A postscript (notes and images)

WATER

Individuals who invoke the term "Silk Road" may have wondered at one time or another what it really might mean. What Ferdinand von Richthofen meant when he coined the term is clear enough, but over time the concept he enunciated in a very specific sense has morphed into a kind of catch-all term that often has nothing to do with historic exchange across the Old World (whatever geography and chronology that term itself might imply). Readers of this journal may indeed wonder about its title, given how widely its content has ranged over the years. It is commonplace to invoke the past in the cause of contemporary concerns, but unfortunately too often the term "Silk Road" bears no relationship whatsoever to the historical realities it implies.

Not to be deterred here by such words of caution and stimulated by two recent news articles, I am going to risk putting down a few "notes for a future project" which may or may not (if it is ever completed) be graced with the words "Silk Road" in its title. Suppose we were to start a new history of the Silk Road with an emphasis on water. Might it in fact be the guiding thread that could tie together in some coherent way much of what we might like to say about culture and exchange in the Old World, if those really constitute our subject?

The first of the news items is not news for anyone who has been reading about climate change and its consequences. On 18 January 2018, *The New York Times* published an article by Somini Sengupta entitled "Warming, Water Crisis, Then Unrest: How Iran Fits an Alarming Pattern." At the head of the piece was a dramatic picture of Lake Urmia, in northwestern Iran, which, as the caption indicated, has lost some 90% of its water since the 1970s. The picture very much reminds us of what we have been seeing in recent decades about the near disappearance of the Aral Sea. Both of these bodies of water, of course, lie along some of the historic routes of travel and settlement which we normally include in our thinking about the Silk Road. The point of Sengupta's article was to emphasize how the looming water crisis, which can be documented for many other places as well, is already igniting political unrest and has the potential to tear apart even the fragile remains of stability in many heavily populated areas of the world. Moreover, the looming crisis is to be connected with ill-advised policies of political elites, investing in dam building and other mega-projects that may produce short-term financial benefits but at the expense of future generations. Without water, the historic "silk routes" could not have existed, and now huge areas along them are threatened with becoming uninhabitable.

The second recent news item, brought to my attention by Victor Mair, was a short article in *Newsweek* (linked to the academic report) on 3 January 2018 summarizing new research by archaeologists at a site called Mohuchahoangoukou in the Yangqi Basin, a region nestled in the foothills of the Tian Shan mountains northwest of the Turfan Depression in the Xinjiang-Uighur Autonomous Region. The task the authors set was to try to locate evidence that would shed light on the early history of the development of irrigated agriculture in that arid region, evidence which might then address the disputed question of what possible influences were responsible for its emergence (Li et al. 2017). Strikingly, imaging from drones revealed a complex network of canals and other dry-land farming features. Ground survey confirmed the fact that at least in the one smallish region studied, there was a rather sophisticated infrastructure that supported intensive farming, the site datable to approximately the 3rd–4th century CE. In other words, it is evidence from a place and time that lie in the center of what we conventionally consider belongs to Silk Road history. Only at the end, and very cautiously, the authors suggest that possibly those who were responsible for the agriculture at this site may have been influenced by (or even came from) areas further to the west, where similar dry-land farming techniques were known to have been highly developed. At very least, the new study questions the claims that have often been made in Chinese scholarship that settled agriculture in Inner Asia must have come in the wake of Chinese expansion into the region.

A similar set of questions underlay a recent study done by Arnaud Bertrand (2012) concerning the tanks (open reservoirs) which have been documented at the famous Silk Road site of Niya. Bertrand hypothesizes that the possible inspiration and technical know-how for introducing such a system of water collection and storage, came from South Asia at the time when Niya was part of the Kushan Empire.

Capturing and directing water from stream or river flow is, of course, only part of the story here. In her article in the current volume on caravanserais in the Mongol Golden Horde, Emma Zilivinskaia notes their proximity to water sources, including the equivalent

of the tanks or cisterns known from other regions. When streams dry up, collecting runoff from seasonal rainfall may be essential. Wells and underground channels called *karez* or *qanat* are amongst the sources which have long been studied (and, one might add, are now under threat as reservoirs of groundwater are being drained to feed burgeoning populations and in the service of often wasteful agricultural projects). Some years ago in this journal, Bertrand (2009) summarized information about such systems as documented from the Turpan region and from comparative work in the Middle East (see also Trombert 2008).

Clearly if we are to learn more about water availability and management historically, the most modern scientific analytical tools must be brought to bear. Satellite imaging has been applied already in studying the situation in Niya, in the important Murghab delta region at Merv (Padwa and Stride et al. 2004), and in the area around the fortress of Resafa, in the eastern Syrian desert. Palaeoclimate data based on sampling of glacial ice cores has suggested a correlation between the demise of Niya and climate change which dried up its river (Yang et al. 2004).

