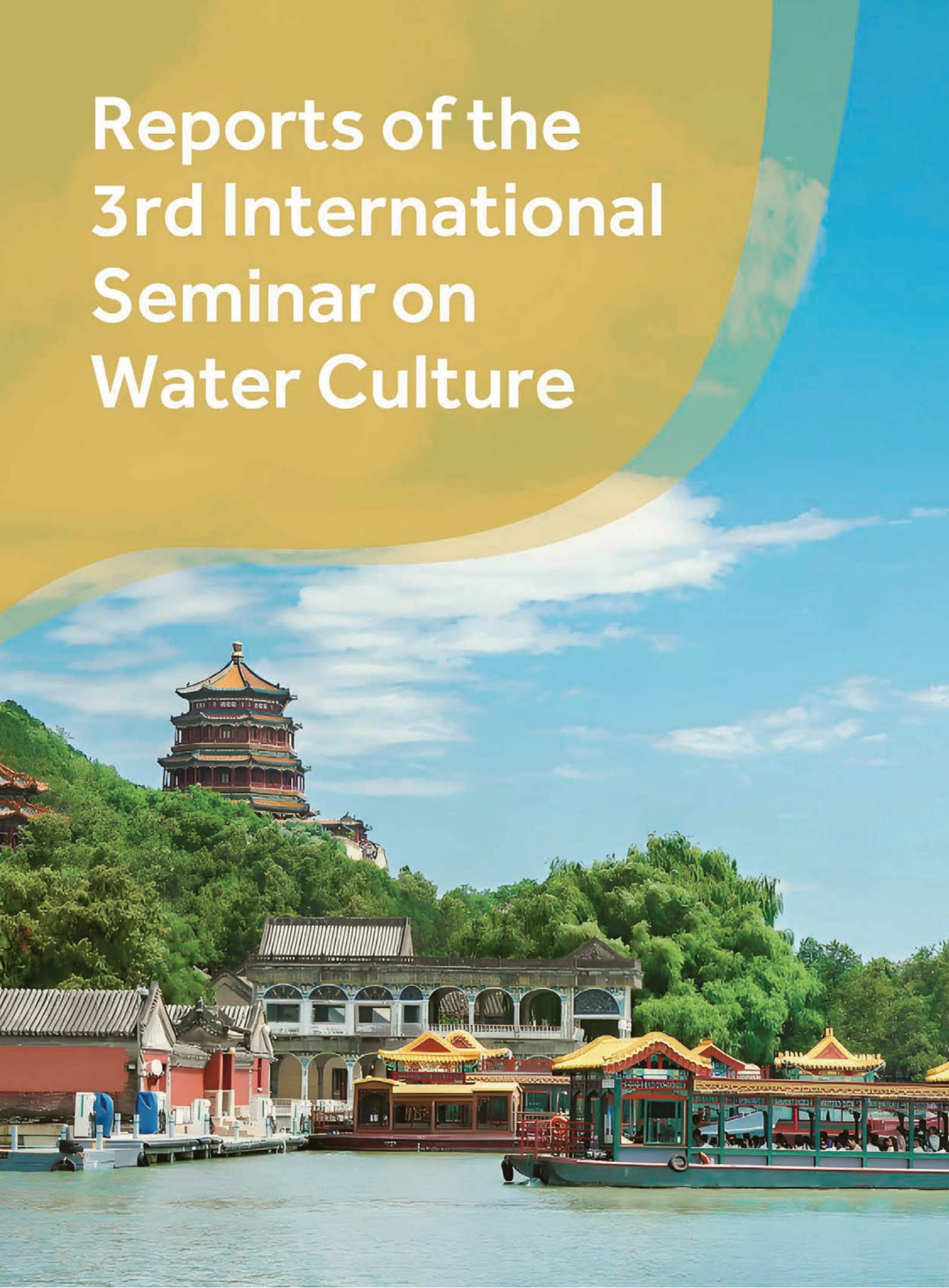
Reports of the 3rd International Seminar on Water Culture



CONTENTS

BRINGING WATER HERITAGE BACK TO FOREFRONT

KEY TO ACHIEVING SUSTAINABILITY IN WATER

Dr. DEEKSHA KATYAL ,
GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY , DELHI , INDIA

WATER HERITAGE OF INDIA

1. CULTURAL BELIEFS ON WATER
2. TRADITIONAL WISDOM ON WATER CONSERVATION
3. WATER TREATMENT METHODOLOGIES ACCORDING TO ANCIENT INDIAN TEXTS

AYURVEDA MEANING KNOWLEDGE OF LIFE (VITAL POWER)

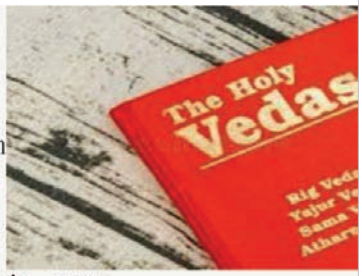
Ayurveda describes all existing bodies as:

a) Macrocosmic : Universe

b) Microcosmic: Individual body

All macro/micro cosmic bodies are made up of five elements called Panchmahabhutas viz. Akash (Ether), Vayu (Air), Agni, (Fire), Aap (Water), and Prithvi (Earth).

THE VEDIC PHILOSOPHY



FOUR VEDAS : a) Rig Veda b) Yajur Veda c) Sam

d) Atharva Veda

All the Vedas describe about the qualities of water in some form:

Rig Veda : Pure water cleans our body like mother . It makes us sacred with particles of energy present in it . It drains all pollutants and makes the man pious and energetic. (Rig Veda 10/17/10)

Chandogya Upanishad (Part of Sama Veda)

When we drink water, it becomes divided in three parts. The grossest part of it becomes urine; that which is less gross becomes blood; and the finest part becomes prāna, the vital force (Verse 6.5.2) . It discusses the metaphor of water in relation to the self (Atman)

That' s the emphasis that was put onto the nature of water and the thought with which it is consumed by scriptures which some say were written around 6000BCE .

Water was recognized on the basis of its taste(rasa), look (rupa), touch (sparsha) & smell(snigdha)

Six tastes which were : a) Madhura (sweet), b) Amla (sour), c) Lavana (salty), d) Katu (pungent), e) Tikta (bitter) and f) Kashaya (astringent).

Even various principles of taking water are defined (Jalpan Niyam)

a) Two parts of the stomach should be filled with solid foods, one part by liquids, and one part should be kept vacant for air.

b) It is recommended that water be taken half an hour prior or after meals (preferably sitting). Food during or immediately after meals should be avoided

c) While cold water is preferred during exhaustion , fainting , giddiness or alcohol intoxication , warm water is preferred for stimulating hunger , digestion , throat infections , flatulence and digestion

Rituals depicting the significance of water :

a) **Purification and Cleansing**: Since water is considered as a purifying element , it is mandatory to cleanse the body before engaging in prayers or other religious activities . Before entering a temple or performing worship at home, we typically wash our hands, face, and feet.

b) **Offering**: 'Abhishekam' which means offering water along with milk honey, yogurt, and ghee, to deities is a form of worship which invoke the blessings and divine grace of the gods.

c) **The Holy Rivers**: As discussed earlier , water is associated with creation, as it is believed to be the element from which life emerged . Thus, rivers are considered extremely sacred(especially , Ganges) and taking a dip in these rivers is believed to cleanse one of sins and bring spiritual merit.

d) **Holi and Water Festivals**: The festival of Holi is celebrated with great enthusiasm in India and involves the playful throwing of colored water. It is generally seen as a celebration of the arrival of spring and helps foster community bonds.(cont.)

Kua Poojan : Kuan Poojan ceremony is an auspicious ritual performed during marriage festivities and also after the birth of a child . Family and friends worship the place that is the source of their drinking water (in earlier times, a well) and pray for the well-being of the family

Moksha and the Waters of Liberation: Since our ultimate goal is to achieve liberation (moksha) from the cycle of birth and death (samsara), water forms an important pat of our cremation too. Death is often metaphorically described as a state of merging with the divine, like a drop of water merging with the ocean. Water is used as a symbolic representation of this concept.

The emphasis on water in ancient Indian texts achieved several significant outcomes and impacts on Indian culture, society, and spirituality. Since these practices and beliefs have been passed down through generations, it has contributed to a sense of continuity and unity among diverse communities. Water is used as a metaphor to convey complex spiritual and metaphysical concepts, aiding in the contemplation of the nature of reality and the self. The reverence for water has contributed to the preservation of historical sites like temples, ghats and heritage associated with sacred rivers and water bodies. The recognition of water's role in agriculture has also led to a drive and desire for agricultural sustainability and food security in India. The emphasis on

Meeting the Honorable Prime Minister of India , Shri Narendra Modi

NAMASKAR

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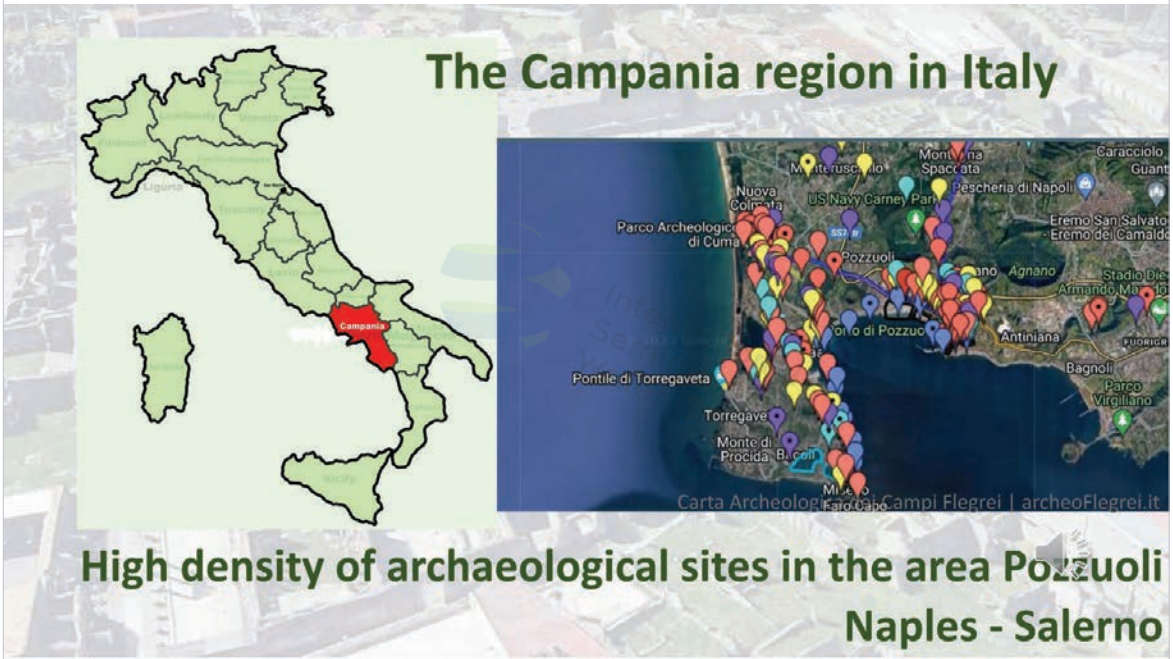
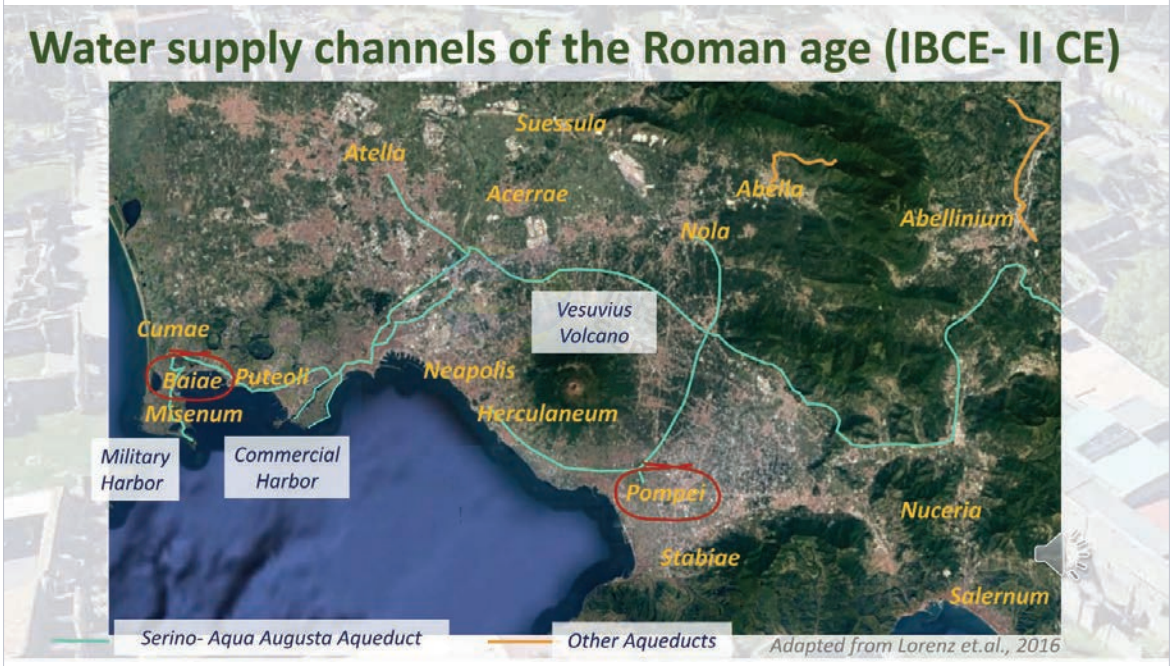
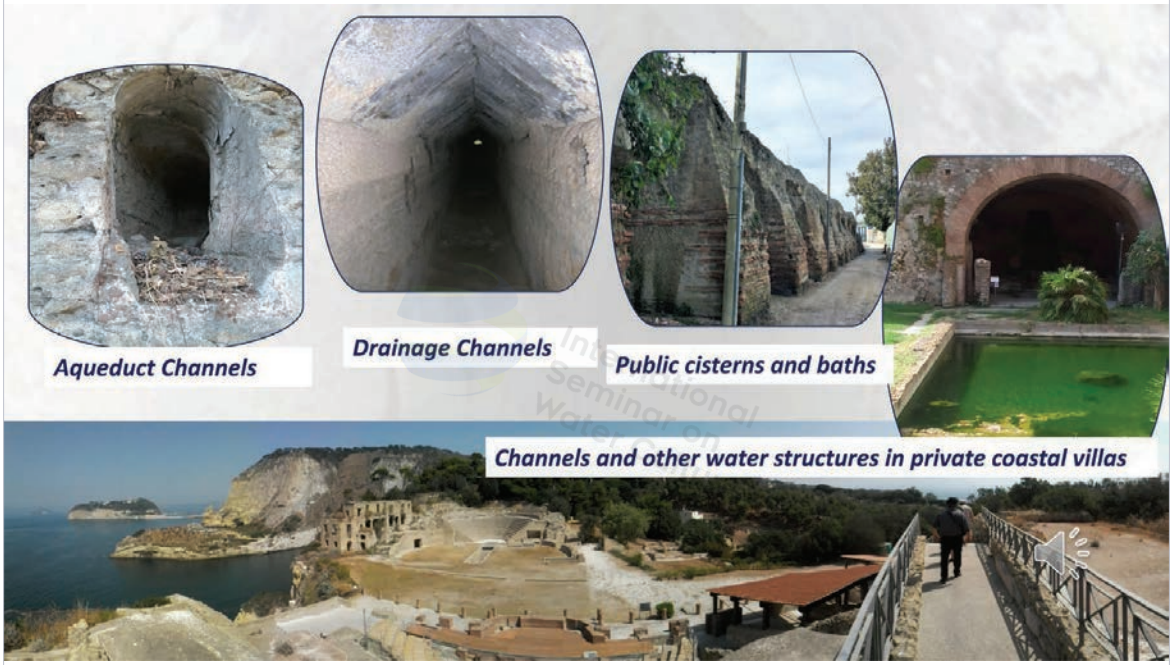
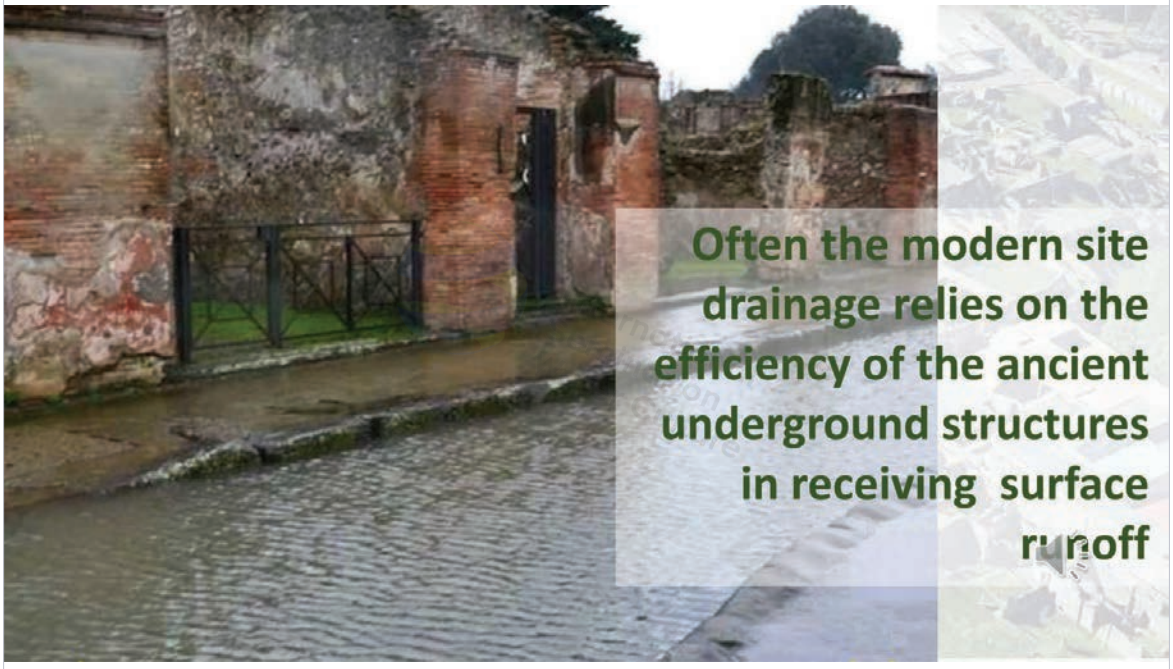
Ancient Roman channels
in Campania (Italy):
Issues of structural maintenance
and drainage efficiency
Maria C Monteleone Daniele De Simone Graziano W Ferrari


