Roš)

On the water (photo: M. Roš)

Ob vodi (foto: M. Roš)

By the water (photo: M. Paternoster)

Pod vodo (foto: D. Badovinac)

Under the water (photo: D. Badovinac)

TAKING CARE OF THE ENVIRONMENT

Environmental Protection Section of the Municipality of Ljubljana

The important assignments of the Environmental Protection Section of the Municipality of Ljubljana include the detailed and special monitoring of nature and the environment. We conduct environmental measurements associated with air pollution, quality of the groundwater, quality of the surface watercourses, ground pollution, waste, noise and the natural environment, either on our own or in collaboration with external partners.

QUALITY OF THE GROUNDWATER

The groundwater of the Ljubljana Field and the Ljubljana Marshes is the main source of drinking water used by the city of Ljubljana. The quality of the groundwater has been monitored since 1997. It should be noted that the monitoring pertains to the quality of the groundwater, not drinking water. That is, the quality of water “on tap” is not the same as the quality of the groundwater, not least because of the measures carried out by the operator of the water distribution system.

QUALITY OF THE SURFACE WATERCOURSES

The quality of the surface watercourses has been monitored since 1998, on the Sava, Ljubljanica, Bezlanov graben, Cornovec, Mali graben, Gradaščica, Iščica, Gameljščica, Črnušnjica and Besnica.

The aim of the measurements is to follow the quality of the water at the locations people use to swim and determine the effects of the Ljubljana Marshes landfill site on the quality of the Ljubljanica and its tributaries.

SKRB ZA ČISTO OKOLJE

Oddelek za varstvo okolja Mestne občine Ljubljana

Ena izmed pomembnih nalog Oddelka za varstvo okolja Mestne občine Ljubljana je tudi zagotavljanje podrobnejšega ali posebnega monitoringa stanja okolja in narave. Sami ali v sodelovanju z zunanjimi partnerji izvajamo meritve stanja okolja s področij onesnaženosti zraka, kakovosti podzemne vode, kakovosti površinskih vodotokov, onesnaženosti tal, odpadkov, hrupa in naravnega okolja.

Ljubljanica (foto: M. Roš)

Ljubljanica (photo: M. Roš)

KAKOVOST PODZEMNE VODE

Podzemna voda Ljubljanskega polja in Ljubljanskega barja je glavni vir pitne vode

Ljubljanica (foto: M. Roš)

Ljubljanica (photo: M. Roš)

za mesto Ljubljana. Kakovost podzemne vode spremljamo od leta 1997. Opozoriti je treba, da je nadzor namenjen spremljanju stanja podzemne vode in ne pitne vode. Kakovost »vode na pipi« se namreč razlikuje od kakovosti podzemne vode, navsezadnje tudi zaradi ukrepov, ki jih izvaja upravljavec vodovodnega sistema.

KAKOVOST POVRŠINSKIH VODOTOKOV

Kakovost površinskih vodotokov spremljamo od leta 1998 in sicer na Savi, Ljubljanici, Bezlanovem grabnu, Cornovcu, Malem grabnu, Gradaščici, Iščici, Gameljščici pred izlivom v Savo, Črnušnjico in Besnico pred izlivom v Ljubljanico.

Namen nadzornih meritev je spremljanje kakovosti vode na mestih, ki jih ljudje uporabljajo za kopanje ter ugotavljanje vpliva deponije na Barju na kakovost Ljubljanice in njenih pritokov.

ONESNAŽENOST TAL

Tla so del ekosistema, v katerem se snovi zadržujejo najdlje. Ugotavljanje in spremljanje onesnaženosti tal je dolgotrajen proces in je tako pomemben kot skrb za pitno vodo, podzemno vodo in kakovost zraka. V letu 2005 smo začeli z rednim monitoringom onesnaženosti tal kmetijskih zemljišč na vodovarstvenih območjih v Mestni občini Ljubljana.

GROUND POLLUTION

The ground is that part of the ecosystem where substances are retained for the longest time. The determination and monitoring of ground pollution is a long-term process that is at least as important as good drinking water, groundwater and air. We initiated regular monitoring of ground pollution of the agricultural land in the water protection areas in the Municipality of Ljubljana in 2005.

MODEL VODONOSNIKA LJUBLJANSKEGA POLJA

Javno podjetje Vodovod – Kanalizacija

V Ljubljani pijemo naravno pitno vodo, ki ni pripravljena s tehnološkimi postopki. Da je ohranitev kakovostnih vodnih virov pomemben dosežek mesta Ljubljana, je prepoznano tudi v evropskem merilu, saj je pri ocenjevanju pobude za Zeleno prestolnico Evrope 2016 področje pitne vode v Ljubljani postalo zgled ostalim evropskim mestom.

Varovanje kakovosti in količin vodnih virov v MOL spada med strateške cilje Programa varstva okolja MOL 2014-2020. Od trajnostnega gospodarjenja z vodnimi viri je odvisna varna oskrba s pitno vodo tudi za prihodnje generacije.

Da bo razmere v vodonosnih plasteh, kjer se zadržuje podzemna voda, ki je vir pitne vode v Ljubljani, lažje razumeti, smo s strokovnjaki Geološkega zavoda Slovenije izdelali model vodonosnika Ljubljanskega polja, s katerim prikazujemo osnovne fizikalne pojave v vodonosnih plasteh, povezavo med površinsko in podzemno vodo, vpliv črpanja in vpliv onesnaženj na kakovost podzemne vode.

Dogajanje smo oblikovali v kratek video zapis, ki ga najdete med našimi video izobraževalnimi gradivi na www.vo-ka.si/aktualno/ucni-model-vodonosnika-ljubljanskega-polja.

Model vodonosnika Ljubljanskega polja

Model of the Ljubljana Field aquifer

MODEL OF THE LJUBLJANA FIELD AQUIFER

JP Vodovod – Kanalizacija

In Ljubljana, we're drinking natural drinking water that has not been technologically treated. The fact that the preservation of high-quality water resources is an important achievement of the city of Ljubljana, has also been recognized by the EU, as the evaluation of Ljubljana as a candidate city for the European Green Capital 2016 declared Ljubljana's drinking water to be an example to other European cities.

The preservation of the quality and quantity of the water resources in MOL is one of the strategic goals of the Ljubljana Environmental Protection Programme 2014–2020. A healthy water supply for the future generations depends on a sustainable approach to water resource management.

To make the conditions in the water-bearing layers containing groundwater that is the source of Ljubljana's potable water easier to understand, we collaborated with the experts of the Geological Survey of Slovenia to create a model of the Ljubljana Field aquifer showing the fundamental physical laws at work in the water-bearing layers, the connections between surface and underground water and the effects pumping and pollution have on the quality of the groundwater.

We have formatted the explanation as a short video that you can find among our educational videos at www.vo-ka.si/aktualno/ucni-model-vodonosnika-ljubljanskega-polja.

MODEL BIOLOŠKE ČISTILNE NAPRAVE

Meta Levstek,
Slovensko društvo za zaščito voda

ČIŠČENJE ODPADNE VODE V BIOLOŠKI ČISTILNI NAPRAVI

KAJ SO TO ODPADNE VODE?

Vsak prebivalec v Sloveniji v povprečju dnevno porabi okoli 120 L vode, ki se po uporabi kot odpadna voda prelije v okolje. V odpadni vodi se nahaja vsi tekoči odpadki, ki nastanejo v gospodinjstvu (kuhinja, toaleta, pranje perila…). Takšna odpadna voda je močno onesnažena in se pred izpustom v okolje mora ustrezno očistiti. V primeru, da bi se voda spustila v okolje neočiščena bi vodna telesa postala tako onesnažena, da bi nam pričelo primanjkovati zaloge kvalitetne pitne vode.

KJE SE OČISTIJO ODPADNE VODE?

Vse odpadne vode, ki nastajajo v hiši se preko interne kanalizacije prelijejo v večjih mestih v centralne kanalizacijske sisteme, ki združuje vse odplake in se na koncu zaključijo z veliko biološko čistilno napravo. V manjših naseljih ali vaseh pa mora vsak objekt za sebe poskrbeti za čiščenje odpadne vode. V preteklosti so to bile greznice, ki pa jih bodo v naslednjih letih nadomestile male biološke čistilne naprave.

KAKO SE VODA OČISTI NA BIOLOŠKI ČISTILNI NAPRAVI?

Ne glede na to ali govorimo o velikih čistilnih napravah za cela naselja oziroma mesta ali čistilni napravi za eno hišo vse očistijo odpadno vodo na naraven, to je biološki način. V čistilni napravi se

MODEL OF A BIOLOGICAL TREATMENT PLANT

Meta Levstek,
Slovene Water Pollution Control Society

WASTE WATER TREATMENT IN A BIOLOGICAL TREATMENT PLANT

WHAT IS WASTE WATER?

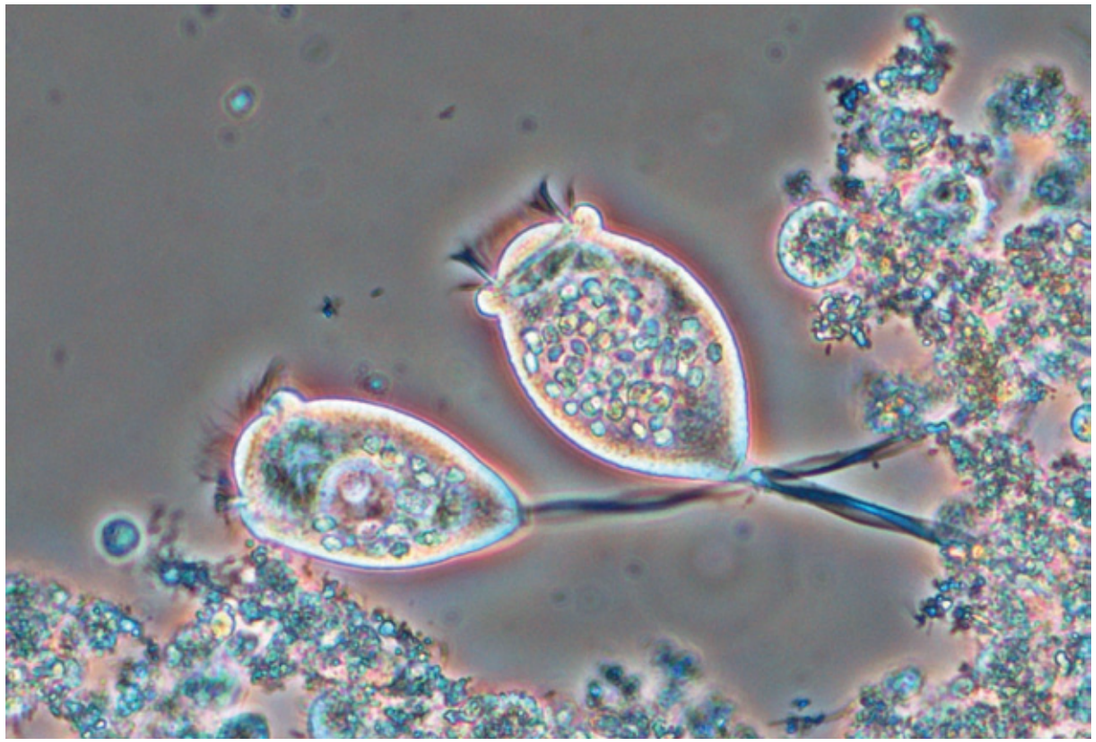
On average, every resident of Slovenia uses up around 120L of water every day, and after it has been used, all this water runs off into the environment. Waste water contains all the liquid domestic waste (kitchen waste, sewage, water from washing machines, etc.). Such waste water is heavily polluted and must be properly treated before being released into the environment. If water were to run off into the environment without being treated, all the water bodies would become so polluted that we would quickly start running out of good drinking water.

WHERE IS THE WASTE WATER TREATED?

In major cities, all domestic waste water is piped through internal sewers into the central sewerage system that collects all the effluent and terminates at a large biological treatment plant. In smaller settlements or villages however, every building must be fitted to take care of its own waste water. In the past, this was done using septic tanks; in the near future however, these will be replaced by small biological treatment plants.

HOW IS WATER TREATED IN A BIOLOGICAL TREATMENT PLANT?

Regardless of their size, ranging from large treatment plants that serve whole towns or cities to those used by a single home, all treatment plants purify the water in a natural, i.e. biological manner. The treatment plant emulates the natural purification processes that we find in rivers,



Slika mikroorganizmov pod mikroskopom

A microscope photo of micro-organisms

posnemajo naravni postopki čiščenja, kot so prisotni v rekah, le da imamo v čistilni napravi večjo koncentracijo odpadnih snovi (odplak), dodatno vpihujemo zrak in večjo koncentracijo mikroorganizmov (aktivnega blata), ki s pomočjo zraka odpadne snovi v vodi razgradijo in tako vodo očistijo. Odpadne snovi v odpadni vodi za mikroorganizme predstavljajo hrano za preživetje in razmnoževanje. Biološka čistilna naprava ob pravilnem obratovanju odpadne vode očisti nad 95 % in je tako očiščena voda primerna za izpust v naravo.

EXPO POENOSTAVLJEN MODEL MALE BIOLOŠKE ČISTILNE NAPRAVE

Čistilna naprave sestoji iz dveh delov. Odpadna voda priteka v notranji del čistilne naprave, ki se imenuje prezračevalna cona. V prezračevalni coni se stalno dovaja zrak s

however, this is applied to a higher concentration of waste material (effluent); it is facilitated by additional air injection, and takes place in the presence of a higher concentration of micro-organisms (activated sludge) that use air to break down the waste material in the water and thus purify it. The waste material in the effluent provides sustenance to the micro-organisms and allows them to multiply. A biological treatment plant that's functioning properly purifies waste water by over 95%, which allows us to release the water into the environment.

AN EXPO SIMPLIFIED MODEL OF A SMALL BIOLOGICAL TREATMENT PLANT

The treatment plant consists of two parts. Waste water flows into the inner part of the treatment plant called the aeration zone. The aeration

pomočjo puhala in talnega difuzorja. Zrak je nujno potreben za obstoj in razgradnjo organskih snovi v odpadni vodi s pomočjo mikroorganizmov (aktivnega blata). V tem delu se vrši čiščenje odpadne vode. Zunanji del čistilne naprave predstavlja usedalno cono, kjer se aktivno blato zaradi težnosti usede na dno, očiščena voda pa prosto odteče v okolje. Usedlo aktivno blato se zaradi posebne oblike čistilne naprave in močnega toka zraka ponovno vrne v osrednji del čistilne naprave, kjer se vrne v proces razgradnje odpadnih snovi. Na vsaki biološki čistilni napravi kot stranski produkt nastaja odvečno blato, ki ga je potrebno na določen časovni interval izčrpati in odpeljati na dodatno obdelavo na večjo čistilno napravo.

zone is constantly being supplied with air using a blower and a floor diffuser. Air is necessary for the preservation of the micro-organisms (activated sludge) and for their breakdown of organic substances in the waste water. This is the part where the water treatment takes place. The outer part of the treatment plant is the so-called settling zone, where gravity forces the activated sludge to settle at the bottom while the treated water runs off into the environment. Thanks to the special shape of the treatment plant and the heavy air flow, the settled activated sludge is returned to the central part of the treatment plant where it re-enters the breakdown of waste material. Every biological treatment plant produces an excess of sludge, which has to be pumped out of the plant in specified intervals and further treated in a larger treatment plant.