For Resafa, the recent detailed analysis includes techniques for determining porosity of different soils, modeling to predict the amount of run-off from rain during different seasons of the year, extrapolations from modern climate data to arrive at reasonable estimates regarding climate in earlier centuries, and more (Beckers 2012; Beckers and Schütt 2013). Excavation data, even if very selective, has demonstrated the existence of dikes and dams from early times. Much more needs to be done to analyze organic remains and other kinds of evidence that may help confirm chronologies. The result so far confirms that the huge cisterns at Resafa, dating from the period when it was a late Roman/Byzantine fort and continuing to be used under Islamic occupation, would have supplied enough water from the collection of run-off during the rainy season to maintain a sizeable population during an entire year of little rainfall that might follow. There is interesting comparative analysis of the evidence from Resafa with that from Petra, another dry-climate site that was hugely important for early trade in Asia and could not have existed without sophisticated management of water resources. As Renato Sala reminds us though with reference in part to his studies of irrigation in Kazakhstan: "Most probably simple techniques of surface water use were invented independently in several places of the world: everywhere they started on alluvial plains as devices for the diversion of seasonal floods from cultivable areas back to the river; and then evolved by directing the drainage channels across dry areas that, water-fed by the sides, were reclaimed to cultivation" (Sala n.d., p. [2]).

To focus on management of water resources that are essential for basic survival and settled agriculture is only part of the story, of course. While it is common to think that nomad pastoralists "followed the grass" with their herds, of course they were also following the water. Seasonal movement thus might be quite localized, moving from winter camps in lowlands to summer pastures in the mountains, where water from snow melt might in fact be quite abundant and there would be sufficient rainfall for the mountain pastures. Camps naturally would be located near water sources, but even so some minimal "engineering" through the digging of ditches or the like might be undertaken. Many pastoral communities also practiced a certain amount of agriculture. None of this would have required borrowing, even if some interaction with the outside world might have been the norm, important exchange taking place along the "steppe roads" or, in Michael Frachetti's recent formulation (2012), the "Inner Asian Mountain Corridor."

Water management might also require high levels of engineering skill and the marshalling of resources that would be beyond the means of small, local communities and individual actors. Aqueducts, dams, dikes, tunnels or canals are important big ticket projects whose visibility has undoubtedly overshadowed the evidence which is harder to come by concerning local communities. Some technologies, such as the use of animals or water wheels to raise water from wells or from a river bed to higher surrounding banks, might easily have been conceived and employed without external inputs. In fact, if water is to be our guiding thread here, it is woven into a tapestry of considerable complexity. Projects on different scales may in fact serve different purposes specific to one society or polity but not to be observed in the same way in another (Kamash 2012). Water-powered mills to grind grain might be fairly simple, but devising the mechanisms and employing them in order to cut stone might demand a different level of knowledge and in any event be irrelevant in societies where mud brick, rather than stone was a basic construction material (itself requiring access to water). The public fountains and baths of Imperial Rome are an example not emulated everywhere. Techniques for carrying water in Hellenistic times left a considerable legacy, but were overlaid by grandiose Roman projects based on different approaches to engineering. Both left their imprint on the Sasanian and Islamic Middle East, but at some remove. Nabataean Petra, "at the hub of a vital region of the Near East" (Ruben 2003, p. xxi), illustrates well the complexity of inputs from adjoining areas.

Of course a great deal has been written about science and technology in various regions of the Silk Roads (a literature that is, I admit, still largely *terra incognita* to

me). It is clear though that without substantial new archaeologically documented evidence, and even when we have it, key questions remain to be answered regarding directions and processes of borrowing. The easy analogies in material culture from disparate locations are always tempting, but without careful chronologies and precise analysis of techniques and materials, they are hardly ever going to be conclusive.

The infrastructure supporting travel and communication is part of this history and not just what we almost take for granted about overland routes involving caravans (or in some analyses, just small parties with a few transport animals). Rivers were important highways, even (or especially) in winter when they may have been frozen. Most major cities were either on rivers or were seaports, and the location of key nodes in many cases was the point where two rivers joined or where they were most easily crossed. The engineering involved in building and maintaining ports certainly is part of this history, where some of the most famous entrepots died as their harbors silted up. Every new discovery through underwater archaeology is fleshing out the still very sketchy but hugely important subjects of maritime trade and shipbuilding technology, which most students of the silk roads have come to recognize are part of the story. Some of the most interesting evidence about the importance of river networks in the Old World comes from northeastern Europe, a region which has often been ignored in conventional treatments of the silk roads. We know now a great deal about the boat-building technologies which enabled the Vikings to travel by river and portage all the way to the Middle East (Larsson 2007).