Maria C Monteleone is an independent researcher in ancient Roman hydraulic structures since 2006, recently collaborating at Northumbria University (UK) Ancient Water System Group
Daniele de Simone is an archaeologist collaborating with the Italian Cultural Heritage ministry in Naples, as well as various research institutions such as Aix-Marseille (FR) and Salerno University (IT)
Graziano W Ferrari is the director of the speleological association 'Cocceius' in Naples (IT), for many years collaborating with Cultural Heritage officers to the exploration of various underground ancient structures


The Campania region in Italy
Campania
Parco Archeologico di Cuma
Pozzuoli
Agnano
Antiniana
Bagnoli
Pontile di Torregaveta
Torregave
Monte di Procida
Carta Archeologica dei Campi Flegrei | archeoFlegrei.it
High density of archaeological sites in the area Pozzuoli
Naples - Salerno

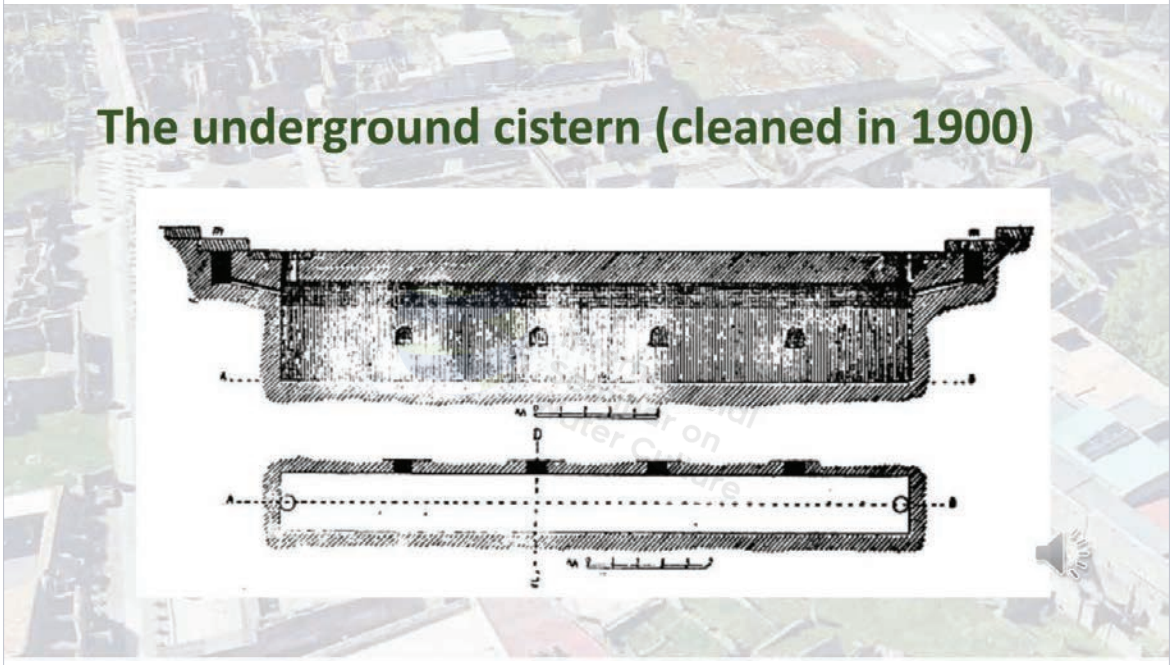

Water supply channels of the Roman age (IBCE- II CE)
Suessula
Atella
Acerrae
Abella
Nola
Abellinium
Vesuvius Volcano
Cumae
Baiae
Puteoli
Neapolis
Misenum
Herculaneum
Military Harbor
Commercial Harbor
Pompei
Nuceria
Stabiae
Salernum
Serino- Aqua Augusta Aqueduct
Other Aqueducts
Adapted from Lorenz et.al., 2016


Aqueduct Channels
Drainage Channels
Public cisterns and baths
Channels and other water structures in private coastal villas


Often the modern site drainage relies on the efficiency of the ancient underground structures in receiving surface runoff

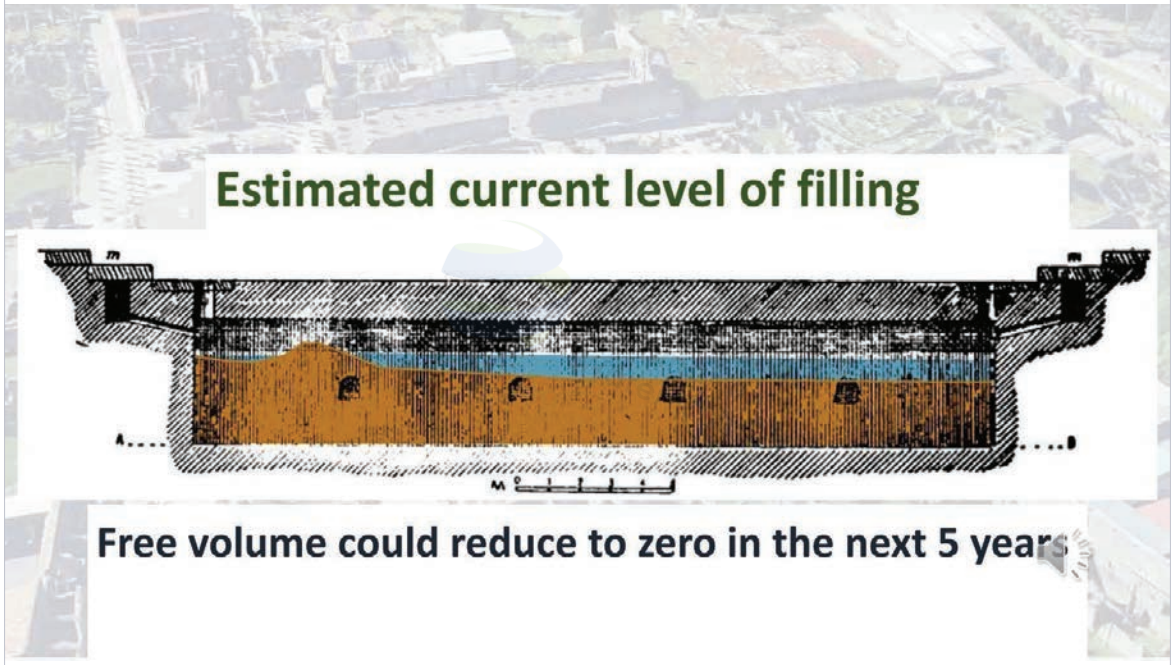

Case 1:
Pompeii forum drainage system

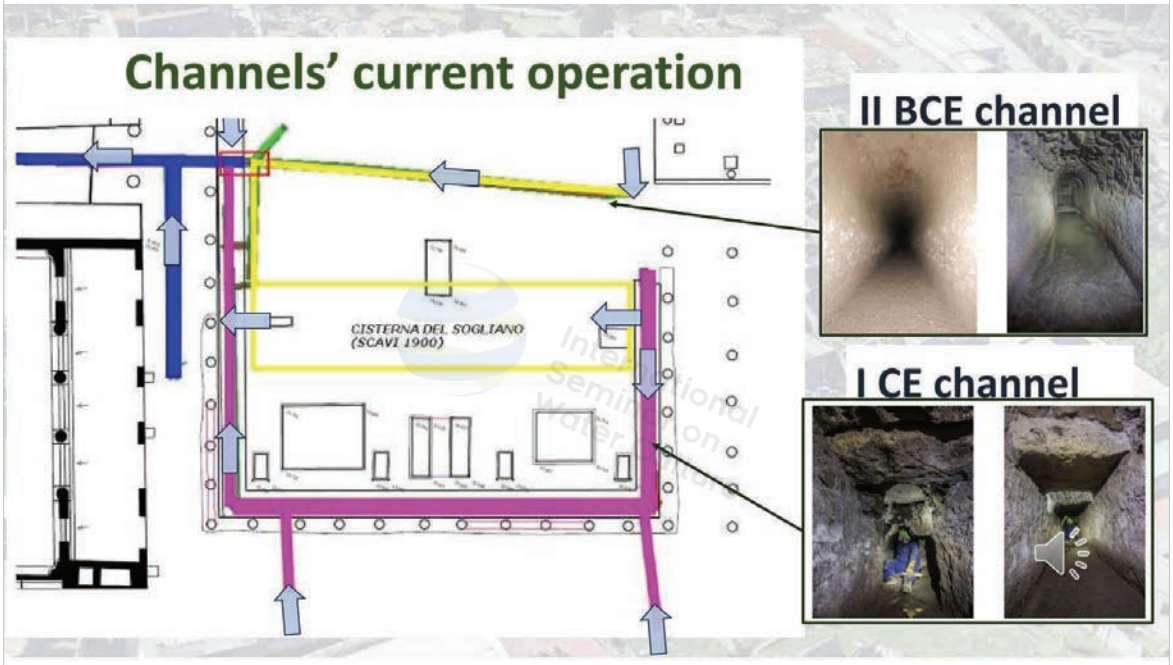

Underground Cistern
Google Earth
Layers

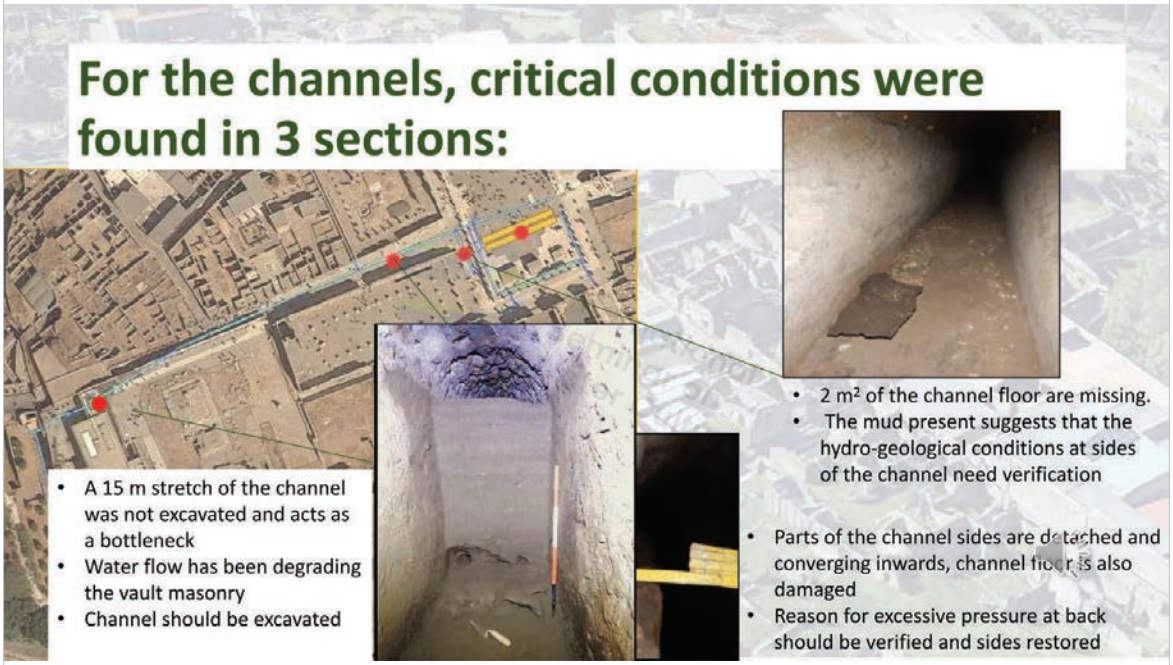

The underground cistern (cleaned in 1900)


Exploration of the underground structures (2018)


The cistern acting as a sediment trap

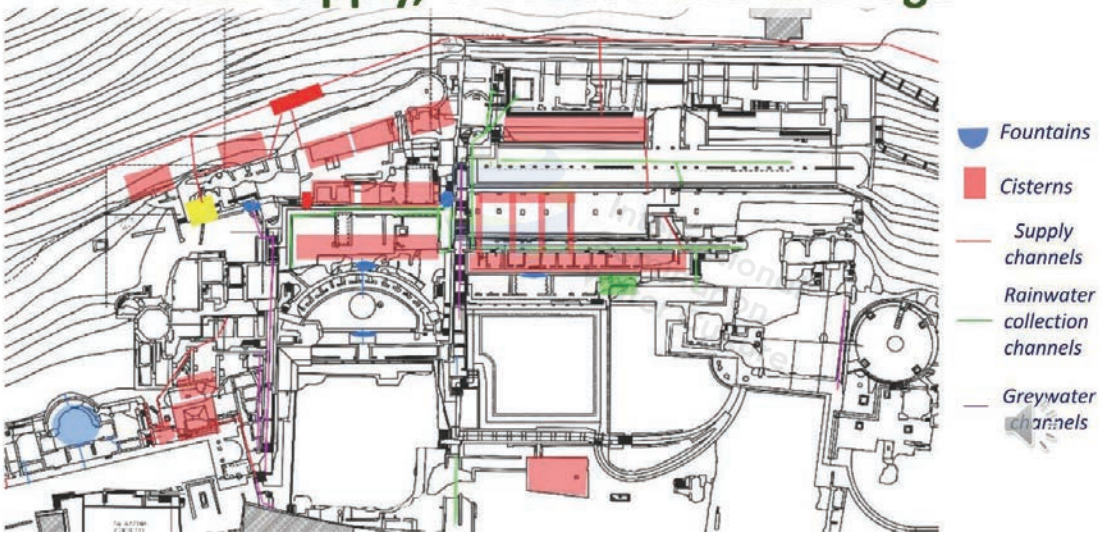

Estimated current level of filling
Free volume could reduce to zero in the next 5 years