Iztok iz čistilne naprave Novo Mesto

Effluent from the waste water treatment plant in Novo Mesto

slika 1: THE CENTRAL WASTE WATER TREATMENT PLANT LJUBLJANA (size: 360,000 PE) - Pogled na CČN Ljubljana iz zraka (Arhiv JP VO-KA)

Figure 1: CENTRALNA ČISTILNA NAPRAVA LJUBLJANA (velikost 360.000 PE) - A bird's-eye view of the CWWTP Ljubljana (JP VO-KA archives)

slika 2: CENTRALNA ČISTILNA NAPRAVA DOMŽALE-KAMNIK (200.000 PE) - Pogled na CČN Domžale-Kamnik iz zraka (Arhiv JP CČN Domžale-Kamnik d.o.o.)

Figure 2: THE CENTRAL WASTE WATER TREATMENT PLANT DOMŽALE-KAMNIK (size: 200,000 PE) - A bird's-eye view of the CWWTP Domžale-Kamnik (JP CČN Domžale-Kamnik d.o.o. archives)

slika 3: ČN MARIBOR (velikost 195.000 PE) - Pogled na CČN Maribor iz zraka (Arhiv JP CČN Maribor)

Figure 3: THE WWTP MARIBOR (size: 195,000 PE) - A bird's-eye view of the CWWTP Maribor (JP CČN Maribor archives)

slika 4: ČISTILNA NAPRAVA CELJE (velikost 85.000 PE) - Pogled na CČN Celje iz zraka (Arhiv Vodovod - Kanalizacija javno podjetje d.o.o., Celje)

Figure 4: THE CENTRAL WASTE WATER TREATMENT PLANT CELJE (size: 85,000 PE) - A bird's-eye view of the CWWTP Celje (Vodovod - Kanalizacija javno podjetje d.o.o. archives)

slika 5: ČISTILNA NAPRAVA NOVO MESTO (velikost 55.000 PE) - Pogled na CČN Novo Mesto (Arhiv Komunala Novo Mesto d.o.o.)

Figure 5: THE WASTE WATER TREATMENT PLANT NOVO MESTO (size: 55,000 PE) - A view of the CWWTP Novo Mesto (Komunala Novo Mesto d.o.o. archives)

slika 6: ČN ŠALEŠKE DOLINE (velikost 50.000 PE) - Pogled na CČN Šaleške doline (Arhiv Komunalno podjetje Velenje d.o.o.)

Figure 6: THE WWTP ŠALEK VALLEY (size: 50,000 PE) - A view of the CWWTP Šalek Valley (Komunalno podjetje Velenje d.o.o. archives)

ČIŠČENJE ODPADNIH VODA V VELIKIH MESTIH

WASTE WATER TREATMENT IN MAJOR CITIES

HIDRAVLIČNI MODEL GIBANJA VODE OD ARHIMEDA IN LEONARDA DA VINCIJA DO DANES

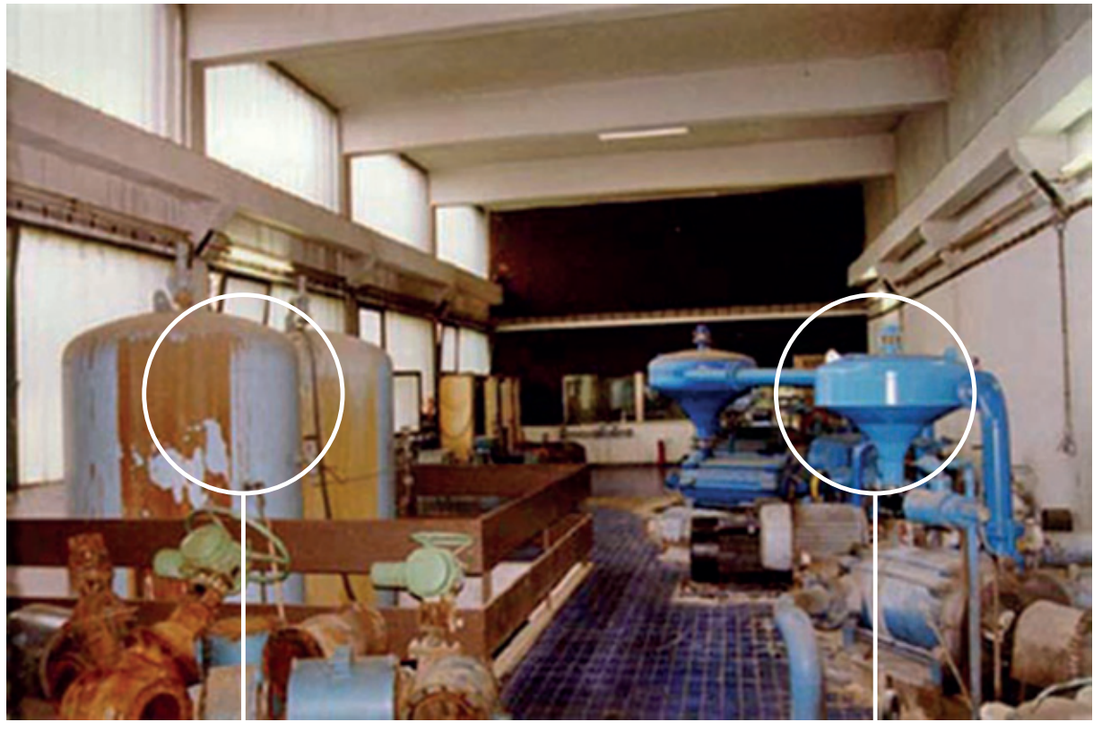
Eugen Petrešin

Hidravlični model ponazarja različne možnosti gibanja vode. To so vrtinec, vrtinčni tok ali vrtinčenje, kvazi radialni tok, turbulentni tok, vakuum, tok s prosto gladino in tlačni tok. Primerjalno so na modelu prikazani različni pogledi na podobno problematiko za zadnjih 2 250 let.

THE HYDRAULIC MODEL OF THE WATER FLOW FROM ARCHIMEDES THROUGH LEONARDO DA VINCI TO TODAY

Eugen Petrešin

The hydraulic model illustrates the various forms of water flow: the eddy, the vortex flow, quasi-radial flow, turbulent flow, vacuum, free surface flow and pressurized flow. The model presents a comparative illustration of different conceptions of the topic in the past 2,250 years.

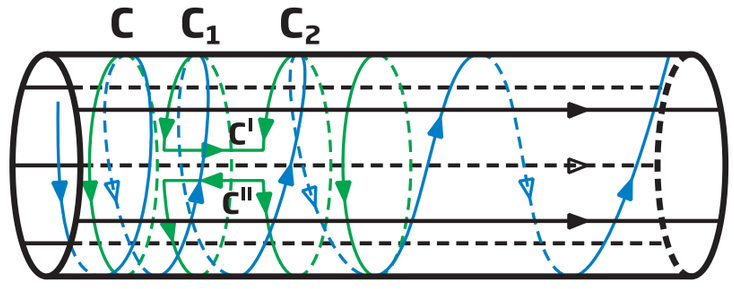


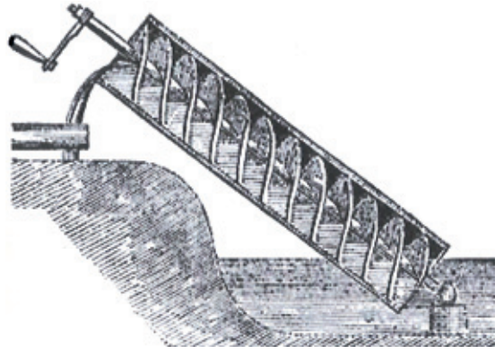
Tlačna posoda 2 * 25 000 l

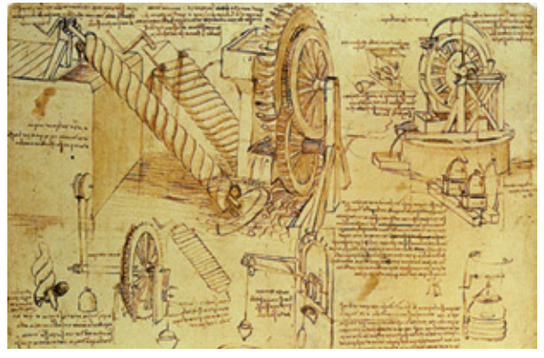
*Pressure tank 2 * 25 000 l*

Hidravlična dioda

Hydraulic diode







Arhimed, 250 pr. n. št.

Arhimed, 250 BC

Leonardo da Vinci, 1480 - 1482

CEVKOVA POT

Javno podjetje Vodovod – Kanalizacija

Za zaključek se lahko mali in veliki poigrate še v Cevkovi sobi in se preizkusite v tem, kako varčni ste z vodo! Več informacij lahko dobite na naši spletni strani www.cevko.si.

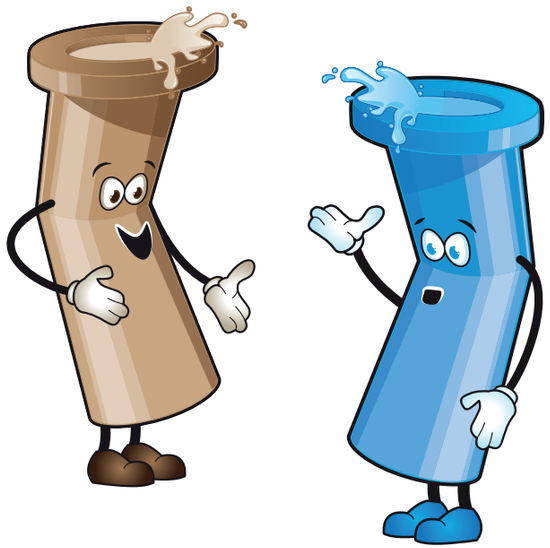
Veseli bomo tudi vašega sodelovanja. Prispevke lahko pripnete na steno »Zgodbe v nastajanju«, kjer si jih bodo lahko ogledali tudi drugi obiskovalci. Prav vsak med nami ima številne izkušnje z vodo, pa naj bodo odlične, malo manj zanimive ali pa celo takšne, da bi jih najraje pozabili.

CEVKO'S WAY

JP Vodovod – Kanalizacija

Both children and adults can end their visit by playing in Cevko's room and testing how good they are at saving water. For more information, please visit our website www.cevko.si.

We'll be grateful for your participation. You can pin your contributions to the "Stories in progress" wall for other visitors to see. Each and every one of us has had a lot of experience with water, be it wonderful, not all that interesting or perhaps even such that you would rather forget it.



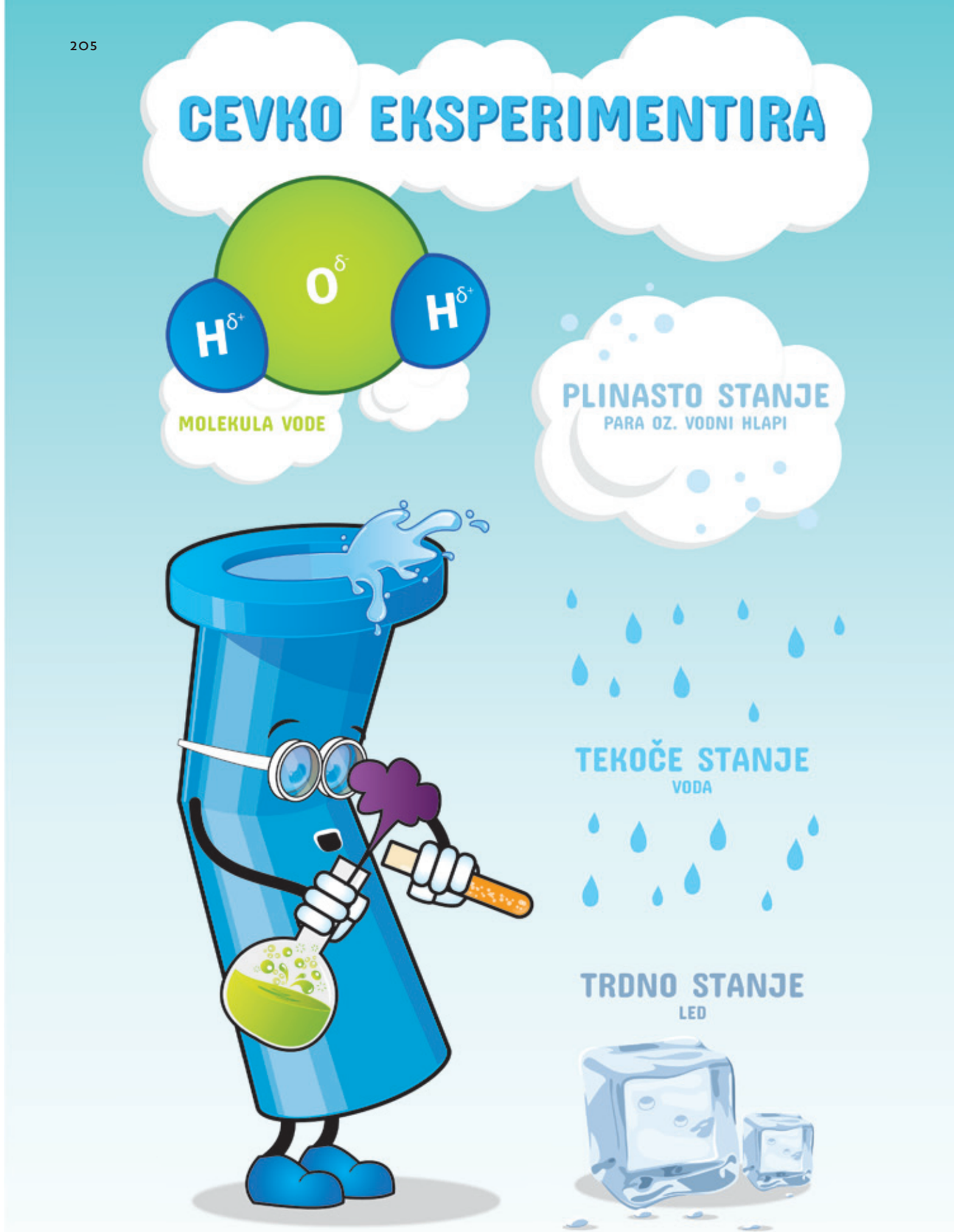


Foto M. Paternoster

Foto / Photo M. Paternoster

PREGLED RAZSTAVLJENIH PREDMETOV
INDEX OF THE EXHIBITS

Špela Saje

1

VRČ / JUG

Snov: keramika
Dimenzije: v. 17 cm
Datacija: bakrena doba
Najdišče: Ig, Parte
Hramba: 510:LJU;0013030