Water and its management also focus our attention on ritual and belief, since deities may have had a particular connection with water, and ritual observance often involves water. Images of water deities have been found at early urban centers in Syria, and temples assumed to have been dedicated to Anahita are scatted through ancient western Asia. In many parts of the world, traditional rituals connected with the agricultural cycle invoke the guiding spirits of nature which ensure that the rains will come. Down to the present in Buddhist temples, ritual offerings of pure water grace the altars and water may be used to "anoint" certain images. Ablutions prior to prayer are expected of Muslims. Holy springs and wells are widespread. The ostensibly secular imagery and built environments of gardens may be evocations of Paradise, out of which, at the east of the imagined world of medieval cartographers, flowed the great rivers of civilization.

So, in a sense, water is everywhere we might look along the silk roads even if roads as such and silk may be conspicuously missing much of the time. Is there a book here? If so, surely a somewhat bizarre concoction that a wag might title "Walking on Water: an alt-History of the Silk Roads." At very least though, in analyses of the Old World exchange, water surely deserves more than a few pages.

The thousands of words that it might take to make a persuasive case here remain to be researched and written. Short of that, I invite you to consider some rather eclectic visual evidence drawn from a considerable photographic archive I have accumulated while trying to follow the "silk routes" over a good many years. I often find that visual stimuli such as sites, landscapes and objects, even as seen through the distorting lens of the present, may point to new directions for deeper inquiry into the past. Think of the images as pieces in a jigsaw puzzle, which one is only beginning to fit together but without the aid of a picture showing what it is supposed to look like when done. Connecting the edge pieces may be relatively easy, but what is in the middle promises to take a lot more time. And it may be that the last person who worked on the puzzle dropped a few of the pieces on the rug where they were vacuumed up. Perhaps, of course, this kaleidoscope of possibilities will turn out to be no more coherent than a Renaissance Wunderkammer, emblematic of a kind of undisciplined curiosity from a time long ago and far away.

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— Daniel C. Waugh
Shoreline, WA
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On the pages which follow, all photos were taken by me with the exception of the Google Earth image and the manuscript miniatures from the Harvard Art Museum, the Bibliothèque Nationale, and the David Collection.

Mountains at the Center of the Silk Roads

We might start any survey of "Silk Road geography" in the mountain knot of Inner Asia, since it is the glaciers and snow which are the source of much of the water that makes life in the lowlands possible.

Top left: the peaks of the **Tien Shan**, looking east from the slopes of Khan Tengri.

Above left, the snout of the **Baltoro Glacier,** Pakistan, where the Braldu River, a tributary of the Indus, begins.

Above: The **Kizil suu** valley in the Pamirs, probably part of the route to China famously recorded by Ptolemy.

Above and right: Two views of **Bogdo Ula** on the eastern end of the Tien Shan in Xinjiang, showing how elevation and vegetation zones are related, and the significance of the snow-melt rivers.

Above: The historic site of **Subashi** flanking the Kuqa River, nearly dry when this photo was taken in 2009.

Human settlement and water

Above: A green oasis in the high desert -- the Upper Indus valley at **Leh** in Ladakh.

Above: The barley fields lining a valley in **Tibet**.

Above: Irrigated agriculture at **Jiayuguan** in the Hexi Corridor, the water from snowmelt out of the Qilian mountains.

Left: A little oasis of a farmstead where a stream enters the **Karatash River** in the mountains south of Kashgar. In this area, pickaxe and shovel are used to channel the water into the fields where there is a precious bit of flat land in the otherwise stark terrain.

Pastoralists (a.k.a. "nomads") follow the grass but also, importantly, the water, and they may bring the water to where it is needed by digging channels or wells.

Above: A summer herder camp above the village of **Maghreb** in the Yagnob region of Tajikistan. Nearby, channels had been dug to direct spring water to small fields where oats or barley had been planted. *Above right*: A herder camp in the **East Karakol Valley,** Kyrgyzstan. *Right*: Horses watering at a well in **western Mongolia**. *Below right*: A Kyrgyz work party creating a water channel in the **Karasu Valley, Pamir-Alai Mountains**. *Below*: An "aqueduct" leading to a camp in the mountains south of Kashgar, with modern hose used to bridge the gully.

The Greeks and the Romans

In important ways technologies employed in western Eurasia for obtaining and transporting water to where it was needed were developed by the Greeks and then further refined by Roman engineering.

Delos, the sacred island of Apollo in the Aegean, was important not only as a center of religious worship but also at various times was a major trading entrepot, with a population of as much as 25,000. For its fresh water, it relied mainly on seasonal rains, which filled the many cisterns. Only at one low-lying area was there a lake, the soil moist enough today to support vegetation, where even in the dry season water could be obtained from wells.

Above: The large cistern, once roofed over, located near the theater.
Below: The site of the lake and a well located amidst the vegetation.