Channels' current operation
II BCE channel
I CE channel
CISTERNA DEL SOGLIANO
(SCAVI 1900)

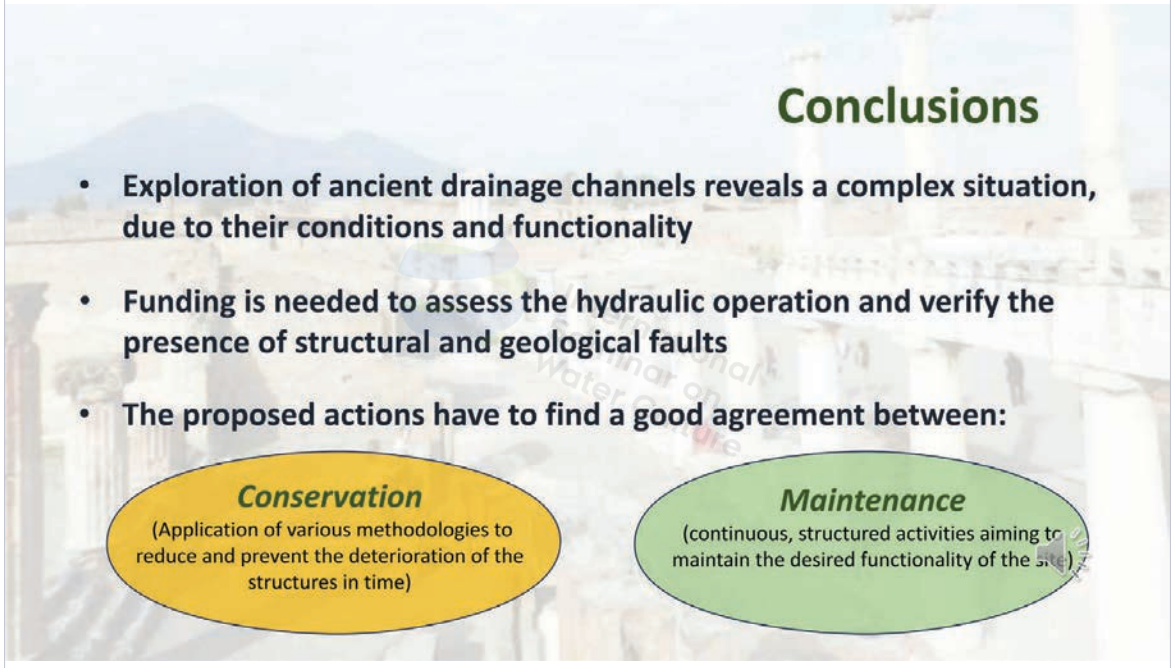

For the channels, critical conditions were found in 3 sections:
• A 15 m stretch of the channel was not excavated and acts as a bottleneck
• Water flow has been degrading the vault masonry
• Channel should be excavated
• 2 m² of the channel floor are missing.
• The mud present suggests that the hydro-geological conditions at sides of the channel need verification
• Parts of the channel sides are detached and converging inwards, channel floors also damaged
• Reason for excessive pressure at back should be verified and sides restored

Case 2: the drainage system of Baiae terraces

Each terrace presents structures for water supply, collection and drainage




Improvement achieved with grates & gullies clearing
Problem of fouled grates
Improved drainage


Conclusions
• Exploration of ancient drainage channels reveals a complex situation, due to their conditions and functionality
• Funding is needed to assess the hydraulic operation and verify the presence of structural and geological faults
• The proposed actions have to find a good agreement between:
Conservation
(Application of various methodologies to reduce and prevent the deterioration of the structures in time)
Maintenance
(continuous, structured activities aiming to maintain the desired functionality of the


Thank You !
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A Historical retrogression of the ancient Greek water and wastewater technology in Greece

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In Greece, systematically organized wastewater drain networks have been found since 3000 BC.

Minoans and Indians are considered the precursors of designing and constructing wastewater disposal networks.

In later times Greeks and Romans further improved the technology of the wastewater management

Ancient Greek philosophers Anaximenes(585-525BC, Hippon 5th Century, Empethocles 493-433BC, Aristoteles cetc had a good conception of the hydrologic cycle and its related phenomena.

This knowledge based on logical reasoning and observation constituted the basis for designing and planning a series of monumentous hydrawlic constructions an some of them being still in operation

The ancient Greeks, considered the water as being a "divine gift" of Gods.

Acheloos River

Acheloos,
the Father of all waters

The fight of Acheloos
and
Hercules for Deianera

Hercules breaks one
of Acheloos's
horns and wins

The hydrological know-how in ancient Greece

The first attempt to manage the water use in crop irrigation was made in Mesopotamia and Egypt during the Neolithic era i.e. 6000 to 7000 years ago
Water technology in Greece started around 2000 BC and only in 600BC the development of views by the Greek philosophers about the scientific history of natural phenomena in which the hydrological and meterological aspect, had an important role.
Also,the first constructions for the transfer of potable water were made in in Eastern Crete, during the Neolithic era.
Apart from the construction of small cisterns for maintaining the water quality by means of settlement of suspended particles, the Minoans of Knossos were using loam filters and special structures filled with charcoal. Such filters were found in Aghios Mamas in Crete.

In the Minoan Crete the rainwater was collected and stored in special cisterns. On the other hand, they were managing the water by means of various hydrological constructions such as: aqueducts, water collection systems, rain water cleaning and storing constructions, deep wells, cisterns and fountains).

In Crete, due to the dry climate, the water management included a wide system of rain water collection.

The hydrological know-how in ancient Greece

Rain water system in Saint Triad (A.N. Angelakis, with permission).

Rain water system in Knossos (A.N. Angelakis, with permission).

The hydrological know-how in ancient Greece

The engineers of the Minoan Crete applied extensively the principle of the "communicating vessels" at constructing water distribution and transfer networks.

In Knossos, during the Roman times, the water was transferred by means of an underground tunnel of 1150m length.
Such tunnels were found in Malia of 1900m length, which was being used for water transfer, also in ancient Tylisos an underground tunnell of 1400m length was operated.

The technological knowledge for the water transfer by means of tunnels was also very advanced and was applied in many parts of Greece, as well. This knowledge allowed also the construction of small dams, canals, pipe ducts, and cisterns in the Aegean islands during the Cycladic period (3100-1600 BC). Similarly technologies were also applied in the continental Greece during the Mycenaean period (1600-1100 BC).

The Mycenaean Civilization

Persea Dam Mycenean

Cistern in the Acropolis of Mycenean (A.N. Angelakis, with permission).

The hydrological know-how in ancient Greece

An important hydraulic structure of this period was the underground cistern in the Acropolis of Mycenae, which supplied the networks with water through a huge rock. This was indeed a miraculous structure before 33 centuries, which could be compared with modern systems of water supply of cities.

The Athenians also constructed a cistern within a rock of Acropolis for water storage.

In Athens the archaeologists found a pelagic aqueduct, which was constructed most probably before the appearance of Theseus. The aqueduct was made of closed cyclic ducts, and it was extending along a large distance from the site of Kesariani to the side of Philopapou hill.

Another old aqueduct of Athens was that of Theseus which was constructed in 3090 BC and transferred the water up to the western side of the mount Pendelis.

The hydrological know-how in ancient Greece

Ancient Greek philisophers knew very well the details of the hydrologic cycle. Though this knowledge had been ignored by the modern Societies, only during the 17th century they started paying attention.

Among the many hydrauclic constructions, a notable one was built during the Mycenaean period. It is a dam with a height of 2-5 meters and 250m to 5000m of length. The volume of water that could be stored was about 2-250 million m^3. This water was used for the irrigation of agriculture crops.

After 700 BC the evolution of commerce created favorable conditions which led to the rapid development of Athens, and consequently the hydraulic works started expanding. Thus deep wells, cisterns, fountains and canals were constructed and public networks for water distribution were made including deep wells, water sources, and many private structures leading to optimum water management.

Some of these monumentous hydraulic constructions , that is, dams, are given below

The hydrological know-how in ancient Greece

During the Archaic period (750-480 BC) and the classical period (480-333 BC) in inland Greece hydraulic structures similar to those of the Minoan period, such as the Pissistratio aqueduct in Athens (510 BC), which had a length of 2800 m, of which 270 m were within a dome.

Also, within the city of Athens many hydraulic structures were constructed such as fountains, water transfer networks, wastewater drain networks, fountains, aqueducts.
Laws were passed by the tyrant Solon for the effective management of water resources.

Pissistratio aqueduct, Athens, (510 BC) (N. Mamasis, with permission).

Parnithas aqueduct in Athens

Andrianion aqueduct in Athens

Andrianion aqueduct in Athens

The basic principles taken into account in constructing hydrological structures in ancient Greece

Some basic principles which were applied by the ancient Greeks in relation to constructing the hydraulic structures were:

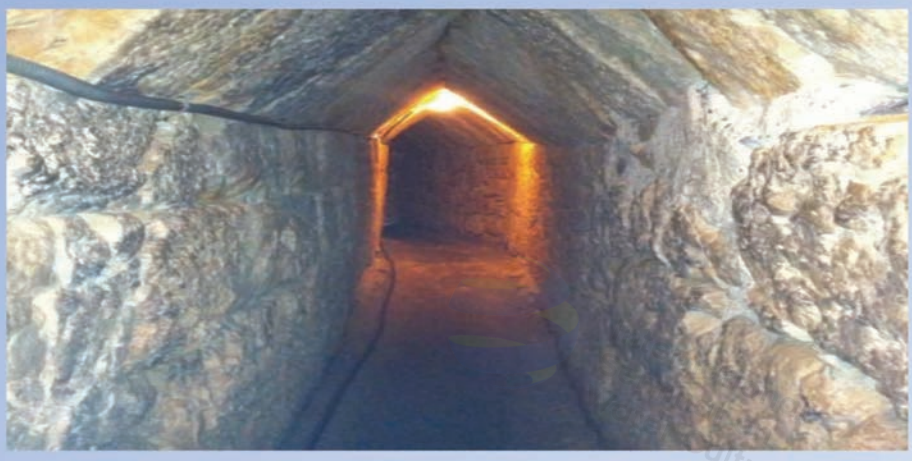
1. **The economy in regard to the use of the material destined for construction**
2. **The means used for accomplishing the aim set forth. Their main scope was to exploit the rain water as effectively as possible.**
3. **The methods used were friendly to the environment.**
4. **The structures made, were enforced so as to resist the effect of time and to last as many years as possible.**
5. **The construction of the structures ought to be friendly towards the environment and to be long lasting, contrary to the modern hydraulic structures which last only 50 years.**

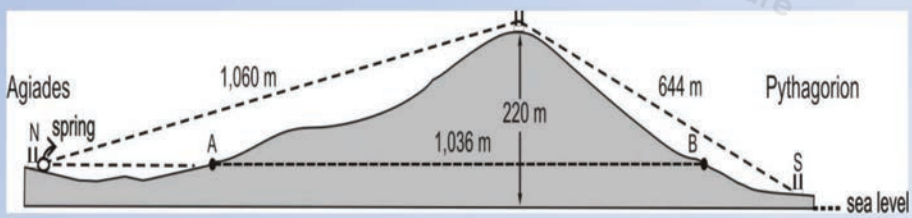
The hydrological know-how in ancient Greece

This period was characterized by an advanced level of hydrological knowledge of ancient Greeks, which contributed to the construction of the well-known Eufpallian aquiduct (tunnel) in the Aegian island of Samos. In fact, this was the first deep tunnel ever made in history. Its construction started from the two ends (edges) of a hill and the tunnels made, were connected with mathematical accuracy. This connection was made at the center of the hill. The technology used was based on the Euclidian geometry.

A general rule which was applied at this period for the water transfer was that the ducts must have a slope of of-2% so that the water to be moving and transferred by means of the effect of gravity.

Also the technology of siphons was used to transfer the water upward, i.e. to higher level via closed pipes.





Eupalinos tunnel in Samos Island (Voudouris, 2012).

The hydrological know-how in ancient Greece

The hydrological know how of ancient Greeks contributed to the construction of the Characteristic aqueduct of Nikopolis, which had a length of 50 km. It was indeed an amazing hydrological construction made to cover the water needs of this town by transferring the water to Nikopolis from the water sources of St. George in 30 BC, located 50 km away from Nikopolis.

The aqueduct was a complex structure of 50 km including an aerial system for water transfer in order to overcome a canyon of Louros and continued by a tunnel through hill, up to the village Archangelos crossing the village Samsuda and Kanali of Preveza and finally transferring the water to Nikopolis.

The hydrological know-how in ancient Greece

Another long aqueduct was constructed during this period in the island of Lesvos (Mytilini) in having a length of 22 km.

Similarly, significant hydraulic structure of this period is the "Andrianion Aqueduct" of 500 m3 capacity and length of 25 km. This aqueduct is underground throughout it length. It transfers the water from the mountain of Parnitha.

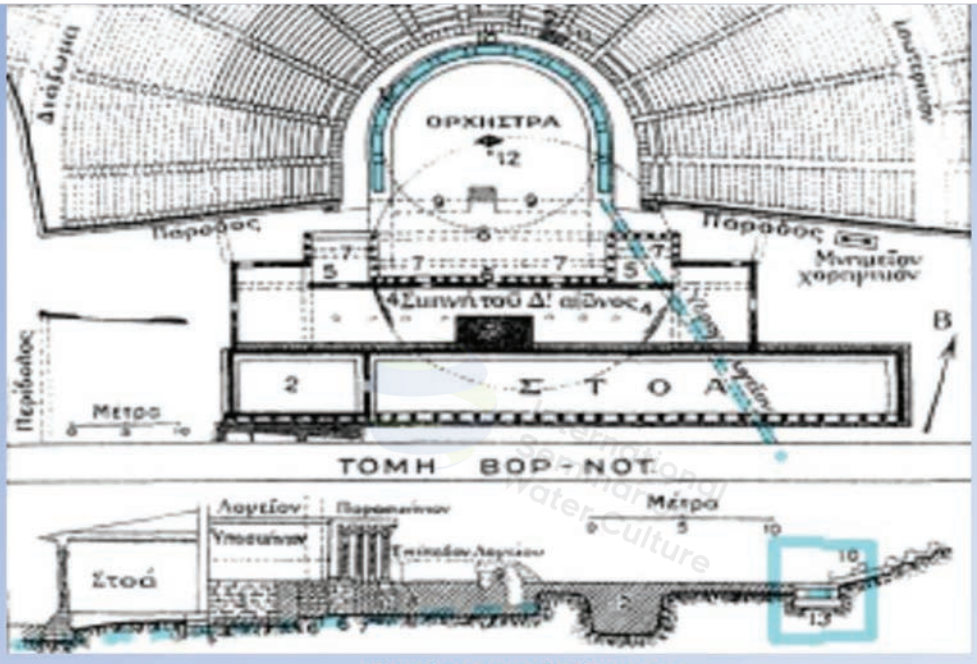
The Andrianion Tunnel

The hydrological know-how in ancient Greece

An important aqueduct was also constructed in the town of Philippi of Kavala with 8 km length. It was made with clay flagstones. The wails and the bottom were covered by lime stones mortar, which was also covered by hydraulic stucco. The dimensions of the tunnel were 0.96m width and 1.35m height. The cross section of the duct was square.

Ancient Makyneia, Aitoloakarnanias, photo of the stone drain system (Kollyropoulos et al., 2017)

Dionysus theater; details of drainage channel (images by K. Kollyropoulos): (a) view next to orchestra; (b) view of channel exit under stage of theater; (c) view of downwards flow of channel **(Kollyropoulos et al., 2015)**



The theater of Dionysos
The Blue colour represents the wastewater drainage system of the theater
The doted line indicates the covered section of the drainage system.
(Kollyropoulos et al., 2014).

Drain systems during the Roman Period

In the Roman Period the drain discharge systems were further improved. The houses had perpendicular drains incorporated into the walls, via which the wastewater was transferred into the central drain system which was underground and led the wastewater into the sea.

The rain water during the Roman time was collected along with the surplus of the water of fountains, and was used for the irrigation of urban gardens or it was removed via the drain system, while at the same time it cleaned the drain ducts, thus protecting human health from diseases.