Material: ceramic
Dimensions: h. 17 cm
Date: Copper age
Site: Ig, Parte
Kept by: 510:LJU;0013030

2

LONEC / POT

Snov: keramika
Dimenzije: v. 20 cm
Datacija: bakrena doba
Najdišče: Ig, Parte
Hramba: 510:LJU;0035618

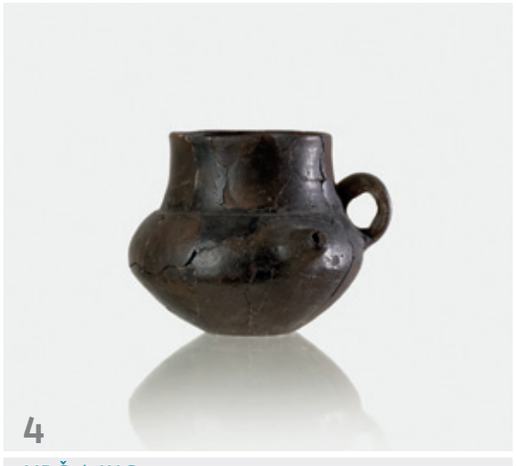
Material: ceramic
Dimensions: h. 20 cm
Date: Copper age
Site: Ig, Parte
Kept by: 510:LJU;0035618

3

VRČ / JUG

Snov: keramika
Dimenzije: v. 14 cm
Datacija: bakrena doba
Najdišče: Ig, Parte
Hramba: 510:LJU;0035622

Material: ceramic
Dimensions: h. 14 cm
Date: Copper age
Site: Ig, Parte
Kept by: 510:LJU;0035622



4

VRČ / JUG

Snov: keramika
Dimenzije: v. 9,6 cm
Datacija: starejša železna doba
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0035655

Material: ceramic
Dimensions: h. 9,6 cm
Date: early Iron age
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0035655

5

SKODELA / BOWL

Snov: keramika
Dimenzije: v. 6,7 cm
Datacija: starejša železna doba
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0035649

Material: ceramic
Dimensions: h. 6,7 cm
Date: early Iron age
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0035649

6

SITULA / SITULA

Snov: keramika
Dimenzije: v. 24,5 cm
Datacija: starejša železna doba
Najdišče: Škofljica, Molnik
Hramba: 510:LJU;0035639

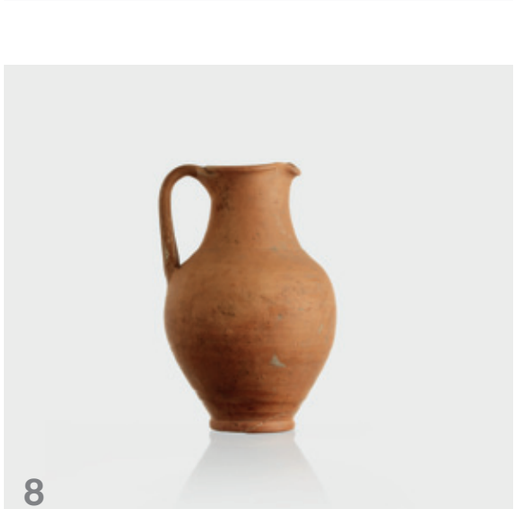
Material: ceramic
Dimensions: h. 24,5 cm
Date: early Iron age
Site: Škofljica, Molnik
Kept by: 510:LJU;0035639

7

VRČ / JUG

Snov: keramika
Dimenzije: v. 22 cm,
Datacija: druga pol. 1.–prva pol. 2. stoletja
Najdišče: Ljubljana, Štefanova ulica
Hramba: 510:LJU;0047660

Material: ceramic
Dimensions: h. 22 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Štefanova ulica
Kept by: 510:LJU;0047660



8

VRČ / JUG

Snov: keramika
Dimenzije: v. 21 cm
Datacija: druga pol. 1.–prva pol. 2. stoletja
Najdišče: Ljubljana, Štefanova ulica
Hramba: 510:LJU;0047661

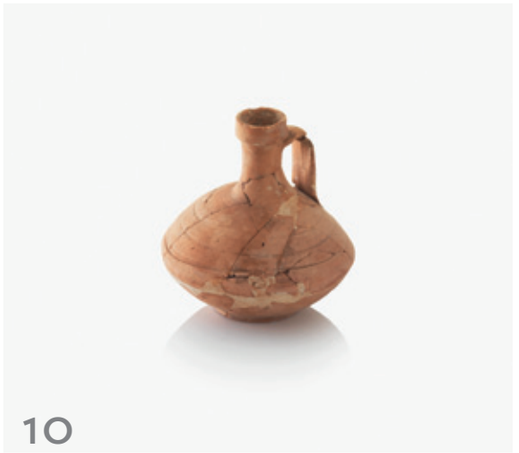
Material: ceramic
Dimensions: h. 21 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Štefanova ulica
Kept by: 510:LJU;0047661

9

VRČ / JUG

Snov: keramika
Dimenzije: v. 21,6 cm
Datacija: druga pol. 1.–prva pol. 2. stoletja
Najdišče: Ljubljana, Štefanova ulica
Hramba: 510:LJU;0047662

Material: ceramic
Dimensions: h. 21,6 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Štefanova ulica
Kept by: 510:LJU;0047662



10

VRČ / JUG

Snov: keramika
Dimenzije: v. 16,5 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0048021

Material: ceramic
Dimensions: h. 16,5 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0048021

11

VRČ / JUG

Snov: keramika
Dimenzije: v. 17 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Pražakova ulica
Hramba: 510:LJU;0048034

Material: ceramic
Dimensions: h. 17 cm
Date: 1st century
Site: Ljubljana, Pražakova ulica
Kept by: 510:LJU;0048034

12

VRČ / JUG

Snov: keramika
Dimenzije: v. 17 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0048018

Material: ceramic
Dimensions: h. 17 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0048018

13

VRČ / JUG

Snov: keramika
Dimenzije: v. 19,5 cm
Datacija: 15. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057789

Material: ceramic
Dimensions: h. 19,5 cm
Date: 15th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057789

14

VRČ / JUG

Snov: keramika
Dimenzije: v. 24 cm
Datacija: 15. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057790

Material: ceramic
Dimensions: h. 24 cm
Date: 15th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057790

15

VRČ / JUG

Snov: keramika
Dimenzije: v. 23 cm
Datacija: 16. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057562

Material: ceramic
Dimensions: h. 23 cm
Date: 16th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057562

16

VRČ / JUG

Snov: keramika
Dimenzije: v. 21 cm
Datacija: 16. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057566

Material: ceramic
Dimensions: h. 21 cm
Date: 16th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057566

17

VRČ / JUG

Snov: keramika
Dimenzije: v. 18,5 cm
Datacija: 15. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0058543

Material: ceramic
Dimensions: h. 18,5 cm
Date: 15th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0058543

18

VRČ / JUG

Snov: keramika
Dimenzije: v. 18,8 cm
Datacija: 16. stoletje
Najdišče: Ljubljana
Hramba: 510:LJU;0000779

Material: ceramic
Dimensions: h. 18,8 cm
Date: 16th century
Site: Ljubljana
Kept by: 510:LJU;0000779

19

VRČ / JUG

Snov: keramika
Dimenzije: v. 17 cm
Datacija: 16. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057586

Material: ceramic
Dimensions: h. 17 cm
Date: 16th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057586

20

VRČ / JUG

Snov: keramika
Dimenzije: v. 24 cm
Datacija: 17. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057583

Material: ceramic
Dimensions: h. 24 cm
Date: 17th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057583

21

VRČ / JUG

Snov: keramika
Dimenzije: v. 15 cm
Datacija: 17. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057587

Material: ceramic
Dimensions: h. 15 cm
Date: 17th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057587

22

VRČ / JUG

Snov: keramika
Dimenzije: v. 15,5 cm
Datacija: 17. stoletje
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057593

Material: ceramic
Dimensions: h. 15,5 cm
Date: 17th century
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057593

23

VRČ / JUG

Snov: keramika
Dimenzije: v. 24 cm
Datacija: 17. stoletje
Najdišče: Ljubljanica,
Gosposka ulica
Hramba: 510:LJU;0035443

Material: ceramic
Dimensions: h. 24 cm
Date: 17th century
Site: Ljubljanica,
Gosposka ulica
Kept by: 510:LJU;0035443

24

VRČ / JUG

Snov: keramika
Dimenzije: v. 22,7 cm
Datacija: okoli 1780
Hramba: 510:LJU;0027571

Material: ceramic
Dimensions: h. 22,7 cm
Date: around 1780
Kept by: 510:LJU;0027571

25

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 10,6 cm
Datacija: prva pol. 1. stoletja
Najdišče: Ljubljana,
Pražakova ulica
Hramba: 510:LJU;0035402

Material: glass
Dimensions: h. 10,6 cm
Date: first half of 1st century
Site: Ljubljana,
Pražakova ulica
Kept by: 510:LJU;0035402

26

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 17,9 cm
Datacija: druga pol. 1. stoletja
Najdišče: Ljubljana, Severno
emonsko grobišče
Hramba: 510:LJU;0047718

Material: glass
Dimensions: h. 17,9 cm
Date: second half
of 1st century
Site: Ljubljana, Severno
emonsko grobišče
Kept by: 510:LJU;0047718

27

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 18,7 cm
Datacija: konec 1. st.–
začetek 2. stoletja
Najdišče: Ljubljana,
Pražakova ulica
Hramba: 510:LJU;0034727

Material: glass
Dimensions: h. 18,7 cm
Date: late 1st century–
early 2nd century
Site: Ljubljana,
Pražakova ulica
Kept by: 510:LJU;0034727

28

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 15 cm
Datacija: druga pol. 1. st.–
prva pol. 2. stoletja
Najdišče: Ljubljana,
Slovenska cesta
Hramba: 510:LJU;0034916

Material: glass
Dimensions: h. 15 cm
Date: second half of
1st century–first half
of 2nd century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0034916

29

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 16,5 cm
Datacija: druga pol. 1. st.–prva pol. 2. stoletja
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0035192

Material: glass
Dimensions: h. 16,5 cm
Date: second half of 1st cent.–first half of 2nd cent.
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0035192

30

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 14,4 cm
Datacija: 1.–2. stoletje
Najdišče: Ljubljana
Hramba: 510:LJU;0044768

Material: glass
Dimensions: h. 14,4 cm
Date: 1st–2nd century
Site: Ljubljana
Kept by: 510:LJU;0044768

31

VRČ / JUG

Snov: steklo
Dimenzije: v. 14,7 cm
Datacija: 2. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0035397

Material: glass
Dimensions: h. 14,7 cm
Date: 2nd century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0035397

32

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,4 cm
Datacija: druga pol. 1. stoletja–2. stoletje
Najdišče: Ljubljana, Bavarski dvor
Hramba: 510:LJU;0034900

Material: glass
Dimensions: h. 8,4 cm
Date: second half of 1st century–2nd century
Site: Ljubljana, Bavarski dvor
Kept by: 510:LJU;0034900

33

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 6,6 cm
Datacija: druga pol. 1. stoletja
Najdišče: Ljubljana, Slovenska cesta
Hramba: 510:LJU;0035193

Material: glass
Dimensions: h. 6,6 cm
Date: second half of 1st century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0035193

34

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 9,9 cm
Datacija: 1.–2. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0035394

Material: glass
Dimensions: h. 9,9 cm
Date: 1st–2nd century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0035394

35

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 9 cm
Datacija: 3. stoletje
Najdišče: Ljubljana, Bavarski dvor
Hramba: 510:LJU;0035046

Material: glass
Dimensions: h. 9 cm
Date: 3rd century
Site: Ljubljana, Bavarski dvor
Kept by: 510:LJU;0035046

36

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 12,3 cm
Datacija: 4. stoletje
Najdišče: Ljubljana, Pražakova ulica
Hramba: 510:LJU;0035396

Material: glass
Dimensions: h. 12,3 cm
Date: 4th century
Site: Ljubljana, Pražakova ulica
Kept by: 510:LJU;0035396

37

ZAJEMALKA / LADLE

Snov: steklo
Dimenzije: v. 9,5 cm
Datacija: druga pol. 1. stoletja
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0034906

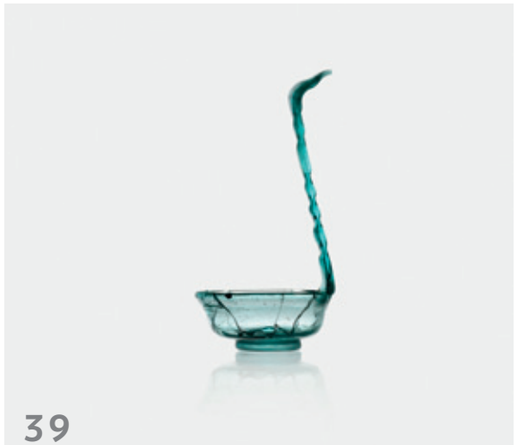
Material: glass
Dimensions: h. 9,5 cm
Date: second half of 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0034906

38

ZAJEMALKA / LADLE

Snov: steklo
Dimenzije: v. 11,4 cm
Datacija: druga pol. 1. stoletja
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0034907

Material: glass
Dimensions: h. 11,4 cm
Date: second half of 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0034907



39

ZAJEMALKA / LADLE

Snov: steklo
Dimenzije: v. 11,7 cm
Datacija: druga pol. 1. stoletja
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0034908

Material: glass
Dimensions: h. 11,7 cm
Date: second half of 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0034908

40

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 5,8 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032928

Material: glass
Dimensions: h. 5,8 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032928

41

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 8,4 cm
Datacija: 1.–2. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032929

Material: glass
Dimensions: h. 8,4 cm
Date: 1st–2nd century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032929

42

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 9 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032932

Material: glass
Dimensions: h. 9 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032932

43

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 9,5 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032933

Material: glass
Dimensions: h. 9,5 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032933

44

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 8,8 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032934

Material: glass
Dimensions: h. 8,8 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032934

45

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 9 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032935

Material: glass
Dimensions: h. 9 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032935

46

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 9,3 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032936

Material: glass
Dimensions: h. 9,3 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032936

47

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 9,8 cm
Datacija: 1. stoletje
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032937