One of the most important cities on the Anatolian coast was **Ephesus** (Efes today, whose population center is the adjoining Selçuk). It flourished as a port until its harbor silted up and for a time played an important role in the early Christian church. Today one may be challenged to disentangle the early Greek from the later Roman layers, but everywhere there is abundant evidence of sophisticated hydraulic engineering.

The aqueducts, whose water source was in the surrounding hills, led to a cistern in town (*above*) and to a water tower (*above right*) that fed the fountains and plumbing.

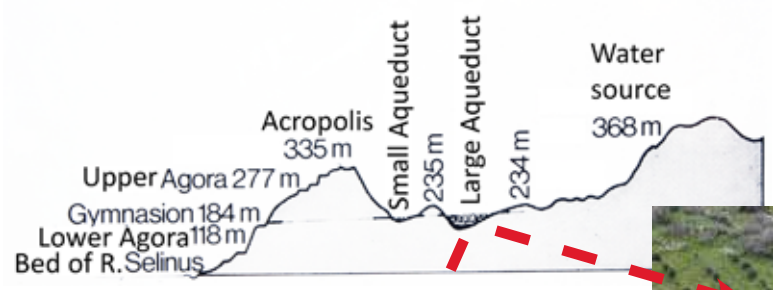
Remains of Roman aqueducts are everywhere, perhaps the most iconic being the **Pont du Gard** in France, which carried water from a source 50 km away to supply Nimes. A visitor should walk along the route the water took, now overgrown, which provides a sense of how the angle of incline from the water source was almost impossibly shallow. Yet it worked, a testimony to Roman surveying accuracy and engineering skill.

Most visitors to **Istanbul** today will see the Aqueduct of Emperor Valens and go down into one of the cisterns now known as the Yerbetan Saray. What is perhaps less well known is the extent of the old Roman and Byzantine aqueduct network, which can be traced to distant suburban hills, and the fact there were a number of other large cisterns in the city.

Above: The Yerbetan Saray.

Right: The location of what was once a huge cistern below the later Ottoman Mosque of Selim I and now occupied by a sports complex.

Pergamon (Bergama today) is another of the Graeco-Roman sites of great importance where one can appreciate the hydraulic engineering. Its Acropolis, the site of various temples, a theater and other public structures, tops out at 335 m above the River Selinus and obtained its water not from the river far below but from a spring off in the mountains at a higher elevation. A long water channel led from the spring, crossing intervening gullies on aqueducts Some of the water was directed to buildings lower down the hill; but the upper structures were supplied by pipes engineered to withstand the considerable pressure that raised the water to where it was needed.



Byzantine engineers continued the high standard of their Roman predecessors and often showed considerable ingenuity in delivering water to places that were not easy to supply. Here, on the left, the aqueduct which supplied the monastery at **Sumela** on a cliff face in a mountain valley south of Trabzon.

Above: The dated inscription at the end of the tunnel naming Valerian and Titus.

Ambitious engineering projects often were directed not at bringing the water to a place that needed it but rather keeping it away from a place that did not want it. A famous example is the nearly kilometer-long tunnel and adjoining dam built by Emperors Vespasian and Titus in the 1st century CE, at **Seleucia in Pieria**, the important harbor city serving inland Antioch that had been founded by the successors of Alexander the Great and continued to flourish under Roman rule. The hydraulic works were to divert seasonal flooding from the port and prevent its silting up, though today the area is covered with farm plots tended on the layers of sedimentary soil that evenually ended its days as a harbor town.

Though one should never exaggerate the influence of Hellenistic and Roman accomplishments east along the Silk Roads, certainly in the areas that came under their direct control, be it as far away as Greek Ai Khanum on the Oxus or much closer to home on Rome's eastern frontiers, a lot of their infrastructure remains.

On the right: Byzantine aqueducts at **Şanliurfa** (historic Edessa, now in Turkey)..

At Byzantine **Dara**, along the southern border of today's Turkey, it was crucial to collect the runoff during the winter rainy season. The house below rests on a remarkable foundation, a large cistern, and the remains of another cistern, now bereft of its vaulting, can be seen on the outskirts of town,

Even more impressive are the huge cisterns (*right*) at **Resafa** in the Syrian desert south of Raqqa but not directly on the Euphrates. The site was important as a fortress and also for the location there of a much revered Christian shrine. Even under the Umayyads it retained its importance and for a time was the residence of the caliph. The early Islamic rulers maintained the previous hydraulic system which filled the huge cisterns (their tops barely visible in the partial panorama *below*) with the seasonal rainwater, directed into them through a complex system of levees and dams.