In Patras during the Roman time the domestic wastewaters were crossing underground central roads via built ducts or clay pipes, discharging the wastewater into the sea. Even today there are sections of the drain network, which are still in function. Also, at the same time, public toilets were constructed to serve peoples' needs.

Patras Roman aqueduct

Ancient Pleurona, Aitoloakarnania : The Great Cistern (Diamanti and Kalavrouziotis, 2013)

Water reservoir in Makyneia, Aitoloakarnanias, (Kollyropoulos e al., 2017)

Toilets and drain systems

The ancient Greeks being experienced hydrologists,had forseen the need of construction of public toilets and constructed them in such a way so as to have four or more seats (places) as shown in the toilet of Amorgos. The waste waters were removed via a ditch, which was connected to the main canal being constructed parallel to the South wall of the toilet.

Public toilets have been found in the island of Delos, in Athens, in Roman markets (Agora), in the drain of Attalos, in island of Kos, in Philippoi and in Epidaurus.

A characteristic example of theater was that of the island of Delos which was constructed in 314 BC.

Hellenistic Period

During this period great progress took place in relation to the knowledge of hydraulic structures technology, which led to the improvement of hygienic bathrooms and toilets.

Generally the ancient theaters of Greece were constructed in such a way so as to include a drain system for the collection of rain water and its effective management.

The ancient theater of Delos with the part of sewage (Kollyropoulos et al., 2014).

Ancient Greek and present world water technology

Based on the above mentioned, an important question may arise regarding the relation between the ancient Greek and the present world water technology. Is it worth to study the ancient water technology?

The comparison of the ancient Greek civilization hydraulic technology with the contemporary world technological achievements provides an excellent example of motivation for environmental and conservation issues of our present time.

A number of Greek ancient technological developments are still in use. Similarly, such developments accomplished in other regions of the world are still in practice in Africa, India, Iran, Jordan etc.

Ancient Greek and present world water technology

Considering the ingenuity of the Greek Technology related to the solution of hydraulic problems, Greeks apart from the cisterns,clay pipes, drainage systems open and underground, fountains, aqueducts toilet and sanitary systems, rain harvesting and similar developments, along with other civilizations of the ancient world, they especially invented many hydraulic devices, making easier the handling of the water and of the fluids.

Ancient Greek and present world water technology

The hydraulic devices the ancient Greek ingenuity has produced some important devices for water lifting (pumps) being used in some countries until the present time. Some examples of representative hydraulic devices are given below

a- The Kilonion (Shantur): An ancient system for water pumping (invented by in Mesopotamia and reproduced by the Greeks).

b- The hydraulic endless screw of Archimedes: A mechanism for pumping water with small difference in height, still used today for transposting fluids and granular material.

c- The hydraulic wheel of perahora: A machine used in the 3rd century for pumping water, discovered in the Village of perahora of Korinthos, Greece. (It is considered the most ancient water pumping device).

d- The subdivided wheel of Philon: A water pumping machine (device) of small difference in height.

Ancient Greek and present world water technology

e- The sub-divided wheel of Philon (variation of Polykadia)

f- The chain pump of Philon A popular machine for water pumping of large differences in height used until recently.

g- The piston force pump of Ktersibios: A force piston pump used for fluids, invented by Ktesibios in the 3rd century and its use till the present time extensive innovated in various ways.

h- The fire pump of Heron: A twin suction fotce piston pump for continuou water flow that was used in firefighting and continued to be used till recently identically.

g- The hydraulic bellow: An ingenious machine for water pumping.

Ancient Greek and present world water technology

As it has been pointed out, the ancient technological developments have been considered as the underpinning of modern achievements.
Yet, this high technology had been for a long time forgotten, subjected to maturation, and it was only during the last two centuries that the contemporary technology revived it.

The western Technology however revived the Greek technology extending from robot servant of Philon to the cinema of Heron, and from the automatic clock of Ktesibios to the analog computer of Antikythera. This relation shows undouptedly the real influence of the ancient water technology on the modern one.

Figure 13:Artificial lake Kremasta (G. Fatouros with permission)

Artificial lake Kastraki (G. Fatouros with permission)

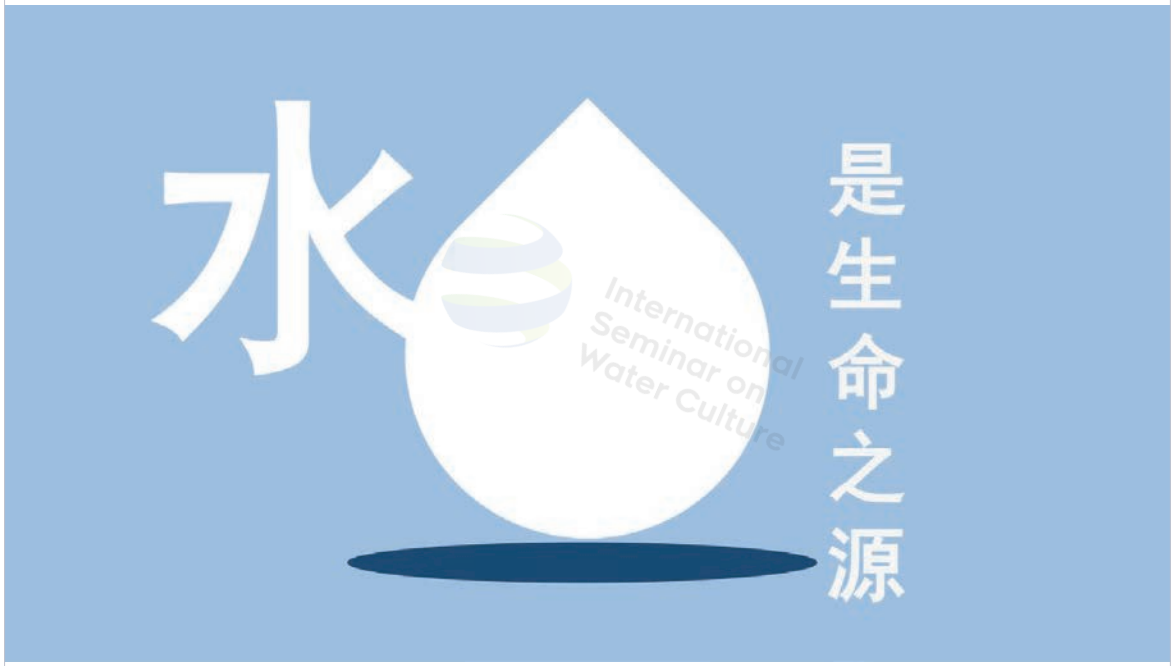
Artificial lake of Stratos (G. Fatouros with permission)

Conclusion

The study of the ancient water technology is of great importance because the inventions and innovations of the ancient Greeks as well as of other ancient civilizations contistitute the underpinning of the modern technological achievements.


Thank you for your attention!


WELCOME


水
是生命之源


古埃及
文明
中华
文明
文明
古巴比伦
文明
古印度
文明


颐和园的地理条件，形成于3500年前


满足北京城发展
和运河用水


旗营
寺庙
园林
村落
稻田
独一无二的“有机整体”


颐和园的“双”世界文化遗产
上个世纪
九十年代
颐和园作为
“世界主要文明之一的有力象征”
2014年
中国大运河获准列入世界遗产名录
颐和园昆明湖是其重要组成部分


善治国者
必重治水

“中国大运河”

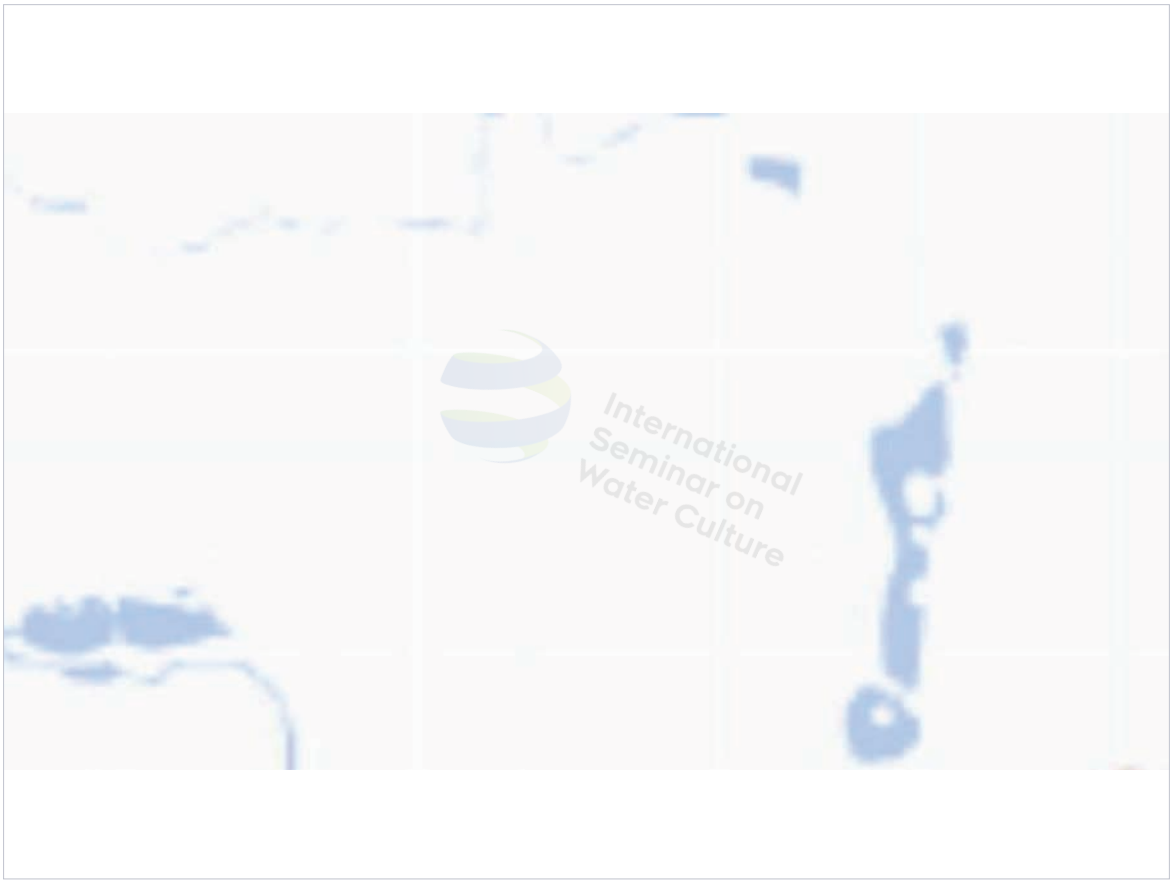

永济渠
通济渠
小丹河
洛阳城遗址
焦作市
新乡市
郑州市
开封市
商丘市
济宁市
枣庄市
宿迁市
淮安市
宿州市
洪泽湖
河南省
江苏省
安徽省
扬州市
镇江市
南京市
常州市
无锡市
苏州市
湖州市
嘉兴市
杭州市
绍兴市
宁波市
浙东运河
浙江省
黄 海
东 海
会通河
台儿庄
中运河
淮安清口枢纽
里运河
长江
江南运河
钱塘江
宁波三江口


“世界上
距离最长
规模最大
的运河”
长度 3200余公里
历史 2500余年
京杭大运河
隋唐大运河
浙东运河
北京市
天津市
河北省
渤 海
山东省
河南省
江苏省
安徽省
浙江省
杭州市
浙东运河
黄 海
东 海
通惠河
北运河
南运河
会通河
中运河
里运河
江南运河
永济渠
通济渠


通惠河
京杭大运河“北京段”
长度
一百六十四里一百零四步
节点
由十泉、二湖、五河段组成
北京市

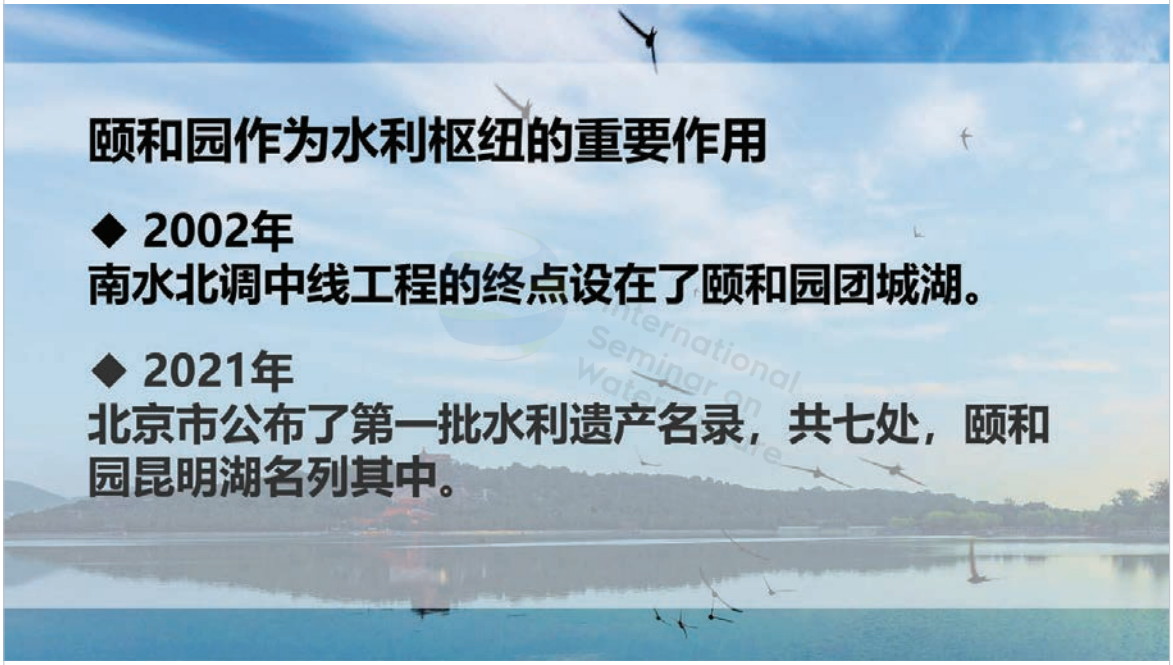

瓮山泊
今颐和园昆明湖


积水潭
又名“海子”
前海
中海
南海



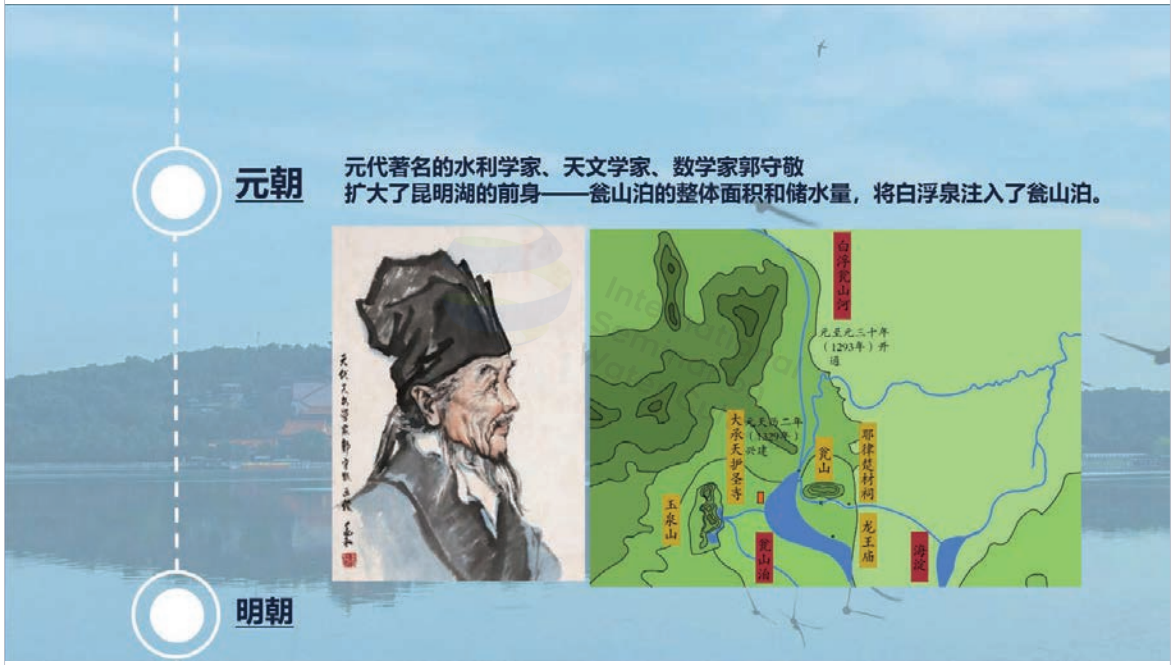

白浮堰渠
长河
高梁河
玉河
通惠河


水
功能价值
+
文化价值
治水智慧
人文内涵
" 治水之能 "
" 文化之美 "