Material: glass
Dimensions: h. 9,8 cm
Date: 1st century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032937

48

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 9,5 cm
Datacija: druga pol. 1. st.–prva pol. 2. stoletja
Najdišče: Ljubljana, Severno emonsko grobišče
Hramba: 510:LJU;0032954

Material: glass
Dimensions: h. 9,5 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Severno emonsko grobišče
Kept by: 510:LJU;0032954

49

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 7,8 cm
Datacija: druga pol. 1. st.–prva pol. 2. stoletja
Najdišče: Ljubljana, Slovenska cesta
Hramba: 510:LJU;0032955

Material: glass
Dimensions: h. 7,8 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0032955

50

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 9 cm
Datacija: druga pol. 1. st.–prva pol. 2. stoletja
Najdišče: Ljubljana, Slovenska cesta
Hramba: 510:LJU;0032956

Material: glass
Dimensions: h. 9 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0032956

51

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 7,6 cm
Datacija: druga pol. 1. st.–prva pol. 2. stoletja
Najdišče: Ljubljana, Slovenska cesta
Hramba: 510:LJU;0032957

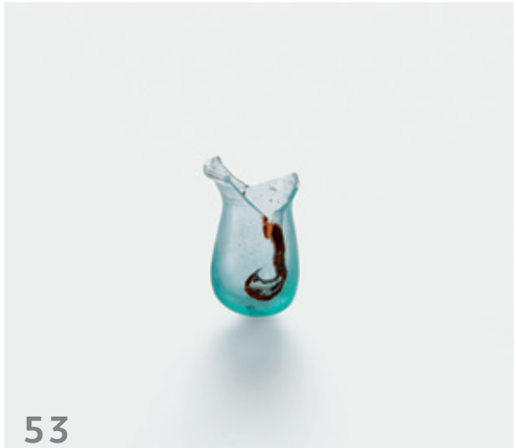
Material: glass
Dimensions: h. 7,6 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0032957

52

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 7,3 cm
Datacija: druga pol. 1. st.–prva pol. 2. stoletja
Najdišče: Ljubljana, Slovenska cesta
Hramba: 510:LJU;0032958

Material: glass
Dimensions: h. 7,3 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0032958



53

BALZAMARIJ / BALSAMARIUM

Snov: steklo
Dimenzije: v. 3,7 cm
Datacija: druga pol. 1. st.–prva pol. 2. stoletja
Najdišče: Ljubljana, Slovenska cesta
Hramba: 510:LJU;0032959

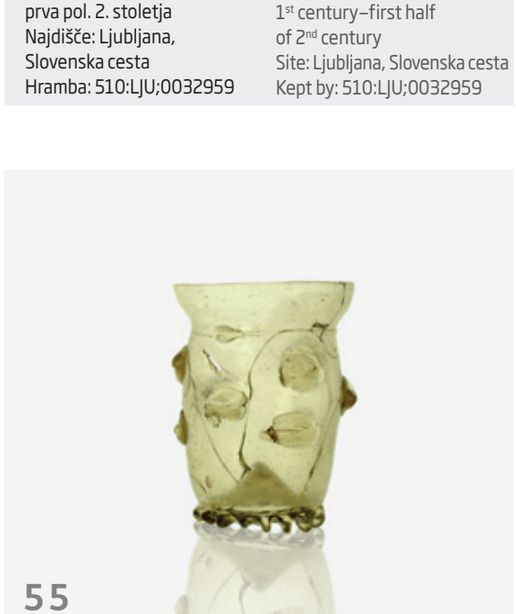
Material: glass
Dimensions: h. 3,7 cm
Date: second half of 1st century–first half of 2nd century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0032959

54

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 12 cm
Datacija: 15. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0012907

Material: glass
Dimensions: h. 12 cm
Date: 15th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0012907



55

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,6 cm
Datacija: 15. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0012908

Material: glass
Dimensions: h. 8,6 cm
Date: 15th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0012908

56

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: 15. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0013338

Material: glass
Dimensions: h. 11 cm
Date: 15th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0013338

57

SKODELA / BOWL

Snov: steklo
Dimenzije: v. 7 cm
Datacija: 15. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0034857

Material: glass
Dimensions: h. 7 cm
Date: 15th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0034857

58

VRČ / JUG

Snov: steklo
Dimenzije: v. 17 cm
Datacija: 15. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0034862

Material: glass
Dimensions: h. 17 cm
Date: 15th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0034862

59

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 6 cm
Datacija: 15. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0034864

Material: glass
Dimensions: h. 6 cm
Date: 15th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0034864

60

SKODELA / BOWL

Snov: steklo
Dimenzije: v. 4,2 cm
Datacija: 15. stoletje
Najdišče: Ljubljanica, Bistra
Zbirka družine Potočnik
Hramba: 510:LJU;0059377

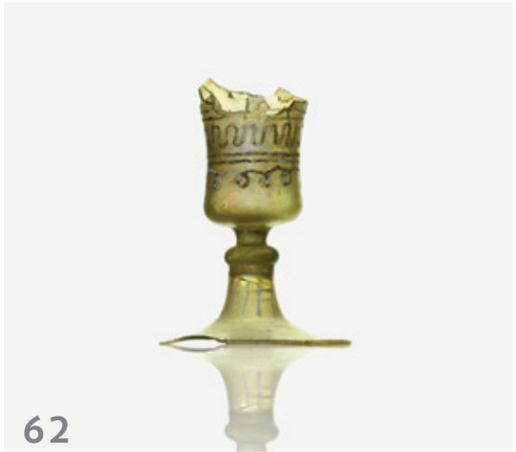
Material: glass
Dimensions: h. 4,2 cm
Date: 15th century
Site: Ljubljanica, Bistra
Potočnik family collection
Kept by: 510:LJU;0059377

61

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 6 cm
Datacija: 15. stoletje
Najdišče: Ljubljanica, Bistra
Zbirka družine Potočnik
Hramba: 510:LJU;0059384

Material: glass
Dimensions: h. 6 cm
Date: 15th century
Site: Ljubljanica, Bistra
Potočnik family collection
Kept by: 510:LJU;0059384



62

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 9 cm
Datacija: 16. stoletje
Najdišče: Ljubljana,
Gosposka ulica
Hramba: 510:LJU;0010596

Material: glass
Dimensions: h. 9 cm
Date: 16th century
Site: Ljubljana,
Gosposka ulica
Kept by: 510:LJU;0010596

63

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 11,5 cm
Datacija: 17. stoletje
Najdišče: Ljubljana
Hramba: 510:LJU;0003590

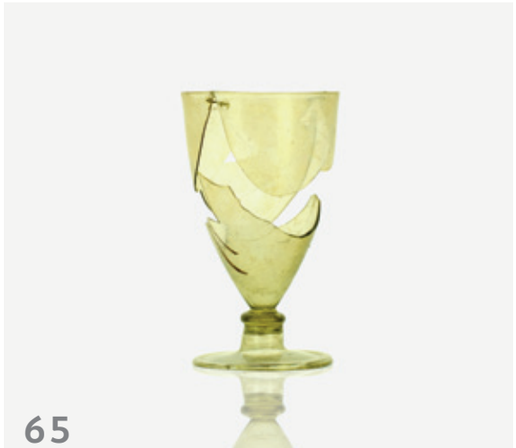
Material: glass
Dimensions: h. 11,5 cm
Date: 17th century
Site: Ljubljana
Kept by: 510:LJU;0003590

64

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11,7 cm
Datacija: 17. stoletje
Najdišče: Ljubljana,
Gosposka ulica
Hramba: 510:LJU;0010403

Material: glass
Dimensions: h. 11,7 cm
Date: 17th century
Site: Ljubljana,
Gosposka ulica
Kept by: 510:LJU;0010403

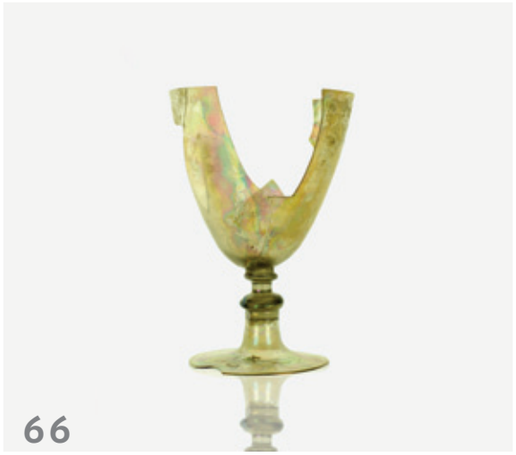


65

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: 17. stoletje
Najdišče: Ljubljana,
Gosposka ulica
Hramba: 510:LJU;0010404

Material: glass
Dimensions: h. 11 cm
Date: 17th century
Site: Ljubljana,
Gosposka ulica
Kept by: 510:LJU;0010404



66

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 12,5 cm
Datacija: 17. stoletje
Najdišče: Ljubljana,
Gosposka ulica
Hramba: 510:LJU;0010597

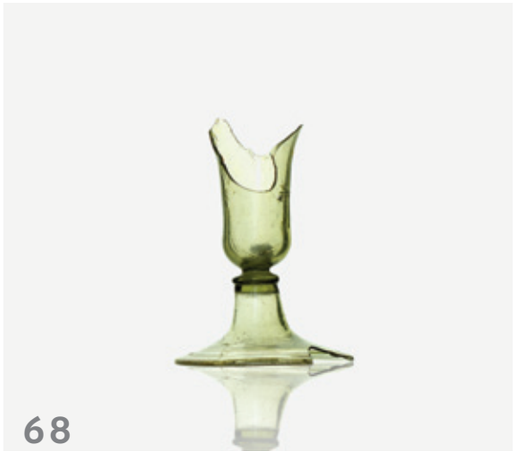
Material: glass
Dimensions: h. 12,5 cm
Date: 17th century
Site: Ljubljana,
Gosposka ulica
Kept by: 510:LJU;0010597

67

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: 17. stoletje
Najdišče: Ljubljana,
Gosposka ulica
Hramba: 510:LJU;0010598

Material: glass
Dimensions: h. 11 cm
Date: 17th century
Site: Ljubljana,
Gosposka ulica
Kept by: 510:LJU;0010598



68

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 10,6 cm
Datacija: 17. stoletje
Najdišče: Ljubljana,
Gosposka ulica
Hramba: 510:LJU;0010600

Material: glass
Dimensions: h. 10,6 cm
Date: 17th century
Site: Ljubljana,
Gosposka ulica
Kept by: 510:LJU;0010600

69

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 9,2 cm
Datacija: 17. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0010601

Material: glass
Dimensions: h. 9,2 cm
Date: 17th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0010601

70

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11,4 cm
Datacija: 17. stoletje
Najdišče: Ljubljana, Gosposka ulica
Hramba: 510:LJU;0034859

Material: glass
Dimensions: h. 11,4 cm
Date: 17th century
Site: Ljubljana, Gosposka ulica
Kept by: 510:LJU;0034859

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STEKLENICA / BOTTLE

Snov: steklo, emajl, kovina
Dimenzije: v. 20,3 cm
Datacija: 17. stoletje
Hramba: 510:LJU;0027069

Material: glass, enamel, metal
Dimensions: h. 20,3 cm
Date: 17th century
Kept by: 510:LJU;0027069

72

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,5 cm
Datacija: 1746
Hramba: 510:LJU;0027061

Material: glass
Dimensions: h. 8,5 cm
Date: 1746
Kept by: 510:LJU;0027061

73

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 9,5 cm
Datacija: konec 18. stoletja
Hramba: 510:LJU;0028792

Material: glass
Dimensions: h. 9,5 cm
Date: late 18th century
Kept by: 510:LJU;0028792

74

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 14,3 cm
Datacija: sredina 19. stoletja
Hramba: 510:LJU;0028785

Material: glass
Dimensions: h. 14,3 cm
Date: mid 19th century
Kept by: 510:LJU;0028785

75

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 10 cm
Datacija: začetek 19. stoletja
Hramba: 510:LJU;0027060

Material: glass
Dimensions: h. 10 cm
Date: early 19th century
Kept by: 510:LJU;0027060

76

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 13,6 cm
Datacija: druga pol. 19. stoletja
Hramba: 510:LJU;0015038

Material: glass
Dimensions: h. 13,6 cm
Date: second half of 19th century
Kept by: 510:LJU;0015038

77

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 13,6 cm
Datacija: druga pol. 19. stoletja
Hramba: 510:LJU;0028789

Material: glass
Dimensions: h. 13,6 cm
Date: second half of 19th century
Kept by: 510:LJU;0028789

78

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 14 cm
Datacija: konec 19.–začetek 20. stoletja
Hramba: 510:LJU;0028790

Material: glass
Dimensions: h. 14 cm
Date: late 19th–early 20th century
Kept by: 510:LJU;0028790

79

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 14,2 cm
Datacija: začetek 20. stoletja
Hramba: 510:LJU;0027062

Material: glass
Dimensions: h. 14,2 cm
Date: early 20th century
Kept by: 510:LJU;0027062

80

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 24,5 cm
Datacija: 19. stoletje
Hramba: 510:LJU;0015179

Material: glass
Dimensions: h. 24,5 cm
Date: 19th century
Kept by: 510:LJU;0015179

81

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 24 cm
Datacija: 19. stoletje
Najdišče: Ljubljanica, Bistra
Zbirka družine Potočnik
Hramba: 510:LJU;0059396

Material: glass
Dimensions: h. 24 cm
Date: 19th century
Site: Ljubljanica, Bistra
Potočnik family collection
Kept by: 510:LJU;0059396

82

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 27,6 cm
Datacija: druga pol. 19. stoletja
Hramba: 510:LJU;0015180

Material: glass
Dimensions: h. 27,6 cm
Date: second half of 19th century
Kept by: 510:LJU;0015180

83

VRČ / JUG

Snov: steklo
Dimenzije: v. 12 cm
Datacija: konec 19.–začetek 20. stoletja
Hramba: 510:LJU;0025760

Material: glass
Dimensions: h. 12 cm
Date: late 19th–early 20th century
Kept by: 510:LJU;0025760

84

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 5,5 cm
Datacija: 19. stoletje
Najdišče: Ljubljana, Ljubljanski grad
Hramba: 510:LJU;0001076

Material: glass
Dimensions: h. 5,5 cm
Date: 19th century
Site: Ljubljana, Ljubljanski grad
Kept by: 510:LJU;0001076

85

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 5,3 cm
Datacija: 19. stoletje
Najdišče: Ljubljana, Ljubljanski grad
Hramba: 510:LJU;0001071

Material: glass
Dimensions: h. 5,3 cm
Date: 19th century
Site: Ljubljana, Ljubljanski grad
Kept by: 510:LJU;0001071

86

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 12,1 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljanica, Bevke
Zbirka družine Potočnik
Hramba: 510:LJU;0059403

