

Karez (Qanats) of Turpan, China

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The oasis at Turpan, located in the desert expanse of northwestern China (PRC), owes it surprisingly lush green environment to the karez (a.k.a. qanat) system of water supply. The basin surrounding Turpan has been the long-time haunt of the Uyghurs (a mixed Turki-Mongol ethnic group that is the majority in Xinjiang Province). The Turpan area is historically significant because nearby Gaochang (now a ruin, see photograph 1) was once the Uyghur capital and an important staging area on the Silk Road.

Silk Road

Turpan was once one of the crossroads of central Asia. Historically, it was a strategic stop on the overland trade route linking China with India, Persia, and Rome (see illustration 1). Because many of the traders carried bales of silk—China’s most-famous export—the entire route became known as the Silk Road (or Route). But this great trans-Asian highway carried much more than just silk. The China-bound caravans were loaded with gold and other valuable metals, woollen and linen textiles, ivory, coral, amber, precious stones, and glass (which was not manufactured in China until the 5th century AD). Caravans leaving China carried furs, ceramics, lacquer, and bronze objects such as belt buckles, weapons, and mirrors. The Silk Road was not one route but a series of caravan trails which, at the extremes connected Xi’an in China with Rome in Europe. The Road hit its peak during the 7th and 8th century AD.

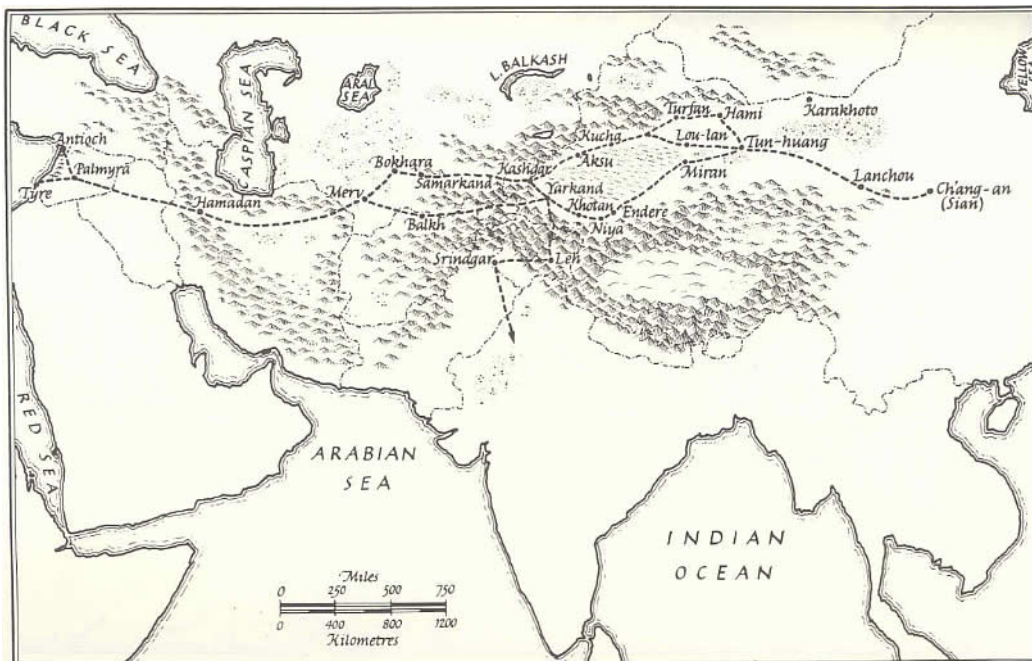


Illustration 1. Main routes of the old Silk Road (from Hopkirk).

Culture and religion also moved along the Silk Road. Before Islam established a firm grip on central Asia, the Uyghurs practiced Buddhism, Manicheanism, Nestorian Christianity, and other religions. Buddhism came north from India across the Karakoram Range. Extraordinary examples of this culture were found in caves at Bezeklik, near modern-day Turpan (see photograph 2). The Manichean faith arrived from Persia and Nestorian Christianity from Asia Minor. The former was founded by Manes in the 3rd century AD. To escape persecution, many Manicheans moved into central Asia. Until German archaeologists unearthed whole libraries in the Turpan area, this creed was thought to have no literature. The Nestorians, outlawed by the Council of Ephesus in 5th century AD, fled eastward. Because so many of its adherents were traders and missionaries, the creed eventually took root along the Silk Road. Nestorian manuscripts were discovered at the Gaochang ruin in the early 20th century. All three cultures were extinguished from central Asia by the tidal wave of Islam, with Tamerlane driving the final nail in their coffin in the 14th century.



Photograph 1. Gaochong, the ancient Uyghur capital and Silk Road fort, is today an adobe ruin.



Photograph 2. The caves at Bezeklik contained important examples of Buddhist culture.

One of the major obstacles along the Silk Road was the Taklamakan Desert, which has one of the world's most inhospitable climates. Caravans skirted this oval-shaped impediment by going around either the northern or southern edges. Turpan was located on the northern route (see illustration 1).

The Silk Route was dependent for both its existence and survival upon a line of strategically situated oases which hugged the perimeter of the Taklamakan Desert. In turn, these oases depended for their survival upon the glacier-fed rivers flowing down from the vast mountain ranges which form a horse-shoe around three sides of the great desert. As the Silk Road traffic increased, these oases began to rank as important trading centers in their own right and no longer merely staging and refueling posts for the caravans passing through them.