Petra, the Nabataean capital and for a long time the arbiter of the spice trade through the Middle East, perhaps best embodies the way that idigenous and borrowed technologies were employed to enable the city to survive in a forbidding climate. Petra ran the danger of flash floods but also had to supply itself with water in an arid land where there were few springs. A diversion tunnel (analogous to the one built by the Romans at Selucia in Pieria) helped keep floodwaters out of the narrow canyon (*siq*) that provided the main access to the city. Dams were built to block flooding from intersecting wadis and also to collect water. Cisterns and channels were everywhere, and there was extensive use of ceramic pipes, sediment collection traps and connection boxes that could direct the water to more than one level where it was needed.

Right and below: a dam (upper right in picture) and cistern in front of a temple.

Lower right: cisterns at the High Place of Sacrifice.

KAREZ AND QANAT:
TAPPING GROUNDWATER

Right: A satellite image showing the wellheads of the *karez* system supplying the **TURPAN** oasis.

Below: Model in the **YAZD**, Iran, water museum showing section of a *karez*.

In the dry regions along the Silk Roads (and they were ubiquitous), every possible technique for obtaining water would be used. One of the most widespread was to dig tunnels that might extend for dozens of kilometers to tap underground water flow from neighboring hills and bring it to the lowlands for drinking and irrigation. Such *karez* (also known as *qanats*) are still widely used today in Iran, Central Asia and Xinjiang.

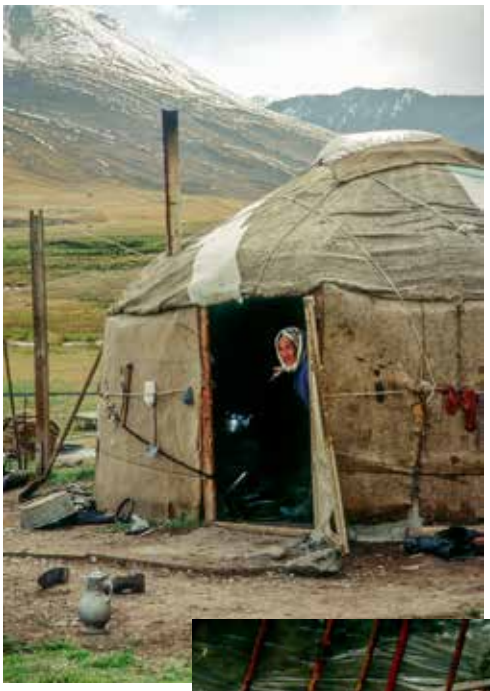
Above: A cooling tower over the entrance to a *karez* well in Yazd, with a model showing a cutaway view of such a structure. *Right*: A cistern at ground level and stairs leading down into a *karez* in the Yazd bazaar.

There were extensive networks of caravanserais criss-crossing the dry lands of the Middle East and Central Asia. All of them had to be located at a source of water, be it cisterns, wells or the occasional spring. The overland trade routes continued to flourish down to the modern era thanks in part to the considerable efforts by the Mughals and Safavids to build the infrastructure which made it possible. Here is a caravanserai at **Khojatabad** in Iran (*top photo*), facing a fortress (the picture below it). They were supplied with water from a spring.

Well water can be raised by hand, as at a textile factory in **Mandalay**, Myanmar (on the *left*), or by yoking animals to a geared system, as reconstructed *above* at the Umayyad bathhouse in the Jordanian desert at **Qusayr Amra**.

Over the centuries in much of the world, water wheels have been used to raise or direct water. One can still see a whole line of them along the Yellow River at **Lanzhou**, where once presumably they supplied much of the city's water supply via the wooden pipes that let off from the tops of the wheels. In Syria, the water wheels at **Hama** on the Orontes are famous, with wheels of different sizes raising the water to different levels and releasing it into masonry aqueducts. Near the top of the rotation, the water in the boxes on the wheel pours out into a trough on the aqueduct.

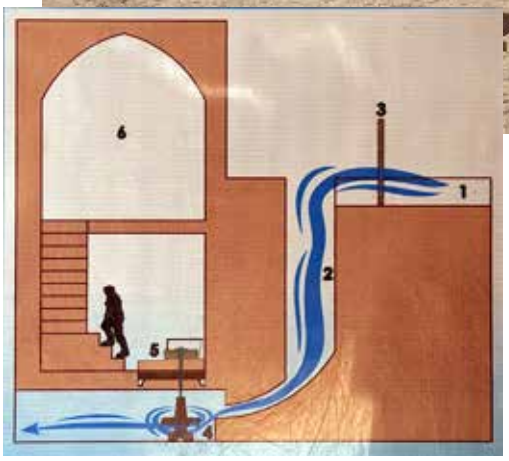
Water Power



From the time water wheels and turbines were invented, the power generated by moving water could be applied to various tasks. I encountered this in an unexpected way when riding a mountain bike along the **East Karakol Valley in Kyrgyzstan** in 1995. Stopping and being invited in for traditional hospitality, I noticed a tiny electric bulb hanging from the rafters. The host then took me out to see the small electric generator he had installed in the stream next to his camp, where he could turn on the flow of the side channel into it simply by liftng a metal plate. This was a family still herding in the pastures by horseback in the summer, but then trucking the sheep and goats via the dirt road down to the winter village at the end of the season.