Material: glass
Dimensions: h. 12,1 cm
Date: 19th–20th century
Site: Ljubljanica, Bevke
Potočnik family collection
Kept by: 510:LJU;0059403

87

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 9 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljanica, Podpeč
Zbirka družine Potočnik
Hramba: 510:LJU;0059411

Material: glass
Dimensions: h. 9 cm
Date: 19th–20th century
Site: Ljubljanica, Podpeč
Potočnik family collection
Kept by: 510:LJU;0059411

88

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 9,5 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljanica, Podpeč
Zbirka družine Potočnik
Hramba: 510:LJU;0059412

Material: glass
Dimensions: h. 9,5 cm
Date: 19th–20th century
Site: Ljubljanica, Podpeč
Potočnik family collection
Kept by: 510:LJU;0059412

89

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 9,8 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljanica, Podpeč
Zbirka družine Potočnik
Hramba: 510:LJU;0059413

Material: glass
Dimensions: h. 9,8 cm
Date: 19th–20th century
Site: Ljubljanica, Podpeč
Potočnik family collection
Kept by: 510:LJU;0059413

90

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 8,1 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljanica, Podpeč
Zbirka družine Potočnik
Hramba: 510:LJU;0059500

Material: glass
Dimensions: h. 8,1 cm
Date: 19th–20th century
Site: Ljubljanica, Podpeč
Potočnik family collection
Kept by: 510:LJU;0059500

91

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 6,6 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljana, Ljubljanski grad
Hramba: 510:LJU;0001072

Material: glass
Dimensions: h. 6,6 cm
Date: 19th–20th century
Site: Ljubljana, Ljubljanski grad
Kept by: 510:LJU;0001072

92

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 4,6 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljana, Ljubljanski grad
Hramba: 510:LJU;0001073

Material: glass
Dimensions: h. 4,6 cm
Date: 19th–20th century
Site: Ljubljana, Ljubljanski grad
Kept by: 510:LJU;0001073

93

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 9,5 cm
Datacija: 19.–20. stoletje
Najdišče: Ljubljana, Ljubljanski grad
Hramba: 510:LJU;0001074

Material: glass
Dimensions: h. 9,5 cm
Date: 19th–20th century
Site: Ljubljana, Ljubljanski grad
Kept by: 510:LJU;0001074

94

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 14,4 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007741

Material: glass
Dimensions: h. 14,4 cm
Date: 1920–1940
Kept by: 510:LJU;0007741

95

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 13,2 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007742

Material: glass
Dimensions: h. 13,2 cm
Date: 1920–1940
Kept by: 510:LJU;0007742

96

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 10,5 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007743

Material: glass
Dimensions: h. 10,5 cm
Date: 1920–1940
Kept by: 510:LJU;0007743

97

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 13,3 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007744

Material: glass
Dimensions: h. 13,3 cm
Date: 1920–1940
Kept by: 510:LJU;0007744

98

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 7,3 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007745

Material: glass
Dimensions: h. 7,3 cm
Date: 1920–1940
Kept by: 510:LJU;0007745

99

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 8,8 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007747

Material: glass
Dimensions: h. 8,8 cm
Date: 1920–1940
Kept by: 510:LJU;0007747

100

STEKLENIČKA / SMALL BOTTLE

Snov: steklo
Dimenzije: v. 9,5 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007748

Material: glass
Dimensions: h. 9,5 cm
Date: 1920–1940
Kept by: 510:LJU;0007748

101

PLADENJ / TRAY

Snov: kovina
Dimenzije: 42,5 x 25,6 cm
Datacija: 1906
Hramba: 510:LJU;0011799

Material: metal
Dimensions: 42,5 x 25,6 cm
Date: 1906
Kept by: 510:LJU;0011799

102

KOZAREC / GLASS

Snov: steklo, kovina
Dimenzije: v. 9,5 cm
Datacija: 1906
Hramba: 510:LJU;0011800

Material: glass, metal
Dimensions: h. 9,5 cm
Date: 1906
Kept by: 510:LJU;0011800

103

KOZAREC / GLASS

Snov: steklo, kovina
Dimenzije: v. 9,5 cm
Datacija: 1906
Hramba: 510:LJU;0011801

Material: glass, metal
Dimensions: h. 9,5 cm
Date: 1906
Kept by: 510:LJU;0011801

104

KOZAREC / GLASS

Snov: steklo, kovina
Dimenzije: v. 9,5 cm
Datacija: 1906
Hramba: 510:LJU;0011802

Material: glass, metal
Dimensions: h. 9,5 cm
Date: 1906
Kept by: 510:LJU;0011802

105

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 9 cm
Datacija: 1890–1940
Hramba: 510:LJU;0053652

Material: glass
Dimensions: h. 9 cm
Date: 1890–1940
Kept by: 510:LJU;0053652

106

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 9,3 cm
Datacija: 1890–1940
Hramba: 510:LJU;0053654

Material: glass
Dimensions: h. 9,3 cm
Date: 1890–1940
Kept by: 510:LJU;0053654

107

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 10,2 cm
Datacija: 1890–1940
Hramba: 510:LJU;0053655

Material: glass
Dimensions: h. 10,2 cm
Date: 1890–1940
Kept by: 510:LJU;0053655

108

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol.
20. stoletja
Hramba: 510:LJU;0048390

Material: glass
Dimensions: h. 11 cm
Date: first half of
20th century
Kept by: 510:LJU;0048390

109

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol.
20. stoletja
Hramba: 510:LJU;0048391

Material: glass
Dimensions: h. 11 cm
Date: first half of
20th century
Kept by: 510:LJU;0048391

110

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol.
20. stoletja
Hramba: 510:LJU;0048392

Material: glass
Dimensions: h. 11 cm
Date: first half of
20th century
Kept by: 510:LJU;0048392

111

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol.
20. stoletja
Hramba: 510:LJU;0048393

Material: glass
Dimensions: h. 11 cm
Date: first half of
20th century
Kept by: 510:LJU;0048393

112

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol.
20. stoletja
Hramba: 510:LJU;0048394

Material: glass
Dimensions: h. 11 cm
Date: first half of
20th century
Kept by: 510:LJU;0048394

113

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol.
20. stoletja
Hramba: 510:LJU;0048395

Material: glass
Dimensions: h. 11 cm
Date: first half of
20th century
Kept by: 510:LJU;0048395

114

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol.
20. stoletja
Hramba: 510:LJU;0048396

Material: glass
Dimensions: h. 11 cm
Date: first half of
20th century
Kept by: 510:LJU;0048396

115

KARAFA / CARAFE

Snov: steklo
Dimenzije: v. 19 cm
Datacija: sredina prve
pol. 20. stoletja
Hramba: 510:LJU;0041881

Material: glass
Dimensions: h. 19 cm
Date: mid-first half
of 20th century
Kept by: 510:LJU;0041881

116

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,2 cm
Datacija: sredina prve
pol. 20. stoletja
Hramba: 510:LJU;0041901

Material: glass
Dimensions: h. 8,2 cm
Date: mid-first half
of 20th century
Kept by: 510:LJU;0041901

117

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,3 cm
Datacija: sredina prve pol. 20. stoletja
Hramba: 510:LJU;0041902

Material: glass
Dimensions: h. 8,3 cm
Date: mid-first half of 20th century
Kept by: 510:LJU;0041902

118

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,4 cm
Datacija: sredina prve pol. 20. stoletja
Hramba: 510:LJU;0041903

Material: glass
Dimensions: h. 8,4 cm
Date: mid-first half of 20th century
Kept by: 510:LJU;0041903

119

KOZAREC / GLASS

Kozarec
Snov: steklo
Dimenzije: v. 8,3 cm
Datacija: sredina prve pol. 20. stoletja
Hramba: 510:LJU;0041904

Glass
Material: glass
Dimensions: h. 8,3 cm
Date: mid-first half of 20th century
Kept by: 510:LJU;0041904

120

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,4 cm
Datacija: sredina prve pol. 20. stoletja
Hramba: 510:LJU;0041905

Material: glass
Dimensions: h. 8,4 cm
Date: mid-first half of 20th century
Kept by: 510:LJU;0041905

121

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,3 cm
Datacija: sredina prve pol. 20. stoletja
Hramba: 510:LJU;0041906

Material: glass
Dimensions: h. 8,3 cm
Date: mid-first half of 20th century
Kept by: 510:LJU;0041906

122

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 11 cm
Datacija: prva pol. 20. stoletja
Hramba: 510:LJU;0015040

Material: glass
Dimensions: h. 11 cm
Date: first half of 20th century
Kept by: 510:LJU;0015040

123

KOZAREC / GLASS

Snov: steklo
Dimenzije: v. 8,7 cm
Datacija: 20. stoletje
Hramba: 510:LJU;0005569

Material: glass
Dimensions: h. 8,7 cm
Date: 20th century
Kept by: 510:LJU;0005569

124

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 21,8 cm
Datacija: 20. stoletje
Najdišče: Ljubljanica, Vrhnika
Zbirka družine Potočnik
Hramba: 510:LJU;0059345

Material: glass
Dimensions: h. 21,8 cm
Date: 20th century
Site: Ljubljanica, Vrhnika
Potočnik family collection
Kept by: 510:LJU;0059345

125

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 15,7 cm
Datacija: 20. stoletje
Najdišče: Ljubljanica, Sinja Gorica
Zbirka družine Potočnik
Hramba: 510:LJU;0059365

Material: glass
Dimensions: h. 15,7 cm
Date: 20th century
Site: Ljubljanica, Sinja Gorica
Potočnik family collection
Kept by: 510:LJU;0059365

126

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 25,5 cm
Datacija: 1900–1940
Hramba: 510:LJU;0007036

Material: glass
Dimensions: h. 25,5 cm
Date: 1900–1940
Kept by: 510:LJU;0007036

127

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 17 cm
Datacija: 20. stoletje
Najdišče: Ljubljanica, Lipe
Zbirka družine Potočnik
Hramba: 510:LJU;0059513

Material: glass
Dimensions: h. 17 cm
Date: 20th century
Site: Ljubljanica, Lipe
Potočnik family collection
Kept by: 510:LJU;0059513

128

STEKLENICA / BOTTLE

Snov: steklo, kovina
Dimenzije: v. 32 cm
Datacija: 1910
Hramba: 510:LJU;0007372

Material: glass, metal
Dimensions: h. 32 cm
Date: 1910
Kept by: 510:LJU;0007372

129

STEKLENICA / BOTTLE

Snov: steklo, kovina
Dimenzije: v. 31 cm
Datacija: 1928
Hramba: 510:LJU;0007373

Material: glass, metal
Dimensions: h. 31 cm
Date: 1928
Kept by: 510:LJU;0007373

130

STEKLENICA / BOTTLE

Snov: steklo, kovina
Dimenzije: v. 26,5 cm
Datacija: 1928
Hramba: 510:LJU;0006913

Material: glass, metal
Dimensions: h. 26,5 cm
Date: 1928
Kept by: 510:LJU;0006913

131

STEKLENICA / BOTTLE

Snov: steklo, kovina
Dimenzije: v. 27,7 cm
Datacija: 1900–1940
Hramba: 510:LJU;0006997

Material: glass, metal
Dimensions: h. 27,7 cm
Date: 1900–1940
Kept by: 510:LJU;0006997

132

STEKLENICA / BOTTLE

Snov: steklo, kovina, keramika
Dimenzije: v. 20,4 cm
Datacija: 1920–1940
Hramba: 510:LJU;0034510

Material: glass, metal, ceramic
Dimensions: h. 20,4 cm
Date: 1920–1940
Kept by: 510:LJU;0034510

133

STEKLENICA / BOTTLE

Snov: steklo, kovina
Dimenzije: v. 26,2 cm
Datacija: 1920–1940
Hramba: 510:LJU;0006914

Material: glass, metal
Dimensions: h. 26,2 cm
Date: 1920–1940
Kept by: 510:LJU;0006914

134

STEKLENICA / BOTTLE

Snov: steklo, kovina
Dimenzije: v. 26,3 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007079

Material: glass, metal
Dimensions: h. 26,3 cm
Date: 1920–1940
Kept by: 510:LJU;0007079

135

STEKLENICA / BOTTLE

Snov: steklo, kovina
Dimenzije: v. 32,3 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007371

Material: glass, metal
Dimensions: h. 32,3 cm
Date: 1920–1940
Kept by: 510:LJU;0007371

136

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 23,3 cm
Datacija: 1900–1940
Hramba: 510:LJU;0006935

Material: glass
Dimensions: h. 23,3 cm
Date: 1900–1940
Kept by: 510:LJU;0006935

137

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 24,3 cm
Datacija: 1900–1940
Hramba: 510:LJU;006936

Material: glass
Dimensions: h. 24,3 cm
Date: 1900–1940
Kept by: 510:LJU;006936

138

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 20,3 cm
Datacija: 1900–1940
Hramba: 510:LJU;0006937

Material: glass
Dimensions: h. 20,3 cm
Date: 1900–1940
Kept by: 510:LJU;0006937

139

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 24 cm
Datacija: 1900–1940
Hramba: 510:LJU;0006963

Material: glass
Dimensions: h. 24 cm
Date: 1900–1940
Kept by: 510:LJU;0006963

140

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 23 cm
Datacija: 1900–1940
Hramba: 510:LJU;0006964

Material: glass
Dimensions: h. 23 cm
Date: 1900–1940
Kept by: 510:LJU;0006964

141

STEKLENICA / BOTTLE

Snov: steklo
Dimenzije: v. 23,8 cm
Datacija: 1900–1940
Hramba: 510:LJU;0006965

Material: glass
Dimensions: h. 23,8 cm
Date: 1900–1940
Kept by: 510:LJU;0006965

142

STEKLENICA / BOTTLE

Snov: steklo, papir
Dimenzije: v. 29,5 cm
Datacija: 1932
Hramba: 510:LJU;0008207

Material: glass, paper
Dimenzije: h. 29,5 cm
Date: 1932
Kept by: 510:LJU;0008207

143

STEKLENICA / BOTTLE

Snov: steklo, papir
Dimenzije: v. 27 cm
Datacija: 1972
Hramba: 510:LJU;0010543

Material: glass, paper
Dimensions: h. 27 cm
Date: 1972
Kept by: 510:LJU;0010543

144

STEKLENIČKA ZA DOJENČKA
BABY BOTTLE

Snov: steklo, kovina, plastika
Dimenzije: v. 20 cm
Datacija: 1942
Hramba: 510:LJU;0011506

Material: glass, metal, plastic
Dimensions: h. 20 cm
Date: 1942
Kept by: 510:LJU;0011506