Turpan

Turpan lies in the second deepest inland depression in the world, with more than 4,000 sq. kilometers of land situated below sea level. Anciently called, 'Land of Fire,' it has recorded some of the hottest summer days in China, with temperatures as high as 130 degrees F. The Chinese administrator Aitchen K. Wu (*Turkistan Tumult* (1940) as quoted in *China: the Silk Routes*, p. 231) passed through Turpan in 1933 and commented:

The market often goes on all night long—while in the daytime the streets are deserted, every one having 'gone to the earth' in caves . . . The hot wind is worse than anything that can be imaged, shriveling the skin, scorching the eyes; and the direct rays of the sun carry death. It is a proverbial saying, not much exaggerated, that the people bake their dough cakes by sticking them on the walls of the huts.

Mildred Cable and Francesca French, two intrepid missionaries who spent many months in the region during the 1920s and '30s, describe the oasis vividly in their book *The Gobi Desert* (1942) as quoted in *Foreign Devils on the Silk Road*, p. 113:

. . . Turfan lies like a green island in a sandy wilderness, its shores lapped by grit and gravel instead of ocean waters, for the division between arid desert and fertile land is as definite as that between shore and ocean. Its fertility is amazing, and the effect on the traveller, when he steps from the sterility and desiccation into the luxuriance of Turfan is overwhelming.

The area's specialty is grapes, and many farms have drying towers for turning them into raisins. Turpan's greenery owes its existence to the underground channels called karez (or qanats). These underground tunnels rate as one of Asia's more intriguing and historic public works activities (see photograph 3). Uyghur and Chinese versions of karez technology date back over 2,000 years ago.



Photograph 3. Karezes provide the water needed to keep the Turpan oasis green.



Photograph 4. Cleaning an ancient karez.

Karez

A karez is a horizontal underground gallery that conveys water from aquifers in pre-mountainous alluvial fans, to lower-elevation farmlands (see illustration 2). The water for the karez is provided by the mother well(s), which is sunk into the groundwater recharge zone. A karez transports water underground, usually surfacing in cultivated areas (see photograph 4). Putting the majority of the channel underground reduces water loss from seepage and evaporation. A karez is fed entirely by gravity, thus eliminating the need for pumps.

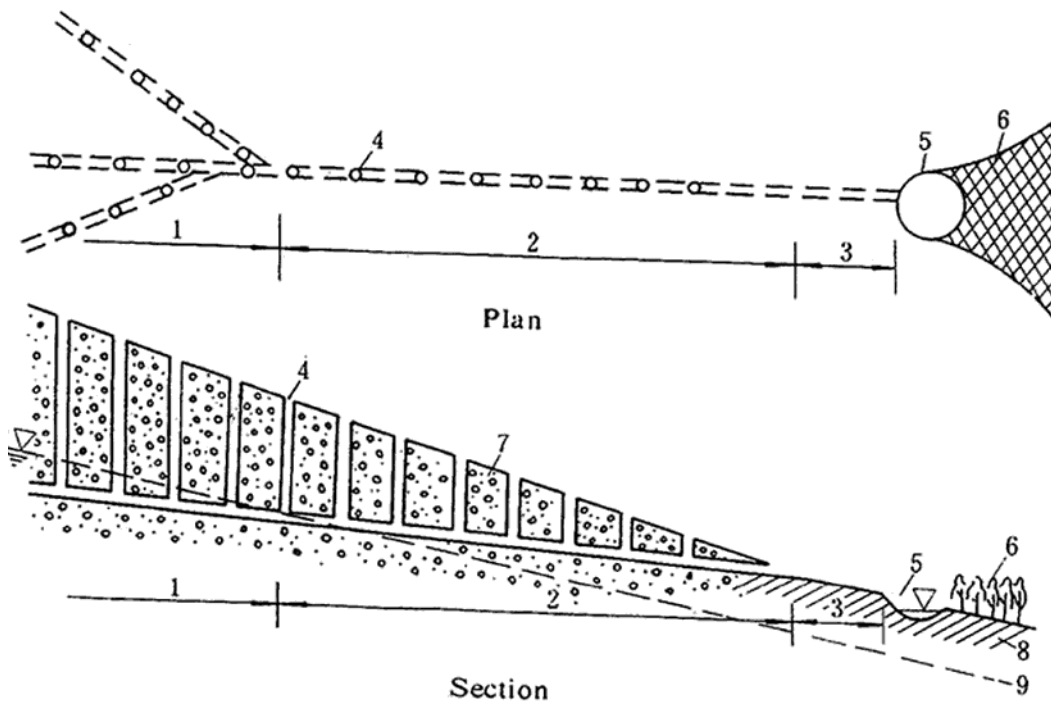


Illustration 2. Schematic of a Karez Project:

- (1) Infiltration Part of the Tunnel
- (2) Water Conveyance Part of the Tunnel
- (3) The Open Channel
- (4) Vertical Shafts
- (5) Small Storage Pond
- (6) The Irrigation Area
- (7) Sand and Gravel
- (8) Layers of Soil
- (9) Groundwater Surface

Several theories have been made concerning the origins of Turpan's karez technology. It was: (1) imported from Persia; (2) locally developed and refined through long-term experience; and (3) developed elsewhere in China and then imported (ie. Longshouqu Canal project). Some combination of 1 and 2 seem the most probable. It seems likely that the karez concept moved north and east from Persia along the Silk Road.

In 1845, Lin Zexu was banished to the Turpan area. He was deeply impressed by the karez technology and encouraged its spread to other areas. Under his leadership more than 100 karezes were constructed. Statistics for 1944 show that there were 379 karezes in the Turpan area. By 1952, there were 800, with a total length of 2,500 km, equivalent to the length of the Grand Canal. Today there are over 1000 karezes in the Turpan area.

Acknowledgment

Photographs 3 and 4 were taken by the author at the Karez Museum in Turpan.

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