The stonecutters at **Jerash**, one of the flourishing Roman cities of the Decapolis in Jordan, did not have electricity at their disposal, but they did know how to use water power. Shown here is a reconstruction based on careful study of archaeological remains, of a water-powered saw that was used to cut the stone blocks for erecting what is still a very imposing array of buildings. The saw (and nearby a pottery kiln), were located right next to the Temple of Artemis.

Mills in the mountain knot of Central Asia show a combination of traditional and modern technology. At *top left* is the ruin of a traditional mill in **Gulmit**, Hunza Valley, Pakistan, photographed in 1995. The remaining pictures are from **Mustang**, Nepal, in 2013, the mill *top right* a functioning one fed by a mill race built down through the middle of the village. *Below* one can see a similarly man-made channel leading to a wooden trough into a now disused mill building off to the right, the settlement a more remote one. At *bottom*, a woman grinds grain in the first of these mills, the millstones powered by a metal horizontal water wheel, shown underneath where she is working.



Water Mills in Iran

At **Shustar** (*top four pictures*), a Sasanian era dam diverted water from the river to a canal that led to town, where horizontal wheel mills (their workings shown in the diagram), lined each side of the waterway. At **Dezful**, vertical wheel mills were built out into a rapidly flowing section of the river, a reconstruction and one of the huge millstones shown on the *right*.

BEFORE THERE WERE SOCIAL MEDIA…

In **EPHESUS** (*top pictures*) one might meet an acquaintance at the public latrine, where wastes were flushed away by running water. In **MILETOS** (*above right*), as in most other Roman cities of note, the great public baths were the meeting place of the elite. And in the Islamic world (*right*), public baths too were an essential part of the infrastructure, here a model of the one at **BULGAR** on the Volga and (*below right*), the warm room of the bath at Islamic **GRANADA** in Spain.

And there was always the town well or pump, here **BHAKTAPUR,** Nepal, before the earthquake of 2015.

In Islam, ablutions before prayer are *de riguer*. So every mosque provides an appropriate place to wash. *Top above* shows the pool (*khauz*) in front of the Bolo Khauz mosque in **BUKHARA**, a photo from 1969. *Above right*, a man at his ablutions in the courtyard of the Great Mosque in **ALEPPO** in 2010. The ablution fountain in the courtyard of the Ulu Camii in **DIYABAKIR**, Turkey, has well-worn faucets and a sign reminding users to keep it clean.

Many Muslims also regard as holy water sources they associate with one of the prophets. At **ŞANLIURFA** (*below*), a complex with a large pool next to a spring is connected with the belief that Abraham was miraculously saved from death by the appearance of the water. The man praying here invited me to drink of the holy water. Also at Şanliurfa is a huge new complex built around an underground chamber said to be the cave of Job, and a well identified with an appropriate Quranic citation that also is connected with Job (Eyub).

Gods associated with water feature prominently in many cultures. For the Romans, public nymphaea, such as this grandiose one *on the right* at **Jerash** in Jordon, had fountains and images of water nymphs. On **Rhodes** (*below*), the Roman nymphaeum was connected with a network of grottoes through which flowed a spring.

Villas of the wealthy, such as that of Giulia Felice in **Pompeii,** not only had pools in the gardens but also their private nymphaea, decorated in this case with paintings showing "nilotic" scenes with dwarves on boats, this one carrying a load of amphorae. The painting is now in the Archaeological Museum in Naples, though other parts of the house retain paintings on the walls and can be viewed *in situ*.

On the *right* here is a bathing pool in the palace compound at **Bhaktapur**, Nepal, presided over by a gilded head of Vasuki, the snake god, and surrounded by the serpent's body.

Above: Euphrates and the river gods, a mosaic from **Zeugma** on the Euphrates.

Left: The River goddess Yamuna. *Right*: The river goddess Ganga, from **Rajasthan**, ca. 800 CE. Coll. of the Los Angeles County Museum of Art.

Left: Statue of the water goddess from ancient **Mari** in Syria. Collection of Aleppo National Museum.

Below: Remains of a vessel used to store the holy water of the River Ganges, at the Mughal palace site of **Fatehpur Sikri.**

Below: The Anahita temple, at Sasanian **Bishapur**, Iran.

Sacred springs are found in many cultures, the one here in northern Xinjiang on the way to Lake Kanas. Whether or not they are identified by a highway sign, they are often festooned with prayer offerings.