145

STEKLENIČKA ZA DOJENČKA
BABY BOTTLE

Snov: steklo, kovina, plastika
Dimenzije: v. 20 cm
Datacija: 1942
Hramba: 510:LJU;0011507

Material: glass, metal, plastic
Dimensions: h. 20 cm
Date: 1942
Kept by: 510:LJU;0011507

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STEKLENIČKA ZA DOJENČKA
BABY BOTTLE

Snov: steklo, kovina, plastika
Dimenzije: v. 20,4 cm
Datacija: 1942
Hramba: 510:LJU;0011508

Material: glass, metal, plastic
Dimensions: h. 20,4 cm
Date: 1942
Kept by: 510:LJU;0011508

147

KUHINJSKO KORITO / KITCHEN SINK

Snov: les, kovina
Dimenzije: 81 x 82 x 43 cm
Datacija: sredina 20. stoletja
Hramba: 510:LJU;0036169

Material: wood, metal
Dimensions: 81 x 82 x 43 cm
Date: mid 20th century
Kept by: 510:LJU;0036169

148

PERIVNIK / WASHBOARD

Snov: les, keramika
Dimenzije: 55 x 31 cm
Datacija: 1930–1940
Hramba: 510:LJU;0028479

Material: wood, ceramic
Dimensions: 55 x 31 cm
Date: 1930–1940
Kept by: 510:LJU;0028479

149

PERIVNIK / WASHBOARD

Snov: les, kovina
Dimenzije: 52 x 33,5 cm
Datacija: 1900–1990
Hramba: S0071480

Material: wood, metal
Dimensions: 52 x 33,5 cm
Date: 1900–1990
Kept by: S0071480

150

LONEC ZA KUHANJE PERILA
VESSEL FOR BOILING LAUNDRY

Snov: kovina
Dimenzije: 38 x 31 cm
Datacija: 1920–1940
Hramba: 510:LJU;0011491

Material: metal
Dimensions: 38 x 31 cm
Date: 1920–1940
Kept by: 510:LJU;0011491

151

NAPRAVA ZA OŽEMANJE PERILA
HAND-OPERATED TUMBLE-DRYING DEVICE

Snov: kovina
Dimenzije: 44 x 55 cm
Datacija: 1880–1900
Hramba: 510:LJU;0011447

Material: metal
Dimensions: 44 x 55 cm
Date: 1880–1900
Kept by: 510:LJU;0011447

152

PRALNI STROJ / WASHING MACHINE

Snov: kovina, plastika
Dimenzije: 59 x 53 x 90 cm
Datacija: 1965
Hramba: S0075212

Material: metal, plastic
Dimensions: 59 x 53 x 90 cm
Date: 1965
Kept by: S0075212

153

SKLEDA / BASIN

Snov: fajansa
Dimenzije: 11 x 32 x 12 cm
Datacija: konec 19. stoletja
Hramba: 510:LJU;0027088

Material: Faience
Dimensions: 11 x 32 x 12 cm
Date: late 19th century
Kept by: 510:LJU;0027088

154

LAVOR / WASHING BOWL

Snov: kovina
Dimenzije: 42 x 12,4 x 42 cm
Datacija: 1890–1920
Hramba: 510:LJU;0021716

Material: metal
Dimensions:
42 x 12,4 x 42 cm
Date: 1890–1920
Kept by: 510:LJU;0021716

155

LONEC / POT

Snov: kovina
Dimenzije: 25 x 28,7 x 19 cm
Datacija: 1890–1920
Hramba: 510:LJU;0021718

Material: metal
Dimensions:
25 x 28,7 x 19 cm
Date: 1890–1920
Kept by: 510:LJU;0021718

156

VRČ / JUG

Snov: kovina
Dimenzije: v. 27,7 cm
Datacija: 1890–1920
Hramba: 510:LJU;0021714

Material: metal
Dimensions: h. 27,7 cm
Date: 1890–1920
Kept by: 510:LJU;0021714

157

NOČNA POSODA / POTTY

Snov: kovina
Dimenzije: 27 x 11 x 23,1 cm
Datacija: 1890–1920
Hramba: 510:LJU;0021712

Material: metal
Dimensions: 27 x 11 x 23,1 cm
Date: 1890–1920
Kept by: 510:LJU;0021712

158

SKLEDA / BASIN

Snov: porcelan
Dimenzije: 5 x 20 cm
Datacija: začetek 20. stoletja
Hramba: 510:LJU;0015093

Material: porcelain
Dimensions: 5 x 20 cm
Date: early 20th century
Kept by: 510:LJU;0015093

161

POSODA ZA ZOBNO ŠČETKO
TOOTHBRUSH CASE

Snov: porcelan
Dimenzije: 9,5 x 19 x7 cm
Datacija: začetek 20. stoletja
Hramba: 510:LJU;0015095

Material: porcelain
Dimensions: 9,5 x 19 x7 cm
Date: early 20th century
Kept by: 510:LJU;0015095

162

POSODA ZA MILO / SOAP DISH

Snov: porcelan
Dimenzije: 9,5 x 11 x 9 cm
Datacija: začetek 20. stoletja
Hramba: 510:LJU;0015097

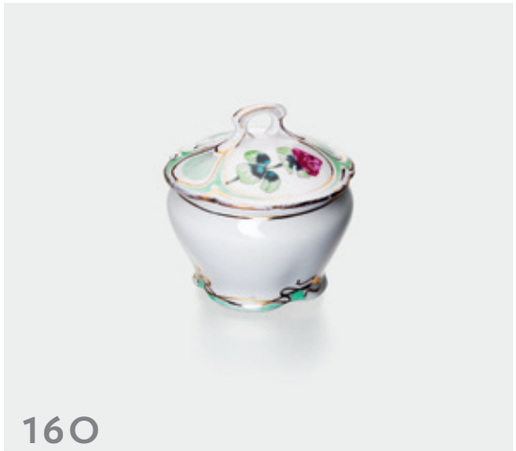
Material: porcelain
Dimensions: 9,5 x 11 x 9 cm
Date: early 20th century
Kept by: 510:LJU;0015097

159

VRČ / JUG

Snov: porcelan
Dimenzije: v. 34 cm
Datacija: začetek 20. stoletja
Hramba: 510:LJU;0015092

Material: porcelain
Dimensions: h. 34 cm
Date: early 20th century
Kept by: 510:LJU;0015092



160

POSODA ZA ZOBNI PRAŠEK
TOOTH POWDER CONTAINER

Snov: porcelan
Dimenzije: 8,5 x 5,9 cm
Datacija: začetek 20. stoletja
Hramba: 510:LJU;0015094

Material: porcelain
Dimensions: 8,5 x 5,9 cm
Date: early 20th century
Kept by: 510:LJU;0015094

163

LAVOR / WASHING BOWL

Snov: porcelan
Dimenzije: 35,5 x 13 cm
Datacija: 1923
Hramba: 510:LJU;0018400

Material: porcelain
Dimensions: 35,5 x 13 cm
Date: 1923
Kept by: 510:LJU;0018400

164

POSODA ZA MILO / SOAP DISH

Snov: porcelan
Dimenzije: 14,8 x 9,5 x 9 cm
Datacija: 1923
Hramba: 510:LJU;0018402

Material: porcelain
Dimensions: 14,8 x 9,5 x 9 cm
Date: 1923
Kept by: 510:LJU;0018402

165

POSODA ZA ZOBNI PRAŠEK
TOOTH POWDER CONTAINER

Snov: porcelan
Dimenzije: 8 x 7,3 x 5,5 cm
Datacija: 1923
Hramba: 510:LJU;0018406

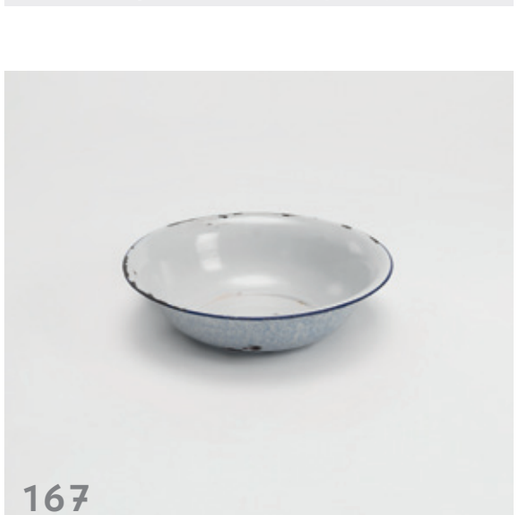
Material: porcelain
Dimensions: 8 x 7,3 x 5,5 cm
Date: 1923
Kept by: 510:LJU;0018406

166

POSODA ZA ZOBNO ŠČETKO
TOOTHBRUSH CASE

Snov: porcelan
Dimenzije: 23,2 x 8,3 x 9,7 cm
Datacija: 1923
Hramba: 510:LJU;0018408

Material: porcelain
Dimensions: :
23,2 x 8,3 x 9,7 cm
Date: 1923
Kept by: 510:LJU;0018408

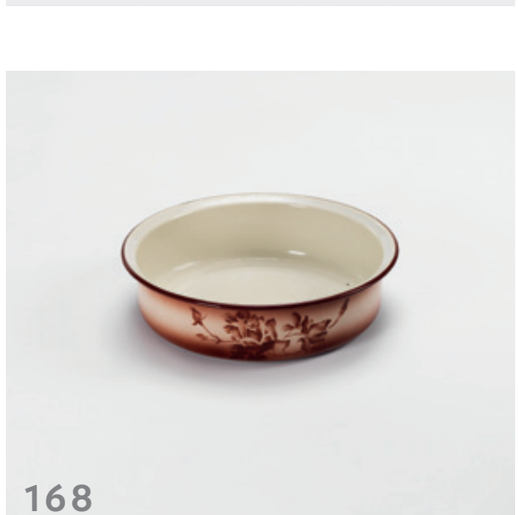


167

LAVOR / WASHING BOWL

Snov: kovina
Dimenzije: 50 x 14 cm
Datacija: 1890–1920
Hramba: S0073175

Material: metal
Dimensions: 50 x 14 cm
Date: 1890–1920
Kept by: S0073175



168

LAVOR / WASHING BOWL

Snov: kovina
Dimenzije: 11,5 x 42,5 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007305

Material: metal
Dimensions: 11,5 x 42,5 cm
Date: 1920–1940
Kept by: 510:LJU;0007305

169

VRČ / JUG

Snov: kovina
Dimenzije: v. 28 cm
Datacija: 1920–1940
Hramba: 510:LJU;0007306

Material: metal
Dimensions: h. 28 cm
Date: 1920–1940
Kept by: 510:LJU;0007306

170

VRČ / JUG

Snov: kovina
Dimenzije: v. 28 cm
Datacija: 1920–1940
Hramba: 510:LJU;0011865

Material: metal
Dimensions: h. 28 cm
Date: 1920–1940
Kept by: 510:LJU;0011865

171

VRČ / JUG

Snov: kovina
Dimenzije: v. 26,8 cm
Datacija: 1950–1970
Hramba: 510:LJU;0007560

Material: metal
Dimensions: h. 26,8 cm
Date: 1950–1970
Kept by: 510:LJU;0007560

172

KOPALNA KAD / BATHTUB

Snov: kovina, les, papir
Dimenzije: 170 x 75 x 70 cm
Datacija: 1890–1910
Hramba: 510:LJU;0055050

Material: metal, wood, paper
Dimensions: 170 x 75 x 70 cm
Date: 1890–1910
Kept by: 510:LJU;0055050

173

KOPALNA KAD / BATHTUB

Snov: kovina
Dimenzije: 80 x 63 x 50 cm
Datacija: 1890–1910
Hramba: 510:LJU;0055042

Material: metal
Dimensions: 80 x 63 x 50 cm
Date: 1890–1910
Kept by: 510:LJU;0055042

174

KOPALNA KAD / BATHTUB

Snov: plastika
Dimenzije: 81 x 43 x 28 cm
Datacija: 1970–1980
Hramba: S0080077

Material: plastic
Dimensions: 81 x 43 x 28 cm
Date: 1970–1980
Kept by: S0080077

175

UMIVALNIK / WASHBASIN

Snov: kovina
Dimenzije: 50 x 28 x 80 cm
Datacija: 1890–1920
Hramba: S0079247

Material: metal
Dimensions: 50 x 28 x 80 cm
Date: 1890–1920
Kept by: S0079247

176

UMIVALNIK / WASHBASIN

Snov: kovina
Dimenzije: 78 x 52,5 x 28 cm
Datacija: 19.–20. stoletje
Hramba: 510:LJU;0036179

Material: metal
Dimensions:
78 x 52,5 x 28 cm
Date: 19th–20th century
Kept by: 510:LJU;0036179

177

UMIVALNIK / WASHBASIN

Snov: kovina, keramika
Dimenzije: 63 x 43 x 50 cm
Datacija: 1890–1920
Hramba: S0017227

Material: metal, ceramic
Dimensions: 63 x 43 x 50 cm
Date: 1890–1920
Kept by: S0017227

178

BIDE / BIDET

Snov: kovina, keramika
Dimenzije: 58 x 40 x 70 cm
Datacija: začetek 20. stoletja
Hramba: 510:LJU;0041593

Material: metal, ceramic
Dimensions: 58 x 40 x 70 cm
Date: early 20th century
Kept by: 510:LJU;0041593

179

PRENOSNO STRANIŠČE
PORTABLE TOILET

Snov: les, keramika
Dimenzije: 51 x 42 x 50 cm
Datacija: 1890–1920
Hramba: 510:LJU;0055036

Material: wood, ceramic
Dimensions: 51 x 42 x 50 cm
Date: 1890–1920
Kept by: 510:LJU;0055036

180

PRENOSNO STRANIŠČE
PORTABLE TOILET

Snov: les, keramika, kovina
Dimenzije:
91 x 62,5 x 51,5 cm
Datacija: 1900–1920
Hramba: 510:LJU;0035828

Material: wood, ceramic, metal
Dimensions:
91 x 62,5 x 51,5 cm
Date: 1900–1920
Kept by: 510:LJU;0035828

181

STRANIŠČA ŠKOLJKA / TOILET

Snov: keramika
Dimenzije: 42 x 37,5 cm
Datacija: 1900–1910
Hramba: 510:LJU;0047218

Material: ceramic
Dimensions: 42 x 37,5 cm
Date: 1900–1910
Kept by: 510:LJU;0047218

182

PISOAR / URINAL

Snov: kovina
Dimenzije: 32 x 26 x 45 cm
Datacija: 1880–1920
Hramba: S0075476

Material: metal
Dimensions: 32 x 26 x 45 cm
Date: 1880–1920
Kept by: S0075476

185

VODOVODNE PIPE IN VENTILI
WATER TAPS AND VALVES

Snov: kovina, les
Dimenzije:
28 x 5,5 cm; 5,2 x 3,5 cm
Datacija: 1920–1970
Hramba: S0073663