颐和园作为水利枢纽的重要作用
◆ 2002年
南水北调中线工程的终点设在了颐和园团城湖。
◆ 2021年
北京市公布了第一批水利遗产名录，共七处，颐和园昆明湖名列其中。


一部“活”的
水利文化史诗


辽金时期
开始修建大运河，给北京城和运河供水而修建了一座水库，看重了瓮山泊就是如今的昆明湖。
瓮山
玉泉山
香山行宫
芙蓉殿行宫
元朝


元朝
元代著名的水利学家、天文学家、数学家郭守敬
扩大了昆明湖的前身——瓮山泊的整体面积和储水量，将白浮泉注入了瓮山泊。
白浮泉瓮山河
元至元三十年（1293年）开通
元天历二年（1329年）兴建
大承天护圣寺
瓮山
那律梵村祠
玉泉山
龙王庙
瓮山泊
明朝


明朝
明朝以后，白浮泉引水工程废弃，昆明湖水量有所减少。
因为翁山泊位于北京西郊，因此又被称为“西湖”，此时周围环境优美“宛如江南风景”。上至明代武宗、神宗，下至百姓都会来到此处观赏游玩，有的文人雅客摹仿杭州“西湖十景”，命名了北京的“西湖十景”。
清朝


清朝
颐和园区域建设在乾隆时期更得到了质的飞越。
• 昆明湖成为了一座灌、蓄、排设施完备的大型水利枢纽
• 形成以昆明湖为核心的北京西北郊水利系统
• 留下了一座美轮美奂的皇家园林——清漪园，也就是现在的颐和园
北泄水河
功德寺
静明园
圆明园
畅春园


一座“活”的
水利遗产博物馆

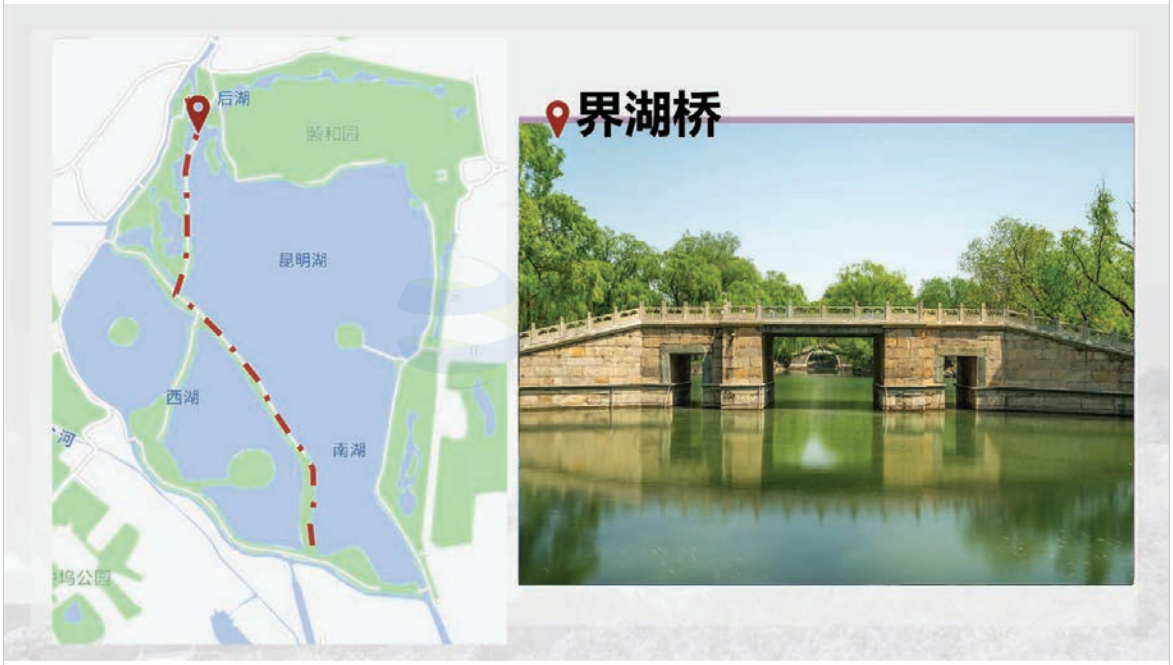

昆明湖
西湖
南湖
半壁桥
荇桥
玉带桥
绣漪桥


后湖
颐和园
昆明湖
西湖
南湖
柳桥


后湖
颐和园
昆明湖
西湖
南湖
练桥


后湖
颐和园
昆明湖
西湖
南湖
镜桥


后湖
颐和园
昆明湖
西湖
南湖
豳风桥


后湖
颐和园
昆明湖
西湖
南湖
界湖桥


后湖
颐和园
昆明湖
西湖
南湖
十七孔桥


后湖
颐和园
昆明湖
西湖
南湖
金河
中埠公园
二龙闸
作用
控制昆明湖东流之水，泄出多余水量，调节水位，灌溉周围农田。

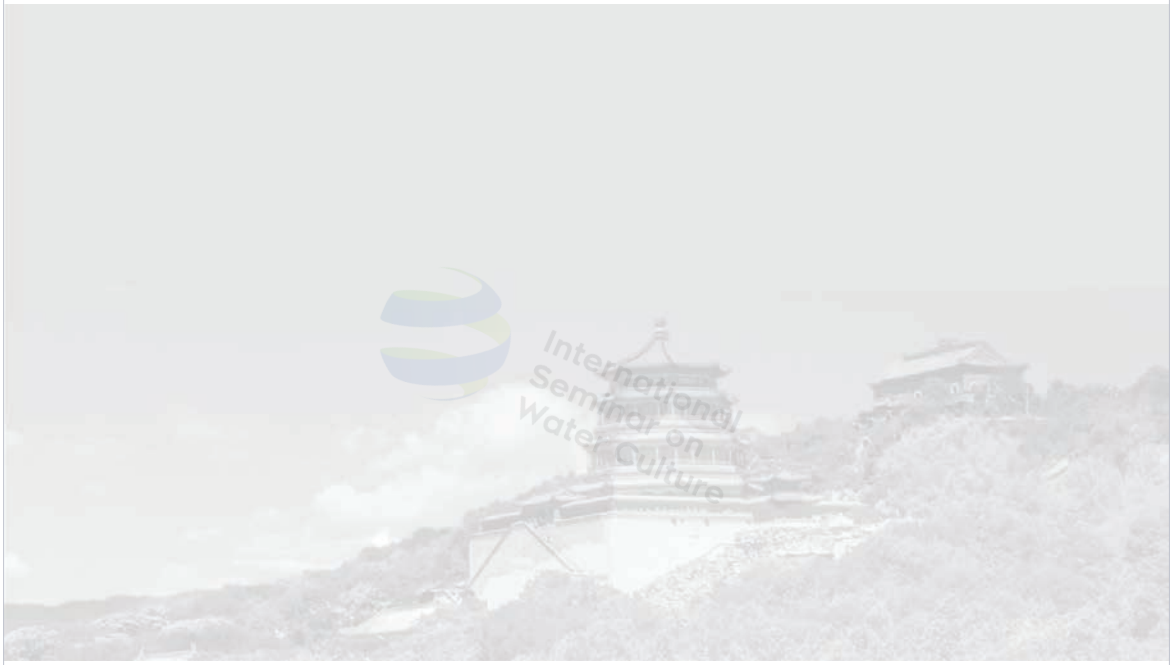

后湖
颐和园
昆明湖
西湖
南湖
金河
中埠公园
绣漪桥闸
作用
调节昆明湖水、长河水流的高低。


后湖
颐和园
昆明湖
西湖
南湖
金河
中坞公园
青龙桥闸
作用
控制北面的湖水水位。


后湖
颐和园
昆明湖
西湖
南湖
金河
中坞公园
惠山园闸
作用
水由惠山园闸流出园墙，沿马路南流至圆明园。

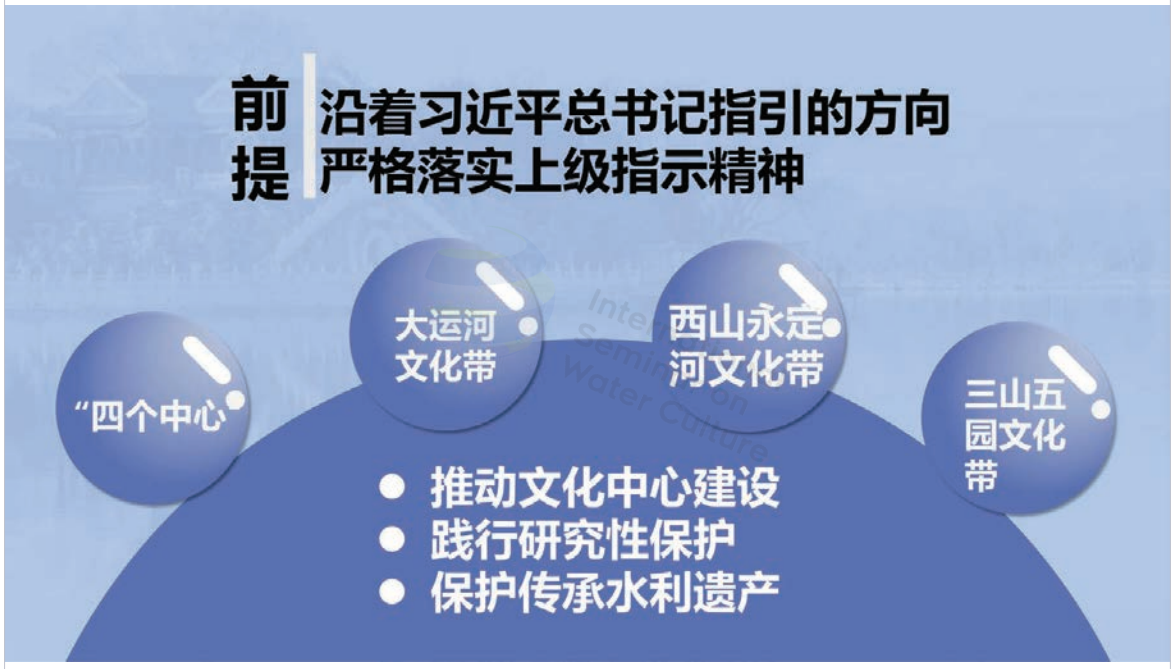

后湖
颐和园
昆明湖
西湖
南湖
中埠公园
谐趣园西闸口
作用
入水闸口，水由谐趣园西闸口流入谐趣园，出园墙南流，过东宫门合并二龙闸流出之水


泽疏流利下田
昆明湖周边数十座桥闸虽已不再具有使用功能
但仍保持着历史原貌




漕运
防灾避洪
耕田
城市用水
◆ 满足人们的精神需要
◆ 影响着从古代苑囿到现代园林建设的发展与进步
◆ 激励和促进文化发展


水利文化的
传承与发展


前提
沿着习近平总书记指引的方向
严格落实上级指示精神
“四个中心”
大运河文化带
西山永定河文化带
三山五园文化带
推动文化中心建设
践行研究性保护
保护传承水利遗产

遗产保护方面

◆成立颐和园世界文化遗产监测中心

◆建立遗产监测预警平台

◆持续开展昆明湖水环境监测和石桥、闸函等水利遗迹的监测

遗产保护方面

◆联合相关公园、科研单位共同开展“三山五园水利文物遗迹研究”课题

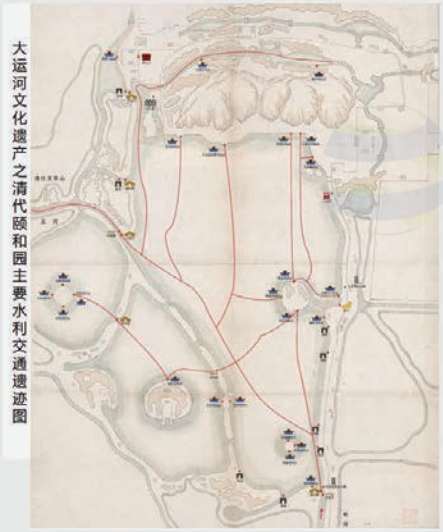
◆系统调研区域现存水利文物遗迹情况

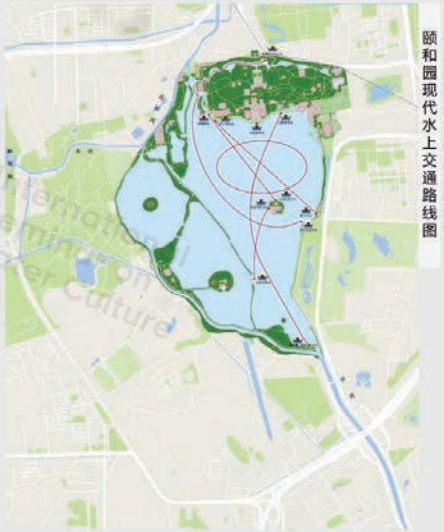
◆对水利文物进行保护型修缮

展示利用方面

◆绘制《大运河文化遗产之清代颐和园主要水利交通遗迹图》
◆绘制《颐和园现代水上交通路线图》
◆设置介绍牌示。

展示利用方面





展示利用方面

◆ 举办了《明珠耀两河——西山永定河、大运河文化带视角中的颐和园历史文化展》

文物展览和文化传播

◆注重应用文物、图片、视频展示颐和园及周边区域的水利遗迹

◆打造“颐和园研究院”学术交流平台、“园说”系列文物展和“颐和讲堂”文化传播品牌等


文物展览和文化传播
◆打造“颐和园研究院”学术交流平台、“园说”系列
文物展和“颐和讲堂”文化传播品牌等


文物展览和文化传播
◆打造“颐和园研究院”学术交流平台、“园说”系列
文物展和“颐和讲堂”文化传播品牌等
园
说


文物展览和文化传播
◆打造“颐和园研究院”学术交流平台、“园说”系列
文物展和“颐和讲堂”文化传播品牌等


文物展览和文化传播
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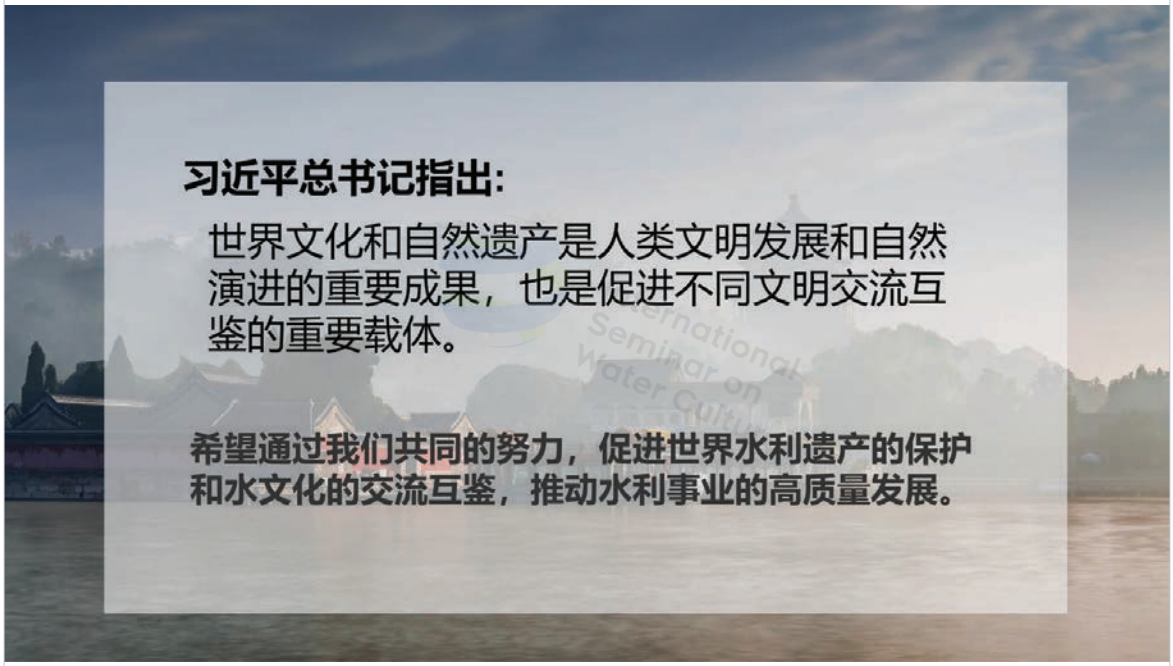
文物展和“颐和讲堂”文化传播品牌等


文物展览和文化传播
◆打造“颐和园研究院”学术交流平台、“园说”系列
文物展和“颐和讲堂”文化传播品牌等
百年大計興中華
借运河谈城市


文物展览和文化传播
◆打造“颐和园研究院”学术交流平台、“园说”系列
文物展和“颐和讲堂”文化传播品牌等


尾声


习近平总书记指出:
世界文化和自然遗产是人类文明发展和自然演进的重要成果，也是促进不同文明交流互鉴的重要载体。
希望通过我们共同的努力，促进世界水利遗产的保护和水文化的交流互鉴，推动水利事业的高质量发展。

早期中国的水文明

Water civilization in early China

牛志奇 Niu Zhiqi

2023年10月14日 October 14, 2023

前序 Preamble

中华文明是人类社会最早形成的文明之一。

Chinese civilization is among the oldest ones of human society.