Commercial promotion of almost anything that might attract tourists should not obscure the fact that **Lake Namtso** occupies a special place in Tibetan Buddhism, the cliff overlooking it draped in prayer flags and the lake visited by pilgrims as well as the hordes of tourists.

Left: Water is important in Buddhist worship, here pure bowls of it on an altar in **Maiwasi** Temple, Aba Tibetan and Qiang Autonomous Prefecture, Sichuan.

Right: At the Shewdagon Pagoda in **Yangon**, Myanmar, "anointing" a Buddhist image at one of the stations marking the day in the week when one was born, the ritual invoking good fortune.

Water for Pleasure in Domestic Space

At the House of the Faun in **Pompeii**, a pool with a faun statue greeted visitors as they entered the garden. The original is now in the Naples Archaeological Museum along with the most famous of the objects that was in this garden, in the pavilion in the background, the mosaic depicting Alexander the Great fighting the Persian King Darius.

Domestic space in many cultures is shielded from the street, whereas the atria and porches within open onto gardens where the family can move about unobserved by outsiders. This certainly was true for the Romans, whose houses were designed to capture rainwater from the roofs into basins as shown *middle right* (a house in Pompeii) and where both painted garden scenes and real pools with dolphins (depicted swimming around the edges in the mosaics) might be seen. The house with the pool, the floor original, is a reconstructed Roman villa on the island of **Kos** in the Aegean.

Image source: Harvard Art Museums/Arthur M. Sackler Museum, Gift of John Goelet; <https://idscache.harvardartmuseums.org/ids/view/178108682?width=3000&height=3000 >

Pleasure gardens with water features were common in the Islamic world, little tastes of Paradise. *At left*: Two views of the renowned Fin Gardens in **KASHAN**, Iran. *Above*: A Mughal miniature, dated 1588, from the collection of Harvard's Art Museum. *Below right*: The Generalife at the Alhambra, GRANADA, Spain.

Boats

Here I must rely heavily on artistic representations, museum models, and but minimally on actual archaeological evidence, which can be found in, for example, the excavation reports from underwater archaeology. It is certainly of interest to see how traditional methods for boat construction are being used still, the results providing an opportunity to test the handling characteristics of vessels from much earlier centuries.

A lot can be learned if we begin with the Vikings, my examples here from the Viking Ship Museum at **Roskilde** in Denmark.

Among the most important discoveries for our understanding of 11th-century shipping in the Baltic are the boats sunk at Skudelev to block an invading fleet. Their remains, brought up out of the water, are displayed in the Roskilde museum. Careful study has made it possible to reconstruct exact replicas, those on the left being a small warship and a cargo boat (the one at the right) 14 m long that could have carried about 5 tons.

The secret to Viking ship building was the radial splitting of the logs, making it possible to construct a hull of very light weight but strong and flexible. This helps explain how the Vikings could make it through the rivers of Eastern Europe over portages to get Arab silver from the Middle East and raid Byzantium..

This late 10th century runestone found at Pilgård on the Island of **Gotland** commemorates a Viking who died on the rapids of the Dnieper River. In the collection of the Gotlands Museum.

One of the most important discoveries on the seabed was off the Anatolian coast near **Uluburun**, a ship that sank ca. 1300 BCE with varied cargo that included tin ingots (presumably from Central Asia), hippopotamus tusks, ingots of blue glass and much more. It is vivid evidence of the scope of international trade well before the opening of the so-called Silk Roads.

Shown here is a reconstruction image with a view of its contents and a display of the artifacts as they had scattered on the seabed. In the museum at Bodrum.

Common images of **Palmyra,** which flourished because of the international trade, normally focus our attention on camel caravans. This Palmyrene relief from early in the Common Era reminds us that shipping was a key to a lot of that prosperity. The city is on a main route leading east to the Euphrates, and the goods then would have traveled the river route to and from the Persian Gulf and beyond. Collection of the Palmyra Museum.

In the Indian Ocean, goods commonly would have been carried on lateen-rigged dhows like this one in the Greenwich Maritime Museum. A somewhat fanciful image of an Arab boat is in the 13th-century Paris manuscript of the *al-Maqāmāt al-ḥarīriyah.*

While we know that Muslim sailors and their boats were active on the routes all the way to China from the time of the Tang Dynasty, nautical archaeology is also revealing a great deal about the construction and cargoes of East Asian ships, some of them perhaps analogous to the ones shown in these models from the Naval Museum in Venice.

The model *on the left* shows an ocean-going junk, possibly similar to those which were on the famous voyages of the Muslim eunuch admiral Zheng He into the Indian Ocean in the early 15th century.at a time when Chinese nautical technology was still well in advance of that in Europe.