Material: metal, wood
Dimensions:
28 x 5,5 cm; 5,2 x 3,5 cm
Date: 1920–1970
Kept by: S0073663

186

VODOVODNI PIPI / WATER TAPS

Snov: kovina, guma
Dimenzije:
17 x 9 cm; 9,5 x 10,7 cm
Datacija: 1900–1950
Hramba: S0071251

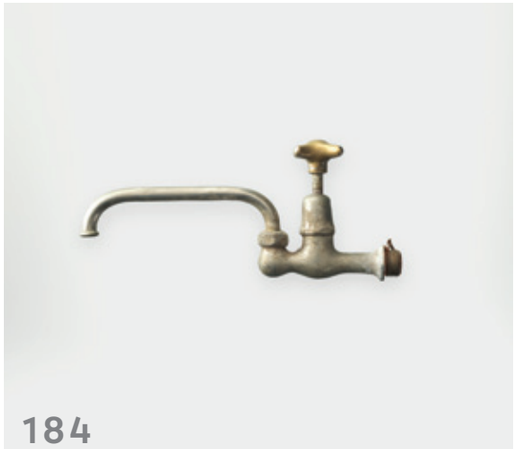
Material: metal, rubber
Dimensions:
17 x 9 cm; 9,5 x 10,7 cm
Date: 1900–1950
Kept by: S0071251

183

VODOVODNA PIPA / WATER TAP

Snov: kovina, keramika
Dimenzije: 25 x 16 x 35 cm
Datacija: 1920–1940
Hramba: S0075701

Material: metal, ceramic
Dimensions: 25 x 16 x 35 cm
Date: 1920–1940
Kept by: S0075701



184

VODOVODNA PIPA / WATER TAP

Snov: kovina
Dimenzije: 24 x 4 x 11 cm
Datacija: 1920–1940
Hramba: S0074769

Material: metal
Dimensions: 24 x 4 x 11 cm
Date: 1920–1940
Kept by: S0074769

187

KOPALNA PEČ S PRHO
BOILER WITH A SHOWER

Snov: kovina
Dimenzije: v. 192 cm
Datacija: 1920–1940
Hramba: 510:LJU;0013918

Material: metal
Dimensions: h. 192 cm
Date: 1920–1940
Kept by: 510:LJU;0013918

188

BOJLER / WATER HEATER

Snov: kovina, plastika
Dimenzije: 75 x 35 cm
Datacija: 1960–1980
Hramba: S0079004

Material: metal, plastic
Dimensions: 75 x 35 cm
Date: 1960–1980
Kept by: S0079004

189

ZALIVALKA / WATERING CAN

Snov: kovina
Dimenzije: 45 x 25 x 38 cm
Datacija: 1950–1960
Hramba: S0078652

Material: metal
Dimensions: 45 x 25 x 38 cm
Date: 1950–1960
Kept by: S0078652

190

VODOVODNE CEVI / WATER PIPES

Snov: kovina
Datacija: 1. stoletje
Najdišče: Ljubljana, Gregorčičeva ulica 23 in 25
Hramba: 510:LJU;0044406

Material: metal
Date: 1st century
Site: Ljubljana, Gregorčičeva ulica 23 and 25
Kept by: 510:LJU;0044406

191

VODOVODNE CEVI / WATER PIPES

Snov: keramika
Datacija: novi vek
Hramba: 510:LJU;0059561

Material: ceramic
Date: Modern era
Kept by: 510:LJU;0059561

192

DEL VODOVODNE NAPELJAVE PART OF A PLUMBING SYSTEM

Snov: kovina
Dimenzije: 50 x 20 x 5 cm
Datacija: 1850–1900
Hramba: 510:LJU;0054733

Material: metal
Dimensions: 50 x 20 x 5 cm
Date: 1850–1900
Kept by: 510:LJU;0054733

193

DEL VODOVODNE NAPELJAVE PART OF A PLUMBING SYSTEM

Snov: kovina
Dimenzije: 4,9 x 68 cm
Datacija: 1850–1900
Hramba: 510:LJU;0053316

Material: metal
Dimensions: 4,9 x 68 cm
Date: 1850–1900
Kept by: 510:LJU;0053316

194

ROČNA ČRPALKA / WATER PUMP

Snov: kovina
Dimenzije: 42 x 18 x 65 cm
Datacija: 1900–1930
Hramba: 510:LJU;0054775

Material: metal
Dimensions: 42 x 18 x 65 cm
Date: 1900–1930
Kept by: 510:LJU;0054775

195

VODOVODNI VENTIL / WATER VALVE

Snov: kovina, les
Dimenzije: 50 x 20 x 20 cm
Datacija: 1900–1940
Hramba: S0073700

Material: metal, wood
Dimensions: 50 x 20 x 20 cm
Date: 1900–1940
Kept by: S0073700

196

HIDRANT / HYDRANT

Snov: kovina
Dimenzije: v. 105,5 cm
Datacija: 1930–1960
Hramba: 510:LJU;0036110

Material: metal
Dimensions: h. 105,5 cm
Date: 1930–1960
Kept by: 510:LJU;0036110

197

VODOVODNI TABLICI / WATER LINE SIGN

Snov: kovina
Dimenzije: 18 x 15 cm
Datacija: 1960–1970
Hramba: S0075706

Material: metal
Dimensions: 18 x 15 cm
Date: 1960–1970
Kept by: S0075706

198

IVAN VAVPOTIČ

REGULACIJA LJUBLJANICE
REGULATION OF THE LJUBLJANICA RIVER

Datacija: 1914
Tehnika: olje na platnu
Dimenzije: 190 x 157 cm
Hramba: 510:LJU;0019668

Date: 1914
Technique: oil on canvas
Dimensions: 190 x 157 cm
Kept by: 510:LJU;0019668

199

FRANZ KURZ PL. GOLDENSTEIN

PAPIRNICA V VEVČAH
VEVČE PAPER MILL

Datacija: 1857
Tehnika: barvna litografija na papirju
Dimenzije: 35 x 49 cm
Hramba: 510:LJU;0019657

Date: 1857
Technique: colour lithography on paper
Dimensions: 35 x 49 cm
Kept by: 510:LJU;0019657

200

GOTTF. SEELOS

ŽELEZNIŠKI NASIP NA LJUBLJANSKEM BARJU
RAILWAY EMBANKMENT ON THE LJUBLJANA MOOR

Datacija: 1857
Tehnika: barvni tisk na papirju
Dimenzije: 34,5 x 53 cm
Hramba: 510:LJU;0025027

Date: 1857
Technique: colour print on paper
Dimensions: 34,5 x 53 cm
Kept by: 510:LJU;0025027

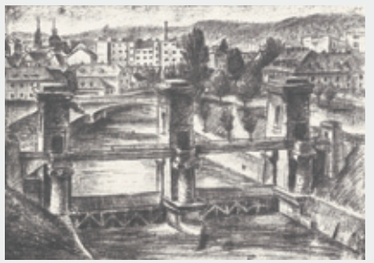
201

JOHANN VARONI

VIADUKT PRI BOROVNICI
VIADUCT NEAR BOROVNICA

Datacija: 1857
Tehnika: barvni tisk na papirju
Dimenzije: 34,5 x 53 cm
Hramba: 510:LJU;0025028

Date: 1857
Technique: colour print on paper
Dimensions: 34,5 x 53 cm
Kept by: 510:LJU;0025028



202

IVO LENŠČAK

PLEČNIKOVE ZAPORNICE NA LJUBLJANICI
PLEČNIK'S SLUICE GATE ON THE LJUBLJANICA RIVER

Datacija: druga pol. 20. stoletja
Tehnika: litografija na papirju
Dimenzije: 30 x 42,5 cm
Hramba: 510:LJU;0030759

Date: second half of 20th cent.
Technique: lithography on paper
Dimensions: 30 x 42,5 cm
Kept by: 510:LJU;0030759

203

KANU / CANOE

Snov: les, kovina, tkanina
Dimenzije: 552 x 92 x 37 cm
Datacija: 1950–1960
Hramba: S0069189

Material: wood, metal, textile
Dimensions: 552 x 92 x 37 cm
Date: 1950–1960
Kept by: S0069189

204

KANU / CANOE

Snov: les, kovina, tkanina
Dimenzije: 458 x 82 x 32 cm
Datacija: 1959–1960
Hramba: 510:LJU;0052543

Material: wood, metal, textile
Dimensions: 458 x 82 x 32 cm
Date: 1959–1960
Kept by: 510:LJU;0052543

205

IVAN VAVPOTIČ

OB LJUBLJANICI
ALONG THE LJUBLJANICA RIVER

Datacija: 20. stoletje
Tehnika: olje na platnu
Dimenzije: 81,5 x 63 cm
Hramba: 510:LJU;0032331

Date: 20th century
Technique: oil on canvas
Dimensions: 81,5 x 63 cm
Kept by: 510:LJU;0032331

206

IVAN GROHAR

V ČOLNU
IN A BOAT

Datacija: 1902
Tehnika: olje na platnu
Dimenzije: 54 x 81 cm
Hramba: 510:LJU;0014346

Date: 1902
Technique: oil on canvas
Dimensions: 54 x 81 cm
Kept by: 510:LJU;0014346

207

IVAN VAVPOTIČ

TROMOSTOVJE
THE TRIPLE BRIDGE

Datacija: 1934
Tehnika: olje na platnu
Dimenzije: 82 x 62,5 cm
Hramba: 510:LJU;0019711

Date: 1934
Technique: oil on canvas
Dimensions: 82 x 62,5 cm
Kept by: 510:LJU;0019711

209

SULICA / SPEAR

Snov: bron
Dimenzije: d. 24,8 cm
Datacija: pozna bronasta doba
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057377

Material: bronze
Dimensions: l. 24,8 cm
Date: Late bronze age
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057377

208

MEČ / SWORD

Snov: bron
Dimenzije: d. 52,8 cm
Datacija: pozna bronasta doba
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057421

Material: bronze
Dimensions: l. 52,8 cm
Date: Late bronze age
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057421

210

SULICA / SPEAR

Snov: bron
Dimenzije: d. 25,8 cm
Datacija: pozna bronasta doba
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057378

Material: bronze
Dimensions: l. 25,8 cm
Date: Late bronze age
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057378

211

SULICA / SPEAR

Snov: bron
Dimenzije: d. 18,8 cm
Datacija: pozna bronasta doba
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057379

Material: bronze
Dimensions: l. 18,8 cm
Date: Late bronze age
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057379

212

SEKIRA / AXE

Snov: bron
Dimenzije: d. 13,3 cm
Datacija: pozna bronasta doba
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057382

Material: bronze
Dimensions: l. 13,3 cm
Date: Late bronze age
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057382

213

SRP / SICKLE

Snov: bron
Dimenzije: d. 18,6 cm
Datacija: pozna bronasta doba
Najdišče: Ljubljanica
Zbirka družine Potočnik
Hramba: 510:LJU;0057383

Material: bronze
Dimensions: l. 18,6 cm
Date: Late bronze age
Site: Ljubljanica
Potočnik family collection
Kept by: 510:LJU;0057383

214

GLAVA VODNEGA BOŽANSTVA AHELOJA
HEAD OF THE RIVER DEITY ACHELOUS

Snov: kamen
Dimenzije: 36 x 24 cm
Datacija: 54–68
Najdišče: Ljubljana, Vegova ulica
Hramba: 510:LJU;0035232

Material: stone
Dimensions: 36 x 24 cm
Date: 54–68
Site: Ljubljana, Vegova ulica
Kept by: 510:LJU;0035232

215

VAZA / VASE

Avtor: Franc Valenčak in Design studio GRY Kozje
Snov: steklo
Dimenzije: 29,7 x 15 cm
Datacija: 1991
Hramba: 510:LJU;0015749

Author: Franc Valenčak and Design studio GRY Kozje
Material: glass
Dimensions: 29,7 x 15 cm
Date: 1991
Kept by: 510:LJU;0015749

216

IVAN GROHAR
MORSKE VILE
SEA NYMPHS

Datacija: 1899–1900
Tehnika: olje na platnu
Dimenzije: 45 x 40 cm
Hramba: 510:LJU;0014420

Date: 1899–1900
Technique: oil on canvas
Dimensions: 45 x 40 cm
Kept by: 510:LJU;0014420

217

NAPISNA PLOŠČA / INSCRIPTION SLAB

Snov: marmor
Dimenzije: 54 x 59 x 23 cm
Datacija: začetek 2. stoletja
Najdišče: Ljubljana, Slovenska cesta
Hramba: 510:LJU;0051009

Material: marble
Dimensions: 54 x 59 x 23 cm
Date: early 2nd century
Site: Ljubljana, Slovenska cesta
Kept by: 510:LJU;0051009

218

STEKLENICA ZA BLAGOSLOVLJENO VODO
BOTTLE FOR HOLY WATER

Snov: steklo, kovina, emajl
Dimenzije: v. 15 cm
Datacija: 18. stoletje
Hramba: 510:LJU;0027082

Material: glass, metal, enamel
Dimensions: h. 15 cm
Date: 18th century
Kept by: 510:LJU;0027082

219

STEKLENICA ZA BLAGOSLOVLJENO VODO
BOTTLE FOR HOLY WATER

Snov: steklo, kovina, emajl
Dimenzije: v. 16 cm
Datacija: 18. stoletje
Hramba: 510:LJU;0027081

Material: glass, metal, enamel
Dimensions: h. 16 cm
Date: 18th century
Kept by: 510:LJU;0027081

220

STEKLENICA ZA BLAGOSLOVLJENO VODO
BOTTLE FOR HOLY WATER

Snov: steklo, kovina, emajl
Dimenzije: v. 14,5 cm
Datacija: 18. stoletje
Hramba: 510:LJU;0027080

Material: glass, metal, enamel
Dimensions: h. 14,5 cm
Date: 18th century
Kept by: 510:LJU;0027080

221

VAZA / VASE

Snov: keramika
Dimenzije: v. 106 cm
Datacija: konec 19. stoletja
Hramba: 510:LJU;0017670

Material: ceramic
Dimensions: h. 106 cm
Date: late 19th century
Kept by: 510:LJU;0017670

222

VAZA / VASE

Snov: kamen
Dimenzije: 117,5 x 45 cm
Datacija: konec 18.– začetek 19. stoletja
Hramba: 510:LJU;0022043

Material: stone
Dimensions: 117,5 x 45 cm
Date: late 18th–early 19th century
Kept by: 510:LJU;0022043

223

VAZA / VASE

Snov: keramika
Dimenzije: 84 x 30 cm
Datacija: 20. stoletje
Hramba: 510:LJU;0011547

Material: ceramic
Dimensions: 84 x 30 cm
Date: 20th century
Kept by: 510:LJU;0011547