Yan Emperor and Yellow Emperor

Yellow River

Yangtse River

前序 Preamble

中国考古发现实证了中华民族百万年的人类史、一万年的文化史、五千多年的文明史。

Archaeological findings have confirmed a million-year of human history, 10,000 years of cultural history, and 5,000 years of civilization of the Chinese nation.

前序 Preamble

水利历史悠久。中华民族在长期的发展过程中，始终在同水旱灾害作斗争，治水伴随着中华民族5000年文明连绵不断的脚步一路走来，显示出治水在文明进程中的重要地位与作用。

A long-standing history of water conservancy. In its long history, the Chinese nation has always struggled with flood and drought disasters. Water conservancy has come along with the continuous steps of Chinese civilization for 5,000 years, marking its important position and role in the development of civilization.

大禹治水
DaYu Tamed the Flood

都江堰
Dujiangyan Irrigation System


主要内容 Contents
一、中华文明的突出特性
I. Prominent Features of Chinese Civilization
二、中华文明探源工程及成果意义
II. The Project to Trace the Origins of Chinese Civilization and Achievements
三、重要考古遗址中的水利
III. Water Conservancy in Core Archaeological Sites
四、早期水利文明的作用和影响
IV. Role and Influence of Early Water Conservancy Civilization


一、中华文明的突出特性
Prominent Features of Chinese Civilization


一、中华文明的突出特性 Prominent Features of Chinese Civilization
连续性 Consistency
创新性 Originality
中华文明的突出特性
统一性 Unity
Prominent Features of Chinese Civilization
包容性 Inclusivity
和平性 Peaceful nature


一、中华文明的突出特性 Prominent Features of Chinese Civilization
连续性 Consistency
中华文明是世界上唯一绵延不断且以国家形态发展至今的伟大文明。
China has the only one of the world's ancient civilizations that has continued and developed in the form of a country.
长城 The Great Wall


一、中华文明的突出特性 Prominent Features of Chinese Civilization
创新性
Originality
中华文明是革故鼎新、辉光日新的文明，静水深流与波澜壮阔交织。文明的发展是以创新为支撑的历史进步过程。
The Chinese civilization has been in constant updating and enhancement. Interweaving with deep-running still water and magnificent waves, its progress has been underpinned by innovation.
纸 造纸术
印 印刷术
南 指南针
纸 火药
四大发明
Four great inventions


一、中华文明的突出特性 Prominent Features of Chinese Civilization
统一性
Unity
中华文明长期的大一统传统，形成了多元一体、团结集中的统一性。“向内凝聚”的统一性追求，是文明连续的前提，也是文明连续的结果。
The long tradition of grand unification of Chinese civilization has shaped a community of the Chinese nation with ethnic groups diversified yet integrated as one. The pursuit of "cohesion" is the prerequisite for and the result of the consistency of civilization.
秦始皇
First Emperor of Qin
书同文
Unified writing system
车同轨
Standardized chariot axle widths
改币制
Reformed currency system
度同制
Adapted one metric system


一、中华文明的突出特性 Prominent Features of Chinese Civilization
包容性
Inclusivity
中华文明从来不用单一文化代替多元文化，而是由多元文化汇聚成共同文化，化解冲突，凝聚共识。
Chinese civilization has never about replacing diversified culture with a single type. Instead, multiple ones converged into a common culture to resolve conflicts and build consensus.
镶金 兽首玛瑙杯 （唐代）
造型与起源于古希腊的酒具“来通”相似，“来通”曾广泛流行于中亚、西亚地区，沿着丝绸之路不断东传进入中国，让我们见证两千余年来中华文明与丝绸之路沿线各国经济、文化交流的悠久历史。
Gold-inlaid Beast-head-shaped Agate Cup (Tang Dynasty)
The shape is similar to that of "rhyton", the wine vessel originated from ancient Greece, once was popular in Central and West Asia and introduced to China through the Silk Road. It is a proof of the long history of economic and cultural exchanges between Chinese civilization and countries along the Silk Road for more than 2,000 years.


一、中华文明的突出特性 Prominent Features of Chinese Civilization
和平性
Peaceful nature
和平、和睦、和谐是中华文明五千多年来一直传承的理念。
Peace and harmony are the concepts of Chinese civilization that has been carried on for over 5,000 years.
2100多年前，汉代使者张骞出使西域，用“驼队和善意”写下东西方互利合作的篇章。
Over 2100 years ago, Zhang Qian, the emissary of the Han Dynasty, was sent to the Western Regions, which wrote a chapter of mutually beneficial cooperation between the East and the West with "camel teams and goodwill".
600多年前，明朝官员郑和七下西洋，用“宝船和友谊”留下中外和平友好的佳话。
More than 600 years ago, official Zheng He of the Ming Dynasty sailed to the west with a fleet of seven treasure ships, becoming a much told tale about peace and friendship between China and foreign countries.


二、中华文明探源工程及成果意义
The Project to Trace the Origins of Chinese Civilization and Achievements


二、中华文明探源工程及成果意义
The Project to Trace the Origins of Chinese Civilization and Achievements
中华文明探源工程：是以考古调查发掘为获取相关资料的主要手段，以现代科学技术为支撑，采取多学科交叉研究的方式，揭示中华民族五千年文明起源与早期发展的重大科研项目。
The project to trace the origins of Chinese Civilization is a major scientific research project that uses archaeological excavation for relevant information, with support of modern science and technology, and adopts multidisciplinary cross-research to reveal the origin and early development of the 5,000-year-old Chinese civilization.

二、中华文明探源工程及成果意义
The Project to Trace the Origins of Chinese Civilization and Achievements

陕西神木石峁遗址，以“中国文明的前夜”入选2012年十大考古新发现和世界十大田野考古发现。（龙山文化）

The Shimao Site of Shenmu in Shaanxi was selected as one of the top ten archaeological discoveries by "the eve of Chinese civilization" in 2012 and the top ten field archaeological discoveries in the world. (Longshan Culture)

2001年正式提出。2004年，在全国范围内众多古文化遗址中， 主要在黄河流域、长江流域、辽河流域等地区，选定了一些中心性遗址进行考古发掘。

It was officially presented in 2001. In 2004, among the many ancient cultural sites throughout the country, some core sites were selected for archaeological excavation mainly in the Yellow River Basin, Yangtze River Basin, and Liao River Basin.

河南灵宝西坡遗址，是仰韶时代庙底沟类型的大型文化遗址，被列入中华文明探源工程六大遗址首选。（仰韶文化）

The Lingbao Xipo Site in Henan Province, as a large one of the type of Miaodigou of the Yangshao culture, is listed as the first choice of the six sites of the project. (Yangshao Culture)

二、中华文明探源工程及成果意义
The Project to Trace the Origins of Chinese Civilization and Achievements

历经预研究阶段、第一阶段、第二阶段、第三阶段等4个阶段，长达15年，以丰富的考古资料实证了中华民族5000年多年的文明。

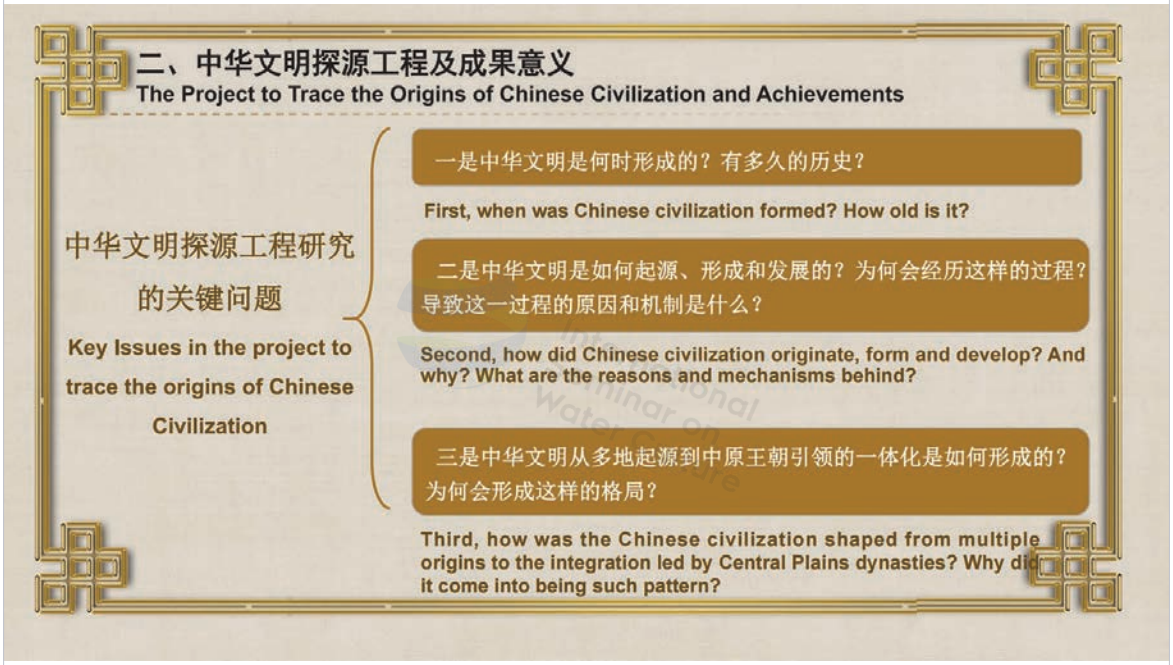
Four phases, namely the pre-study, the first, the second, and the third phase, of research in 15 years confirmed with rich archaeological data that the Chinese civilization continues for more than 5,000 years.

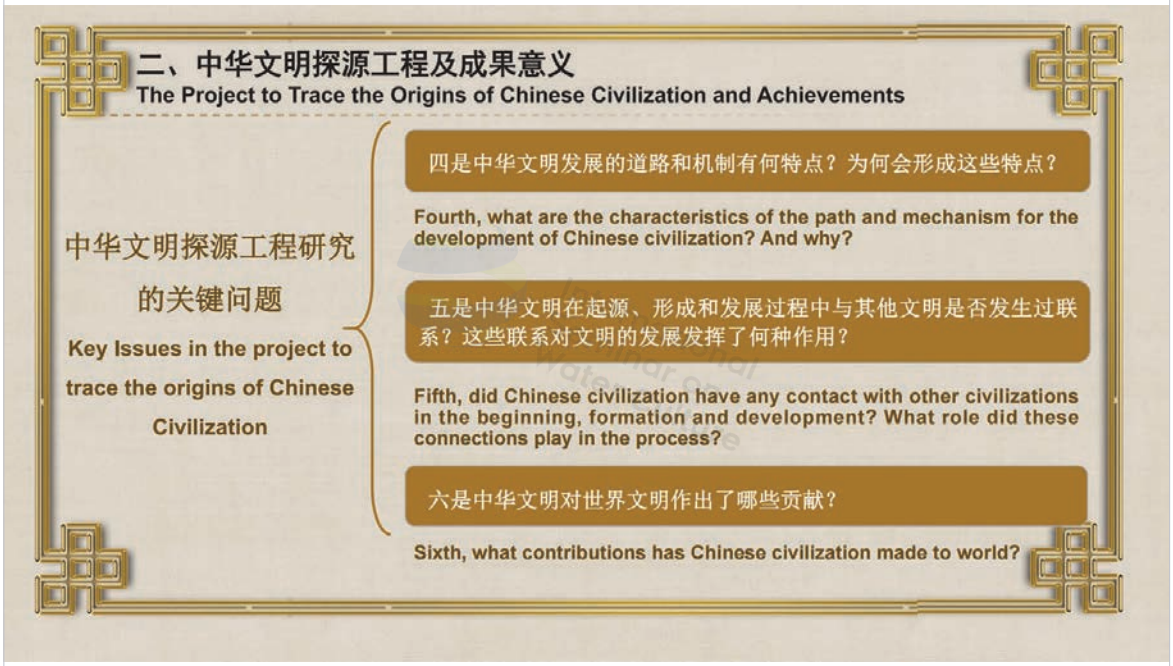
河南洛阳偃师二里头遗址，中华文明探源工程首批重点六大都邑之一。

The Erlitou site in Yanshi, Luoyang, Henan Province, one of the first six major city sites of the project.

河南郑州大师姑夏代城址，是中国已发现的唯一一座二里头文化城址，填补了中国夏代城址考古的空白。

The Dashigu City of the Xia Dynasty in Zhengzhou, Henan, is the only city site of Erlitou cultural found so far in China, filling in the archaeological gap among the discoveries of Xia Dynasty city sites in China.


二、中华文明探源工程及成果意义
The Project to Trace the Origins of Chinese Civilization and Achievements
中华文明探源工程研究的关键问题
Key Issues in the project to trace the origins of Chinese Civilization
一是中华文明是何时形成的？有多久的历史？
First, when was Chinese civilization formed? How old is it?
二是中华文明是如何起源、形成和发展的？为何会经历这样的过程？导致这一过程的原因和机制是什么？
Second, how did Chinese civilization originate, form and develop? And why? What are the reasons and mechanisms behind?
三是中华文明从多地起源到中原王朝引领的一体化是如何形成的？为何会形成这样的格局？
Third, how was the Chinese civilization shaped from multiple origins to the integration led by Central Plains dynasties? Why did it come into being such pattern?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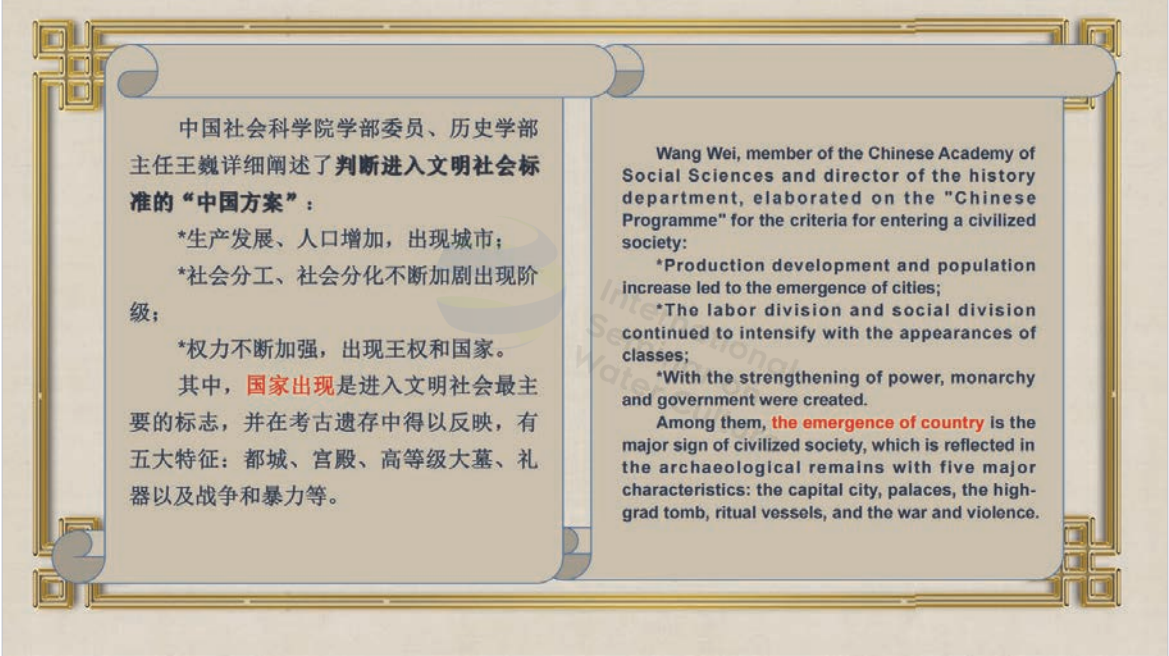
Key Issues in the project to trace the origins of Chinese Civilization
四是中华文明发展的道路和机制有何特点？为何会形成这些特点？
Fourth, what are the characteristics of the path and mechanism for the development of Chinese civilization? And why?
五是中华文明在起源、形成和发展过程中与其他文明是否发生过联系？这些联系对文明的发展发挥了何种作用？
Fifth, did Chinese civilization have any contact with other civilizations in the beginning, formation and development? What role did these connections play in the process?
六是中华文明对世界文明作出了哪些贡献？
Sixth, what contributions has Chinese civilization made to world?