On the very large **Inle Lake** in Myanmar boats are essential transportation, the larger ones all powered by outboard motors. However, the construction techniques are traditional, with hand-sawing of the thin planks, shaping of the ribs, sealing of the seams.

In any history of the Silk Roads, **VENICE** looms large, and not merely because Marco Polo was a Venetian, even if he is emblematic of the far-flung commercial interests of the city on the lagoon at the head of the Adriatic. While Venetians did not aways dominate the Mediterranean and Black Sea trade to the East, they were among the key players even as Venice began to decline in the 16th and 17th centuries.

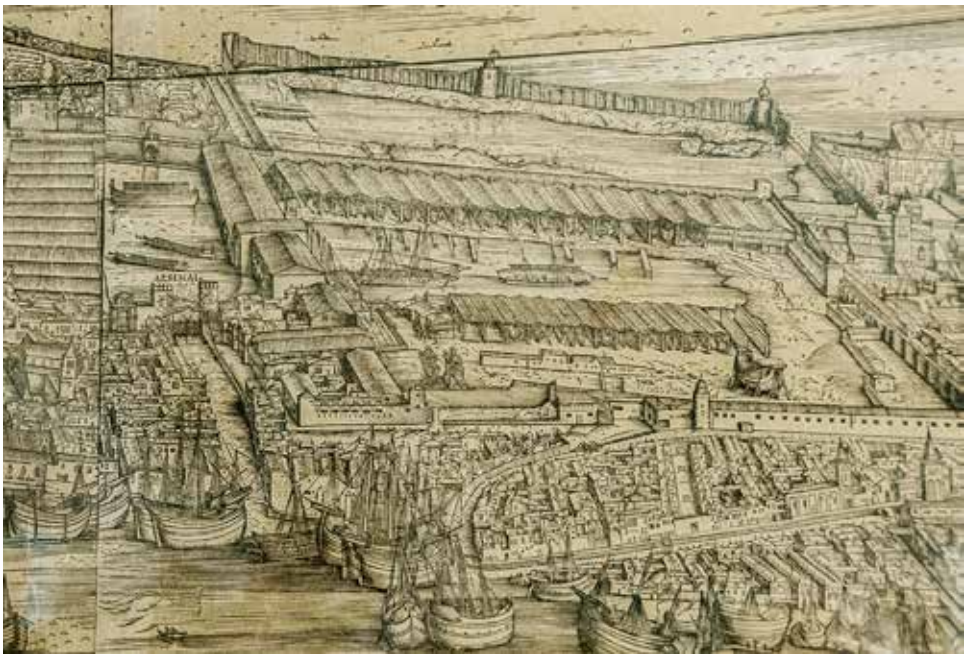
The courtyard where perhaps Marco Polo's house once stood.

Remains of a Venetian harbor fort on the island of **PAROS** in the Aegean

Venetian merchants decorated their houses with testaments to their involvement in the Asian trade, the relief scupture here reminiscent of a depiction on a tomb brick excavated at Dunhuang, where the cameleer is identified as a Central Asian by his dress.

Venetian sea power made it all possible, and the Venetians exacted their price. In the case of the Fourth Crusade, this meant diverting the crusading army to Constantinople, which it took by storm in 1204. The famous gilt bronze quadriga that decorated San Marco (and is now safe from the elements in the cathedral museum, replaced by a replica over the façade) was part of the spoils.

While for tourists today Venice's maritime glory has shrunk to gondolas in the canals (a rare workshop still makes them), what was really important was the massive shipyard at the Arsenal, shown in an engraving *below*, which could turn out a full-sized warship in a day or two.



A Venetian galleon of the 16th century, shown in a model at the Naval Museum, probably was very similar to the Dutch and Portuguese ones of the same era in the Indian Ocean which may have inspired the Safavid artist's depiction in the miniature from the David Collection.

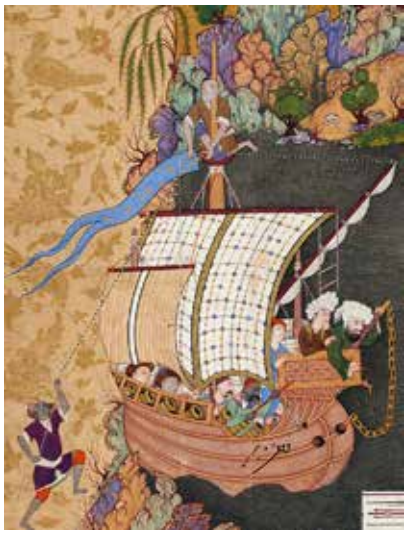


Image source: <https://www.davidmus.dk/files/8/1/4328/Copyright_David-Collection_Copenhagen_11-2016_recto_hvid_web.jpg>. Photo by Pernille Klemp, here cropped.