224

PAVEL KÜNL

BOHINJSKO JEZERO
LAKE BOHINJ

Datacija: 1847
Tehnika: olje na platnu
Dimenzije: 28 x 35 cm
Hramba: 510:LJU;0019615

Date: 1847
Technique: oil on canvas
Dimensions: 28 x 35 cm
Kept by: 510:LJU;0019615

225

IVAN GROHAR

PLANINE
MOUNTAINS

Datacija: 1897–1898
Tehnika: olje na platnu
Dimenzije: 21,5 x 29,5 cm
Hramba: 510:LJU;0014387

Date: 1897–1898
Technique: oil on canvas
Dimensions: 21,5 x 29,5 cm
Kept by: 510:LJU;0014387

226

IVAN GROHAR

OB REKI
ALONG THE RIVER

Datacija: 1902
Tehnika: olje na platnu
Dimenzije: 27 x 33 cm
Hramba: 510:LJU;0014324

Date: 1902
Technique: oil on canvas
Dimensions: 27 x 33 cm
Kept by: 510:LJU;0014324

227

SREČKO MAGOLIČ

OB LJUBLJANICI
ALONG THE LJUBLJANICA RIVER

Datacija: 1903
Tehnika: olje na platnu
Dimenzije: 81,5 x 47,5 cm
Hramba: 510:LJU;0019223

Date: 1903
Technique: oil on canvas
Dimensions: 81,5 x 47,5 cm
Kept by: 510:LJU;0019223

228

NIKOLAJ OMERSA

ŽABJAK
ŽABJAK

Datacija: 20. stoletje
Tehnika: olje na platnu
Dimenzije: 50 x 61 cm
Hramba: 510:LJU;0031916

Date: 20th century
Technique: oil on canvas
Dimensions: 50 x 61 cm
Kept by: 510:LJU;0031916

229

JELA TRNKOCZY

LJUBLJANICA
THE LJUBLJANICA RIVER

Datacija: 1947
Tehnika: olje na platnu
Dimenzije: 55 x 66 cm
Hramba: 510:LJU;0032283

Date: 1947
Technique: oil on canvas
Dimensions: 55 x 66 cm
Kept by: 510:LJU;0032283

230

IVAN VAVPOTIČ

TRNOVSKI PRISTAN
TRNOVSKI PRISTAN

Datacija: 20. stoletje
Tehnika: olje na platnu
Dimenzije: 63,5 x 92 cm
Hramba: 510:LJU;0032333

Date: 20th century
Technique: oil on canvas
Dimensions: 63,5 x 92 cm
Kept by: 510:LJU;0032333

231

TONE LAPAJNE

BARJANEC
MAN FROM THE MOOR

Datacija: 1997
Tehnika: barjanska zemlja na juti
Dimenzije: 87 x 72 cm
Hramba: EG0005221

Date: 1997
Technique: marshland soil on jute
Dimensions: 87 x 72 cm
Kept by: EG0005221

232

FRANCE GODEC

NA BARJU
IN THE MOORS

Datacija: 20. stoletje
Tehnika: olje na vezani plošči
Dimenzije: 60 x 70 cm
Hramba: 510:LJU;0020883

Date: 20th century
Technique: oil on hardboard
Dimensions: 60 x 70 cm
Kept by: 510:LJU;0020883

233

FRAN KLEMENČIČ

OB JEZERU
ALONG THE LAKE

Datacija: 1940
Tehnika: olje na platnu
Dimenzije: 81 x 100 cm
Hramba: 510:LJU;0031875

Date: 1940
Technique: oil on canvas
Dimensions: 81 x 100 cm
Kept by: 510:LJU;0031875

234

BARA REMEC

LJUBLJANA S ŠMARNO GORO
LJUBLJANA WITH THE ŠMARNA GORA HILL

Datacija: 1938
Tehnika: olje na platnu
Dimenzije: 56 x 65 cm
Hramba: 510:LJU;0031942

Date: 1938
Technique: oil on canvas
Dimensions: 56 x 65 cm
Kept by: 510:LJU;0031942

235

FRANCE PAVLOVEC

SAVA S ŠMARNO GORO
THE SAVA RIVER WITH THE ŠMARNA GORA HILL

Datacija: 1942
Tehnika: olje na platnu
Dimenzije: 95 x 130 cm
Hramba: 510:LJU;0044413

Date: 1942
Technique: oil on canvas
Dimensions: 95 x 130 cm
Kept by: 510:LJU;0044413

236

FRANCE PAVLOVEC

SAVSKI MOTIV
VIEW OF THE SAVA RIVER

Datacija: 1938
Tehnika: olje na platnu
Dimenzije: 63 x 58 cm
Hramba: 510:LJU;0019801

Date: 1938
Technique: oil on canvas
Dimensions: 63 x 58 cm
Kept by: 510:LJU;0019801

237

M. B.

MORSKA OBALA
SEASHORE

Datacija: 20. stoletje
Tehnika: olje na platnu
Dimenzije: 51 x 80,5 cm
Hramba: 510:LJU;0032743

Date: 20th century
Technique: oil on canvas
Dimensions: 51 x 80,5 cm
Kept by: 510:LJU;0032743

238

MIRE CETIN

DEVIŠKA TERASA
VIRGIN TERRACE

Datacija: 1954
Tehnika: olje na platnu
Dimenzije: 46 x 75 cm
Hramba: 510:LJU;0031505

Date: 1954
Technique: oil on canvas
Dimensions: 46 x 75 cm
Kept by: 510:LJU;0031505

239

NEZNAN AVTOR / UNKNOWN AUTHOR

JOSEPHA RUDESCH
JOSEPHA RUDESCH

Datacija: 1818
Tehnika: olje na platnu
Dimenzije: 57 x 43 cm
Hramba: 510:LJU;0030341

Date: 1818
Technique: oil on canvas
Dimensions: 57 x 43 cm
Kept by: 510:LJU;0030341

240

THERESE AUERSPERG

CVETJE V VAZI
FLOWERS IN A VASE

Datacija: 19. stoletje
Tehnika: grafit na papirju
Dimenzije: 22 x 16,7 cm
Hramba: 510:LJU;0052209

Date: 19th century
Technique: graphite on paper
Dimensions: 22 x 16,7 cm
Kept by: 510:LJU;0052209

241

PAVLA SLANOVEC

CVETJE V VAZI
FLOWERS IN A VASE

Datacija: 19. stoletje
Tehnika: akvarel na kartonu
Dimenzije: 26,5 x 21,5 cm
Hramba: 510:LJU;0023825

Date: 19th century
Technique: watercolour on cardboard
Dimensions: 26,5 x 21,5 cm
Kept by: 510:LJU;0023825

242

MIRE CETIN

CVETJE
FLOWERS

Datacija: 1958
Tehnika: olje na platnu
Dimenzije: 75 x 45 cm
Hramba: 510:LJU;0031506

Date: 1958
Technique: oil on canvas
Dimensions: 75 x 45 cm
Kept by: 510:LJU;0031506

243

MILAN RIJAVEC

CVETLICE
FLOWERS

Datacija: 1975
Tehnika: olje na platnu
Dimenzije: 47,5 x 56 cm
Hramba: 510:LJU;0020534

Date: 1975
Technique: oil on canvas
Dimensions: 47,5 x 56 cm
Kept by: 510:LJU;0020534

244

IVAN VAVPOTIČ

PIKNIK
PICNIC

Datacija: 20. stoletje
Tehnika: olje na platnu
Dimenzije: 70,5 x 140 cm
Hramba: 510:LJU;0024095

Date: 20th century
Technique: oil on canvas
Dimensions: 70,5 x 140 cm
Kept by: 510:LJU;0024095

247

NEZNAN AVTOR / UNKNOWN AUTHOR

LJUBLJANA
LJUBLJANA

Datacija: okrog 1900
Tehnika: akvarelirana risba z grafitom na papirju
Dimenzije: 28 x 19,5 cm
Hramba: 510:LJU;0041152

Date: around 1900
Technique: graphite and watercolour on paper
Dimensions: 28 x 19,5 cm
Kept by: 510:LJU;41152

248

HERMAN GVARDJANČIČ

KRAJINA
LANDSCAPE

Datacija: 1980
Tehnika: akvarel na papirju
Dimenzije: 71 x 71 cm
Hramba: 510:LJU;0057924

Date: 1980
Technique: watercolour on paper
Dimensions: 71 x 71 cm
Kept by: 510:LJU;0057924

245

JOSIP CODELLI

KODELJEVO
KODELJEVO

Datacija: 1810
Tehnika: lavirana risba s tušem na papirju
Dimenzije: 35 x 43 cm
Hramba: 510:LJU;0030753

Date: 1810
Technique: ink and wash on paper
Dimensions: 35 x 43 cm
Kept by: 510:LJU;0030753

246

MARIJ PREGELJ

ILUSTRACIJA
ILLUSTRATION

Datacija: 1957
Tehnika: lavirana risba s tušem na papirju
Dimenzije: 26,8 x 18 cm
Hramba: 510:LJU;0043421

Date: 1957
Technique: ink and wash on paper
Dimensions: 26,8 x 18 cm
Kept by: 510:LJU;0043421

249

JANEZ MEŽAN

OBLAKI NAD BRUSNICAMI
CLOUDS ABOVE BRUSNICE

Datacija: 1935
Tehnika: akvarel na papirju
Dimenzije: 35 x 47 cm
Hramba: 510:LJU;0030892

Date: 1935
Technique: watercolour on paper
Dimensions: 35 x 47 cm
Kept by: 510:LJU;0030892

250

NEZNAN AVTOR / UNKNOWN AUTHOR

MOST ČEZ LJUBLJANICO
BRIDGE ACROSS THE LJUBLJANICA RIVER

Datacija: okrog 1820
Tehnika: akvarel in gvaš na papirju
Dimenzije: 16 x 22 cm
Hramba: 510:LJU;0019195

Date: around 1820
Technique: watercolour and gouache on paper
Dimensions: 16 x 22 cm
Kept by: 510:LJU;0019195

251

MICHAEL RUPPE

LJUBLJANA PO POTRESU
LJUBLJANA AFTER AN EARTHQUAKE

Datacija: 1897
Tehnika: akvarel na papirju
Dimenzije: 36 x 26 cm
Hramba: 510:LJU;0014569

Date: 1897
Technique: watercolour on paper
Dimensions: 36 x 26 cm
Kept by: 510:LJU;0014569

252

I. HEINISCH

MARIJIN TRG
MARY'S SQUARE

Datacija: 19. stoletje
Tehnika: akvarel na papirju
Dimenzije: 14,5 x 27 cm
Hramba: 510:LJU;0019307

Date: 19th century
Technique: watercolour on paper
Dimensions: 14,5 x 27 cm
Kept by: 510:LJU;0019307

253

I. HEINISCH

TRANČA
TRANČA

Datacija: 19. stoletje
Tehnika: akvarel na papirju
Dimenzije: 24 x 18 cm
Hramba: 510:LJU;0019262

Date: 19th century
Technique: watercolour on paper
Dimensions: 24 x 18 cm
Kept by: 510:LJU;0019262

254

BRUNO VAVPOTIČ

KRAKOVO
KRAKOVO

Datacija: 20. stoletje
Tehnika: akvarel na papirju
Dimenzije: 34,5 x 45,5 cm
Hramba: 510:LJU;0014845

Date: 20th century
Technique: watercolour on paper
Dimensions: 34,5 x 45,5 cm
Kept by: 510:LJU;0014845

255

FRANCE KOŠIR

VEČER NA SAVI
EVENING ON THE SAVA RIVER

Datacija: 1931
Tehnika: akvarel na papirju
Dimenzije: 27 x 37 cm
Hramba: 510:LJU;0031851

Date: 1931
Technique: watercolour on paper
Dimensions: 27 x 37 cm
Kept by: 510:LJU;0031851

256

TINCA STEGOVEC

PRED ZAPORNICAMI
BEFORE THE GATES

Datacija: 1960
Tehnika: jedkanica in akvatinta na papirju
Dimenzije: 24,5 x 31 cm
Hramba: 510:LJU;0041402

Date: 1960
Technique: etching and aquatint on paper
Dimensions: 24,5 x 31 cm
Kept by: 510:LJU;0041402

257

ANDREJ JEMEC

BREZ NASLOVA
UNTITLED

Datacija: 1987
Tehnika: akvatinta na papirju
Dimenzije: 65,5 x 49,3 cm
Hramba: EG0002829

Date: 1987
Technique: aquatint on paper
Dimensions: 65,5 x 49,3 cm
Kept by: EG0002829

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28. 9. 2015–10. 1. 2016

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18. 1. 2016–8. 5. 2016

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Avtor: Andrej Gaspari
8. 2. 2016–8. 5. 2016

Trg francoske revolucije
Naliv
Avtor: Matej Andraž Vogrinčič
Kustos: Blaž Peršin
24. 6. 2015–20. 9. 2015

Jakopičevo sprehajališče, Tivoli
En planet, ena voda
Kustosinji: Maja Bahar, Irena Šinkovec
15. 7. 2015–15. 9. 2015

Krakovski nasip
Ljubljanica
Avtorica: Irena Šinkovec
15. 3. 2016–16. 5. 2016

Magistrat
Začutite, kar čutijo nedolžni
Tomo in Bojana Križnar
4. 11. 2015–27. 11. 2015

City Museum of Ljubljana / first floor
125 years of water supply in Ljubljana
JP Vodovod - Kanalizacija
24. 6. 2015–20. 9. 2015

City Museum of Ljubljana / first floor
H2OLLAND
Embassy of the Kingdom of the Netherlands
28. 9. 2015–10. 1. 2016

City Museum of Ljubljana / first floor
Ljubljana, European Green Capital 2016
The City Municipality of Ljubljana
18. 1. 2016–8. 5. 2016

City Museum of Ljubljana / basement
Stream of life
An exhibitions by students from the Ljubljana High School of Design and Photography
24. 6. 2015–20. 9. 2015

City Museum of Ljubljana / basement
Communal infrastructure of Roman city of Emona
Author: Andrej Gaspari
8. 2. 2016–8. 5. 2016

French Revolution Square
Pouring
Author: Matej Andraž Vogrinčič
Curator: Blaž Peršin
24. 6. 2015–20. 9. 2015

Jakopič promenade, Tivoli
One planet, one water
Curators: Maja Bahar, Irena Šinkovec
15. 7. 2015–15. 9. 2015

Krakovo Embankment
Ljubljanica River
Author: Irena Šinkovec
15. 3. 2016–16. 5. 2016

Ljubljana Town Hall
Feel what the innocent feel
Tomo and Bojana Križnar
4. 11. 2015–27. 11. 2015

VSEBINA / CONTENT

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Glasba / Music: Silence - Boris Benko, Primož Hladnik

Glasba / Music:
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