中国社会科学院学部委员、历史学部主任王巍详细阐述了**判断进入文明社会标准的“中国方案”**：

*生产发展、人口增加，出现城市；

*社会分工、社会分化不断加剧出现阶级；

*权力不断加强，出现王权和国家。

其中，国家出现是进入文明社会最主要的标志，并在考古遗存中得以反映，有五大特征：都城、宫殿、高等级大墓、礼器以及战争和暴力等。

Wang Wei, member of the Chinese Academy of Social Sciences and director of the history department, elaborated on the "Chinese Programme" for the criteria for entering a civilized society:

*Production development and population increase led to the emergence of cities;

*The labor division and social division continued to intensify with the appearances of classes;

*With the strengthening of power, monarchy and government were created.

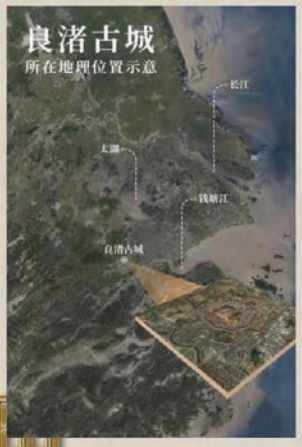
Among them, the emergence of country is the major sign of civilized society, which is reflected in the archaeological remains with five major characteristics: the capital city, palaces, the high-grad tomb, ritual vessels, and the war and violence.

三、重要考古遗址中的水利

Water Conservancy in Core Archaeological Sites

三、重要考古遗址中的水利

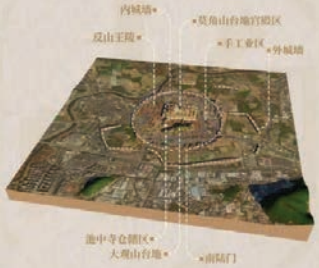
Water Conservancy in Core Archaeological Ruins



2019年7月6日，良渚古城遗址在第43届世界遗产大会上成功列入《世界遗产名录》，得到国际上的认可。这是中国第一次取得新石器时代文明遗址的重大考古成果，使中国文明史的出现时间得到进一步伸延，也意味着中国5000年文明有了强有力的历史遗迹支持。

On July 6, 2019, the ruins of Liangzhu Ancient City was declared a World Heritage Site at the 43rd World Heritage Conference and was recognized internationally. This is the first time that China has achieved major archaeological achievements in Neolithic civilization sites, which has extended the time of the emergence of Chinese civilization, and also offers a strong support for China's 5,000-year-old civilization.

良渚古城遗址 Liangzhu Ancient City Ruins



良渚古城遗址位于浙江省杭州市，距今5300～4300年，有长1800米、宽1500米、面积近300万平方米的内城和面积达800万平方米的外城，以及长3.5公里、宽十几米、高数米的大型水坝，其工程量在全世界同时期的建筑中是首屈一指的。

Located in Hangzhou, Zhejiang Province, the site of Liangzhu Ancient City can be traced back to 5,300 to 4,300 years ago. It has an inner city of nearly 3 million square meters with a length of 1,800 meters, a width of 1,500 meters, an outer city covering an area of 8 million square meters, and a large dam with a length of 3.5 kilometers, a width of more than a dozen meters, and a height of several meters. In terms of the size of the project, it is second to none in the world at the same time.

良渚古城遗址 Liangzhu Ancient City Ruins

水利系统是良渚文明的重要标志，也是申遗的重要组成部分；是中国迄今发现的最早的大型水利工程遗址，也是世界上迄今发现的最早的堤坝系统之一。

The water conservancy system is the symbol of the Liangzhu civilization and the important part to apply for the list of world heritage. It is the earliest large-scale water conservancy site found in China and one of the earliest in the world so far.

良渚古城遗址 Liangzhu Ancient City Ruins

良渚古城外围水利工程是人类历史上最早的复杂的大型水利设施，是以自然山体为依托，在两山谷口之间，以南北为走向，用黄土夹杂草裹泥修筑的两组堤坝。

The peripheral water conservancy project of Liangzhu Ancient City is the earliest complex large-scale water conservancy facility in human history. Based on the natural mountain body, it was located between the two valley mouths from the north to south, consisting of two sets of dams built with loess mixed with grass-wrapping-mud.

其伟大之处在于它是一个中小流域性水利系统，将良渚古城外围的水利工程与古城内外水网相联通，发挥其防洪、拒咸蓄淡、运输、调水、灌溉等功能，成为迄今考古发现的东亚地区最早国家形成的重要标志。

Its greatness lies in the fact that it is a small and medium-sized basin-based water conservancy system, connecting the peripheral water projects with the networks inside and outside the city to serve for flood prevention, fresh water storage, transportation, water diversion, irrigation and others. It becomes an important symbol of the formation of the earliest countries in the East Asia that have been archaeologically discovered so far.

良渚古城遗址 Liangzhu Ancient City Ruins

良渚老虎岭水坝剖面
Liangzhu Laohuling Dam Profile

草裹泥是将泥块（淤泥或黄土）用草料（芦苇或茅草）包裹，再用芒条、苇条或篾条绑扎，制作成的水工构件。春秋战国时期在黄河河工工程、都江堰水利工程中出现了类似的河工或水工构件和建筑。良渚文化将水利工程建筑及结构材料的起源向前延长了两千年。

Grass-wrapping-mud is a hydraulic component made by wrapping clod (sludge or loess) in grass (reed or thatch) and tying it with awns, reed canes or bamboo strips. Similar components were found in buildings and water conservancy projects such as the Yellow River engineering project and the Dujiangyan Water Irrigation Project during the Spring and Autumn and the Warring States Period. The Liangzhu Culture extended the origins of building and structural materials for water conservancy engineering for another two thousand years.

良渚古城遗址 Liangzhu Ancient City Ruins

良渚遗址代表了中华文明起源阶段稻作农业的最高成就，并经由它所代表的良渚文化对其后五千年的中华文明发展拥有广泛而深远的影响。

The Liangzhu site represents the highest achievement of rice farming in the beginning of Chinese civilization, and Liangzhu culture has a broad and far-reaching impact on the development of Chinese civilization in the next five thousand years.

良渚古城遗址 Liangzhu Ancient City Ruins

认识 Knowledge

一是良渚水利工程的建造从一个侧面印证了良渚时期的社会已具备了国家形态。

First, the construction of the Liangzhu Water Conservancy Project confirmed that the society in the Liangzhu period was governed as a state.

良渚城水利设施包括环城河、内城沟渠、高台（避水），构成城河与外河联通，具有水运交通、防洪、供水与排水等综合功能的水利体系

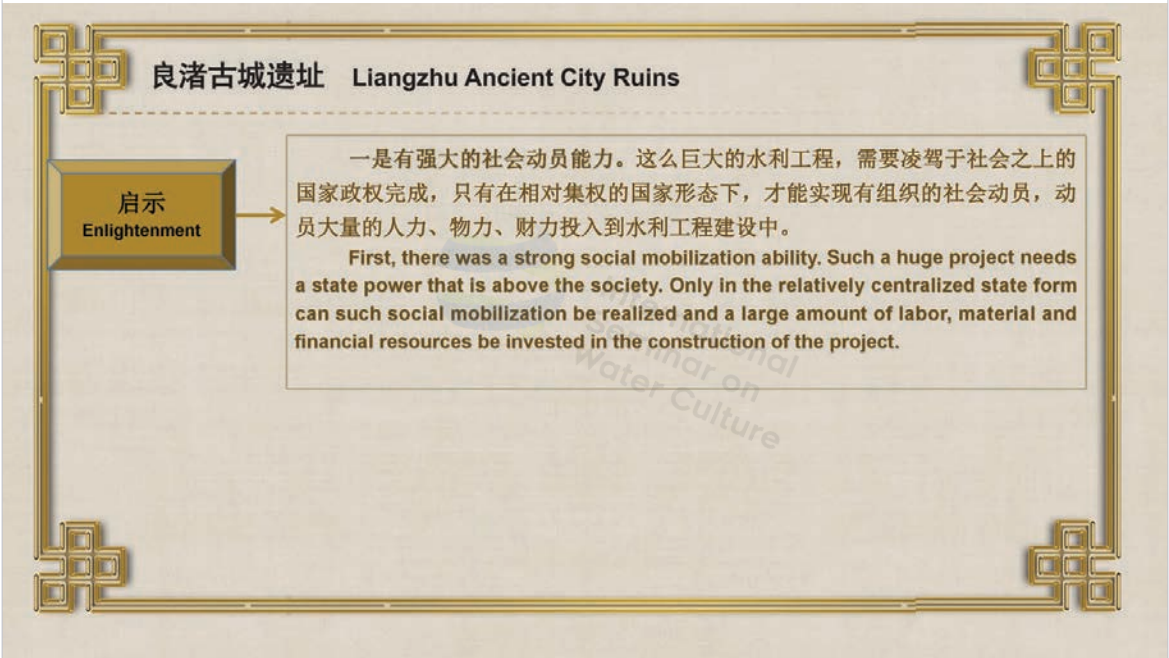
Liangzhu water conservancy facilities include moat, inner city ditches, high platforms (for sheltering), forming a system that connects moat with external rivers to serve for water transportation, flood prevention, water supply and drainage.

外围水利工程体系，构成城市应对来自下游太湖、钱塘江洪水的最后防线

The peripheral water conservancy system constitutes the last line of defense against floods from Taihu Lake and Qiantang River in lower reaches.


良渚古城遗址 Liangzhu Ancient City Ruins
认识
Knowledge
二是良渚水利工程的运用彰显着良渚古人与自然和谐共处的发展观念，山水林田湖海的综合治理，展现出世界同期罕见的治理水平。水利系统起到灌溉、泄洪、防潮、运输、调节水位的作用，既能趋利避害，又兼得山泽之利，使得良渚古城的文明之花得以绽放。
Second, the application of the Liangzhu Water Conservancy Project highlights the concept of harmonious coexistence between Liangzhu ancients and nature. The comprehensive management of landscapes, forests, fields and lakes shows the rare level of governance in the world at the same time. The system played the role of irrigation, flood discharge, protection against the tide, transportation, and water level adjustment, which helped to benefit from nature and avoid harm, so that the civilization in the ancient city of Liangzhu bloomed.


良渚古城遗址 Liangzhu Ancient City Ruins
认识
Knowledge
三是良渚水利工程保护了城址、宫殿、墓地、祭坛、村落、田地，促进了良渚文化乃至长江下游环太湖区域文化的发展，迈出了从荒蛮的史前期踏入文明社会的脚步。
Third, the Liangzhu Water Conservancy Project protected the city, palaces, cemeteries, altars, villages, and fields, promoted the development of the Liangzhu culture and even that of the lower reaches of the Yangtze River around the Taihu Lake region, and took the step from the barbaric prehistoric period to a civilized age.


良渚古城遗址 Liangzhu Ancient City Ruins
启示
Enlightenment
一是有强大的社会动员能力。这么巨大的水利工程，需要凌驾于社会之上的国家政权完成，只有在相对集权的国家形态下，才能实现有组织的社会动员，动员大量的人力、物力、财力投入到水利工程建设中。
First, there was a strong social mobilization ability. Such a huge project needs a state power that is above the society. Only in the relatively centralized state form can such social mobilization be realized and a large amount of labor, material and financial resources be invested in the construction of the project.


良渚古城遗址 Liangzhu Ancient City Ruins
启示
Enlightenment
二是有极强的社会分工和管理能力。水坝的选址规划、地基处理、建坝材料、结构设计需要有不同的社会分工的人力，水利系统要起到灌溉、泄洪、运输、滩涂围垦、调节水位的作用需要融入管理的因素，说明良渚时期的社会分工已满足建造庞大水利工程的需要。
Second, there was a high level of social division of labor and management. The site selection, planning, foundation treatment, dam construction materials, and structural design of dams require different talents. The water conservancy system should play the role of irrigation, flood discharge, transportation, beach reclamation, and water level adjustment, which demands integrated management. All these indicate that the social division of labor in the Liangzhu culture period has met the needs of building huge water conservancy projects.

良渚古城遗址 Liangzhu Ancient City Ruins

风起东方，钱江潮涌，弦歌浩荡。2023 年9月23日晚，在第19届亚洲运动会开幕式上，来自良渚古城遗址的“文明之光”，点燃象征亚洲大团结的体育之火，源远流长的中华文明与激情洋溢的体育盛会交相辉映。

The wind rises in the east, the tidal surge of the Qianjiang River, the mighty string song. On the evening of September 23, at the opening ceremony of the 19th Asian Games, the "light of civilization" from the ancient ruins of Liangzhu ignited the fire of sports, which symbolized the great unity of Asia. The ancient Chinese civilization and the passionate sports event added radiance to each other.

陶寺遗址 Taosi Site

陶寺遗址 Taosi Site

陶寺遗址，位于山西省襄汾，距今4300年，是中国黄河中游地区以龙山文化陶寺类型为主的遗址，是中原地区龙山文化中规模最大的遗址之一。有规模空前的城址、与之相匹配的王墓、世界最早的观象台、气势恢宏的宫殿、独立的仓储区、官方管理下的手工业区。

Located in Xiangfen, Shanxi Province, the Taosi Site can be traced back to 4,300 years ago. As a site representing Longshan Culture in the middle reaches of the Yellow River, it is one of the largest in the Central Plains. It has an unprecedented scale city site, matching royal tombs, the world's earliest observatory, magnificent palaces, independent storage areas, and handicraft districts under official management.

陶寺遗址 Taosi Site

陶寺遗址已经具有完备的都城功能，进入早期文明社会，成为中华文明的重要基石。

As a mark of early civilized society, the Taosi site displays a complete capital city, becoming a key cornerstone of Chinese civilization.

陶寺观象台 Taosi Observatory

陶寺遗址 Taosi Site

陶寺城址布局示意图 The layout of the Taosi site

陶寺城址作为都城，选址规划时考虑了水资源分布、水资源利用，建造使用期间修筑了水利工程和水灾害控制工程。

As a capital city, Taosi site was planned with a view to the distribution and utilization of water resources, and built together with water conservancy and flood control projects.

陶寺遗址 Taosi Site

陶寺遗址的水利因素：
Hydraulic factors at the Taosi site :

一是陶寺早期城址的水资源利用。都城在选址时充分考虑了对河流的利用。
One is the utilization of water resources in the early period of Taosi culture. The use of the river was taken full account for the sitting of the capital.

陶寺遗址 Taosi Site

陶寺遗址的水利因素：
Hydraulic factors at the Taosi site :

二是陶寺中期城址的供水与排水系统。陶寺中期加大了对城南手工业区和城北普通居民区的生产生活用水的供应，同时更加注重对宫城污水排泄和防洪系统的建设。
The other is the water supply and drainage system at the Taosi site in the middle period (ca.2100-2000BCE). This period saw an increase of water supply for production and domestic use in the craft production districts of the south city and the commoners' dwelling area of the north city, and an enhancement of the sewage drainage and flood control system for the palace enclosure.

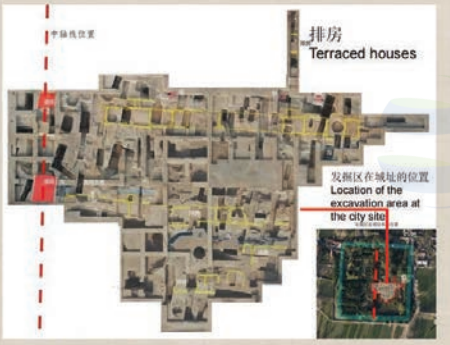

陶寺遗址 Taosi Site
陶寺遗址的水利因素：
Hydraulic factors at the Taosi site :
三是大城的洪水导流系统。陶寺中期城址外东北的小北沟较直，解决了山洪直接入城的隐患。
And last, the flood diversion system of the whole city. Xiaobeigou, or the small north ditch, in the northeast outside the city site of the Middle Period is relatively straight, which removed the hidden danger of direct attacks of mountain torrents.


陶寺遗址 Taosi Site
认识
Knowledge
一是在城址选址方面，已经知道对水的趋利避害，体现了“以水定城”理念。
First, in terms of the location of the city site, they already knew about drawing advantages and avoiding disadvantages of water, which embodies the concept of "setting up urban development based on the local water system and conditions".


陶寺遗址 Taosi Site
认识
Knowledge
二是在古城内人工修筑了完善的引水、排水、排污系统，充分体现了供水在引导古城生产力空间布局方面的作用。
The second is to build a complete water diversion, drainage and sewage system in the ancient city, which fully reflects the role of water supply in guiding the spatial layout of the productivity of the city.


陶寺遗址 Taosi Site
陶寺遗址创造了中原地区龙山文化的陶寺类型，全面拥有文明起源形成的要素和标志，对于探索中国古代文明的起源和尧舜时代的社会历史具有重要意义。陶寺遗址的水资源利用和水灾害控制也是文明起源要素和标志的重要组成部分。水管理在陶寺遗址中占有举足轻重的地位！
The Taosi site created the Taosi pattern of the Longshan culture in the Central Plains region. It boasts all the elements and symbols of the origin of civilization, which is of great significance for exploring the origin of Chinese civilization and the social history of the period of Yao and Shun. The use of water resources and the control of water disasters at the Taosi site are also important elements and signs of the origin of civilization. Water management plays a pivotal role in the site!

平粮台古城遗址 Pingliangtai Ancient City Site



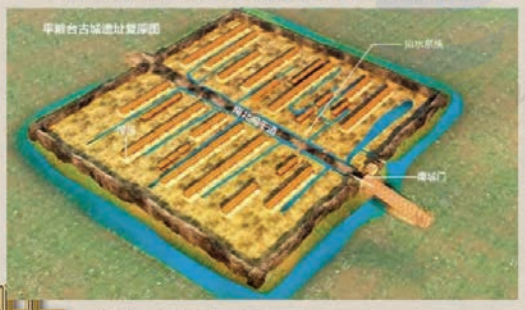
平粮台古城遗址
Pingliangtai Ancient City Site

平粮台古城遗址，位于河南省淮阳县，距今4600多年，是中国新石器时代晚期龙山文化城址，是我国目前发掘出土年代较早的一座古城址。遗址平面方正规整，内部中轴对称，在城市发展史上具有里程碑意义。

Pingliangtai Ancient City Site, located in Huaiyang County, Henan Province, dating back to 4,600 years ago, is the city site of the Late Neolithic Longshan Culture in China, and the Earlier city site excavated in China to date. It is square in shape and symmetrical in layout. It is a milestone in the history of urban development.

平粮台古城遗址 Pingliangtai Ancient City Site

在平粮台古城遗址，发现了迄今为止中国最早的城市排水系统，涵盖城内居址日常排水、城墙排涝和城门通道排水。城门及城内发现的多处陶水管排水设施，为研究早期城市的水资源管理系统发展提供了重要线索。



平粮台古城遗址复原图
Restored map of the Pingliangtai ancient city

At the Pingliangtai site, the earliest urban drainage system in China to date was discovered, including the daily drainage for the city residence, city walls and the city gate passage. Multiple ceramic water pipes earthed at the gate and in the city provide important clues for the study of the water resource management in the early city.

平粮台古城遗址 Pingliangtai Ancient City Site

在南城门东侧的城墙内，新发现的两组陶质排水管道，每组排水管道皆有一定坡度，城内高于城外。城内连通水沟或洼地，城外通过沟渠排向外侧壕沟。

Inside the wall on the east side of the South Gate are two newly discovered sets of ceramic pipes, each arranged on a certain slope which are higher in the city than outside. Inside, they are connected to ditches or low-lying areas, and discharge through ditches to moats outside the walls.

平粮台古城遗址 Pingliangtai Ancient City Site

平粮台遗址出土的管道
Pipeline unearthed from Pingliangtai Site

这个遗址发掘的陶质管道，不管是城内还是城门城墙处用的，都是35～45厘米长的直筒形，壁厚和表面拍制纹饰相似，是标准化产品。

The ceramic pipes excavated at this site, whether those laid within the city or at the walls and gate, are straight cylindrical shapes of 35 to 45 cm in length, with similar wall thickness and pat-prints, suggesting they were standardized products.


平粮台古城遗址 Pingliangtai Ancient City Site
认识
Knowledge
一是平粮台古城遗址的城市排水系统规划完备，布局合理。古城遗址排水系统，充分考虑了城市的布局和外部的地理环境，既考虑排水设施与城市内部道路的关系，又考虑排水管道与城墙、城门的关系；既考虑各个房屋（房后坡脚下的陶水管道）的排水需求，又考虑到房屋到街道水沟的排水要求。
First, the urban drainage system of Pingliangtai ancient city site is well planned and reasonably laid out. The system fully considered the layout of the city and the external geographical environment, not only the relationship between the drainage facilities and the internal roads of the city, but also the relations between the pipes and the walls and gates. Moreover, it took both the drainage demands of each house (the pipes at the foot of the rear slope of the house) and that from houses to the street ditches.


平粮台古城遗址 Pingliangtai Ancient City Site
认识
Knowledge
二是水利技术器具——陶水管的使用对后代的影响至深。陶质排水管道技术在平粮台古城最早出现，从商周沿用到秦汉，甚至在汉长安城还可以看到节节相扣的陶质水管。
Second, the use of water conservancy equipment— ceramic water pipes — has a profound impact on future generations. Ceramic drainage pipe technology first appeared in Pingliangtai ancient city was adopted from the Shang and Zhou to the Qin Dynasties. Even in the Chang 'an City of Han Dynasty were found such pipes with interlocking segments.

平粮台古城遗址 Pingliangtai Ancient City Site

平粮台古城出土的各类遗存，从不同层面展现了中原龙山文化的地理优势和文化特质，是新石器时代末期各区域文明交汇融合的集中体现。中国最早的城市排水系统为研究我国古代城市的出现及其所呈现的文化特质有着重要的学术价值和意义。

平粮台古城排房地基
Pingliangtai Ancient City Terraced-houses Foundation

The various relics unearthed in Pingliangtai site show the geographical advantages and cultural characteristics of the Central Plains Longshan culture from different levels, which is an epitome of the integrated civilizations in various regions at the end of the Neolithic period. The earliest urban drainage system in China has important academic value and significance for the study of the emergence of ancient cities in China and their cultural characteristics.

鸡叫城遗址 Jijiaocheng Site

鸡叫城遗址
Jijiaocheng Site

鸡叫城遗址，位于湖南省常德市，距今5200~4000年，是新石器时代的古遗址。鸡叫城呈圆形，东西长约480米，南北宽约460米，总面积约22万平方米。

Dating back to 5200 to 4000 years ago, Jijiaocheng Site is a Neolithic city site in Changde City, Hunan Province. The site is roughly round, about 480 meters long from east to west and 460 meters from north to south, covering a total area of 220,000 square meters.

鸡叫城遗址 Jijiaocheng Site

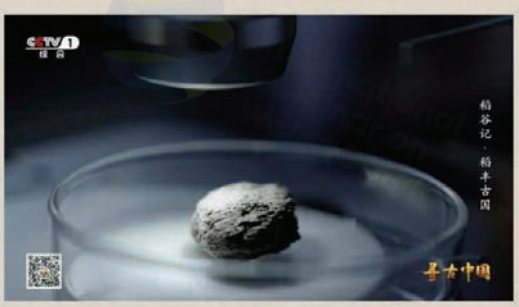
4700多年前，鸡叫城遗址二重、三重环壕之间及三重环壕以外，是稻作的主要区域。这里，平行水渠与环壕构成水网，形成完整的灌溉系统。

More than 4,700 years ago, the area between the second and third layer of moats and that beyond the third were the main region for rice cultivation. Here, parallel canals and ring moats consist a water network, acting as a complete irrigation system.

鸡叫城遗址 Jijiaocheng Site

可以推断，鸡叫城已经迈入稻作农业社会。

It can be inferred that Jijiaocheng had entered the rice farming society.



鸡叫城遗址出土的稻谷慷堆积层样本

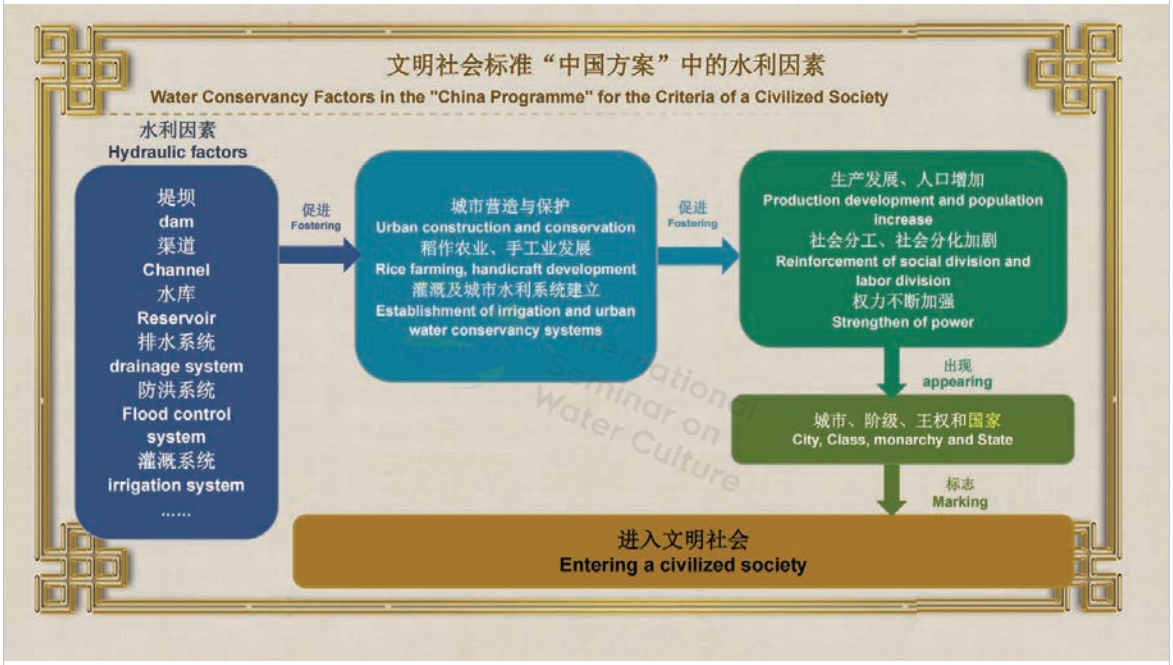
Sample of the stack layer of rice chaff unearthed at the Jijiaocheng Site

四、早期水利文明的作用和影响

Role and Influence of Early Water Conservancy Civilization


四、早期水利文明的作用和影响
Role and Influence of Early Water Conservancy Civilization
早期形态水利灌溉渠系
Early forms of water conservancy irrigation canals
促进
Fostering
农业文明的起源与发展
Origin and development of agricultural civilization
石家河遗址
Shijiahe Site
良渚水利系统
Liangzhu Water Conservancy System

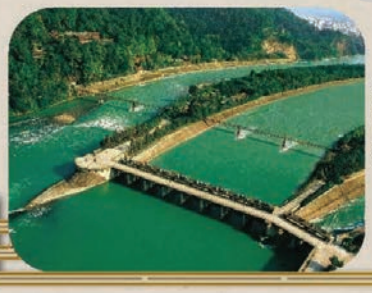

四、早期水利文明的作用和影响
Role and Influence of Early Water Conservancy Civilization
城市排水系统和排水陶管的运用
Application of urban drainage systems and ceramic pipes
促进
Fostering
城市水资源的管理
Management of urban water resources
平粮台遗址排水陶管
Ceramic drainage pipes at Pingliangtai Site


文明社会标准“中国方案”中的水利因素
Water Conservancy Factors in the "China Programme" for the Criteria of a Civilized Society
水利因素
Hydraulic factors
提坝
dam
渠道
Channel
水库
Reservoir
排水系统
drainage system
防洪系统
Flood control system
灌溉系统
irrigation system
.....
促进
Fostering
城市营造与保护
Urban construction and conservation
稻作农业、手工业发展
Rice farming, handicraft development
灌溉及城市水利系统建立
Establishment of irrigation and urban water conservancy systems
促进
Fostering
生产发展、人口增加
Production development and population increase
社会分工、社会分化加剧
Reinforcement of social division and labor division
权力不断加强
Strengthen of power
出现
appearing
城市、阶级、王权和国家
City, Class, monarchy and State
标志
Marking
进入文明社会
Entering a civilized society

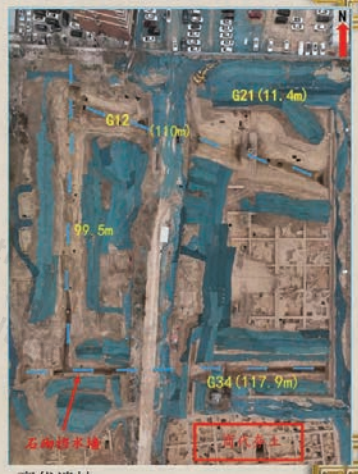

结语 Conclusions
● 水利是早期中华文明起源、孕育的重要因素
● Water conservancy is an important factor in the origin of early Chinese civilization.
北京
河北
山东
江苏
杭州
京杭大运河
Beijing-Hangzhou Grand Canal

结语 Conclusions

- 水利是孕育早期中华文明的重要因素
- Water conservancy is an important factor in the early Chinese civilization.
- 水利文明对中华文明的发展产生巨大的影响
- Water conservancy civilization has a huge impact on the development of Chinese civilization



都江堰
Dujiangyan Irrigation System



商代遗址
Shang Dynasty Ruins

结语 Conclusions

- 水利是孕育早期中华文明的重要因素
- Water conservancy is an important factor in the origin of early Chinese civilization.
- 水利文明对中华文明的发展产生巨大的影响
- Water conservancy civilization has a huge impact on the development of Chinese civilization
- 未来中国，水利依然是文明发展的重要保障
- In the future, water conservancy will remain an important guarantee for the development of civilization in China.

南水北调中线工程“水龙头”——陶岔渠首枢纽
Taocha Canal Headworks – The ‘stopcock’ of the South-to-North Water Diversion Middle Route Project


扎实推动新阶段水利高质量发展
全面提升国家水安全保障能力
Making solid progress toward high-quality development of water management in the new era, comprehensively upgrading the capacity of ensuring national water security.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Thank you
for your attention!
秦始皇陵青铜鹤 (Qin Dynasty)