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Indigenous Knowledge of Water Management towards Sustainable Development

By:

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Introduction

- Water is the alphabet of life, survival, and reclamation.
- Water, fire, and soil were valued as holy aspects of nature in ancient Persia.
- Water, however, has not always been easy to come by in arid and semiarid regions of the country, where rainfall events are very rare.
- Annual precipitation in Iran is 273 mm—less than one-third of the world's mean annual precipitation

The temporal and spatial distribution of rainfall is not uniform; about 75% of the nation's precipitation falls in a small area, mostly in the southern coast of the Caspian Sea, while the rest of the country receives insufficient precipitation. On a temporal scale, 25% of the precipitation falls during plant growth season



✓The need for people to overcome the challenges of an arid climate to meet water demand is nothing new. Approximately 2,500 years ago, Persians invented a number of methods for exploiting, conserving, and storing surface water and groundwater. One of these techniques for water management is called a [qanat](#), a technological and advanced system for water exploitation that has demonstrated through the centuries the ability of humans in arid regions to transform a harsh environment into a habitable area

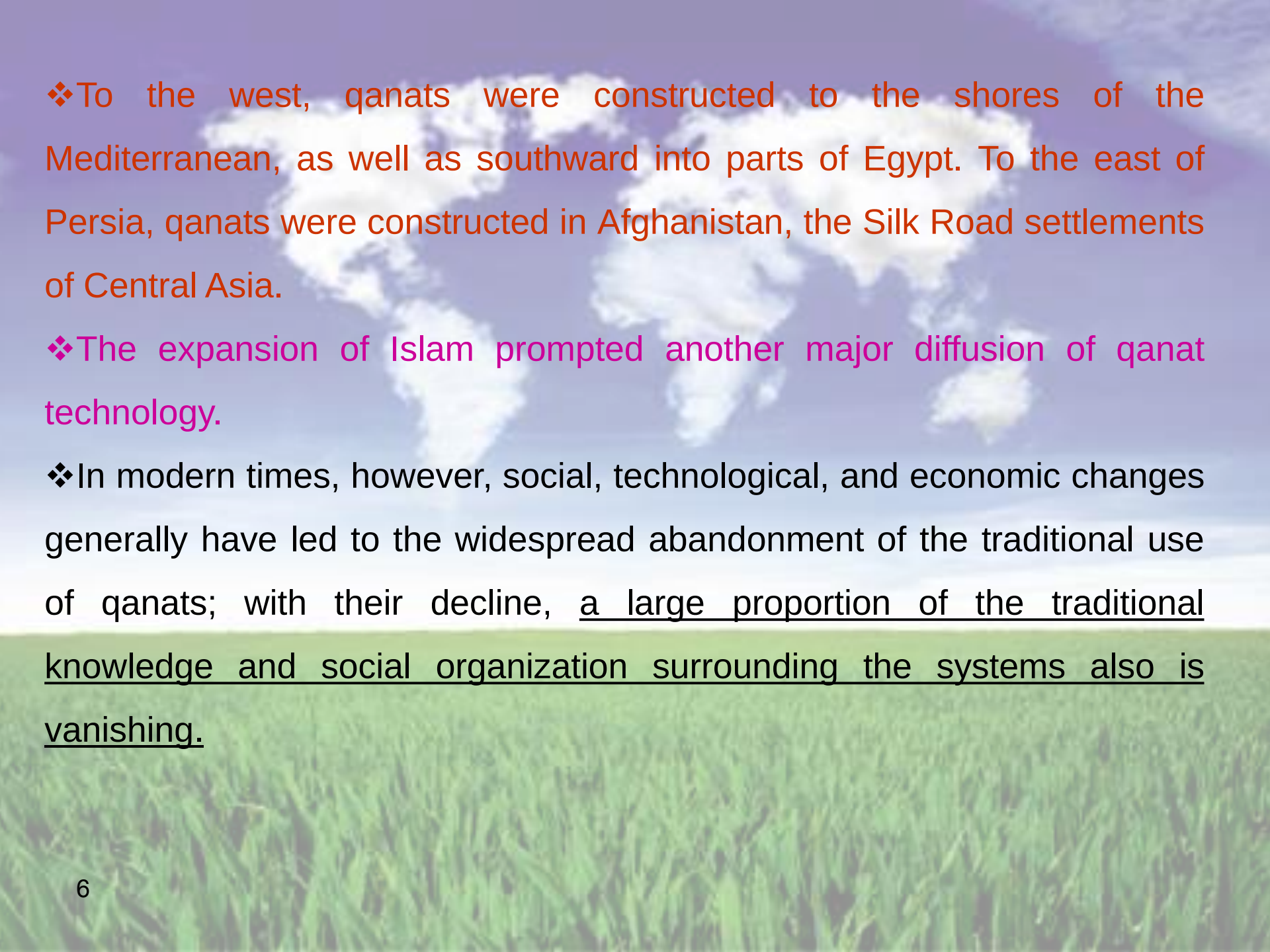


✓The qanat is essentially a horizontal, interconnected series of underground tunnels that collect and deliver groundwater from a mountainous source area, along a water-bearing formation (aquifer), and to a settlement.

✓The tunnels, typically several kilometers long, are roughly horizontal, with a slope. Driven by gravity, water drains to the surface to lower and flatter agricultural land

✓Considered to be the oldest feat of human engineering, this system is still used in a limited number of places in Iran, North Africa, China, the Arabian countries, Afghanistan, and beyond

✓In the early part of the first millennium B.C., Persians started constructing elaborate tunnel systems for extracting groundwater in the dry mountain basins of what is now Iran because surface water resources were insufficient for domestic and agricultural purposes

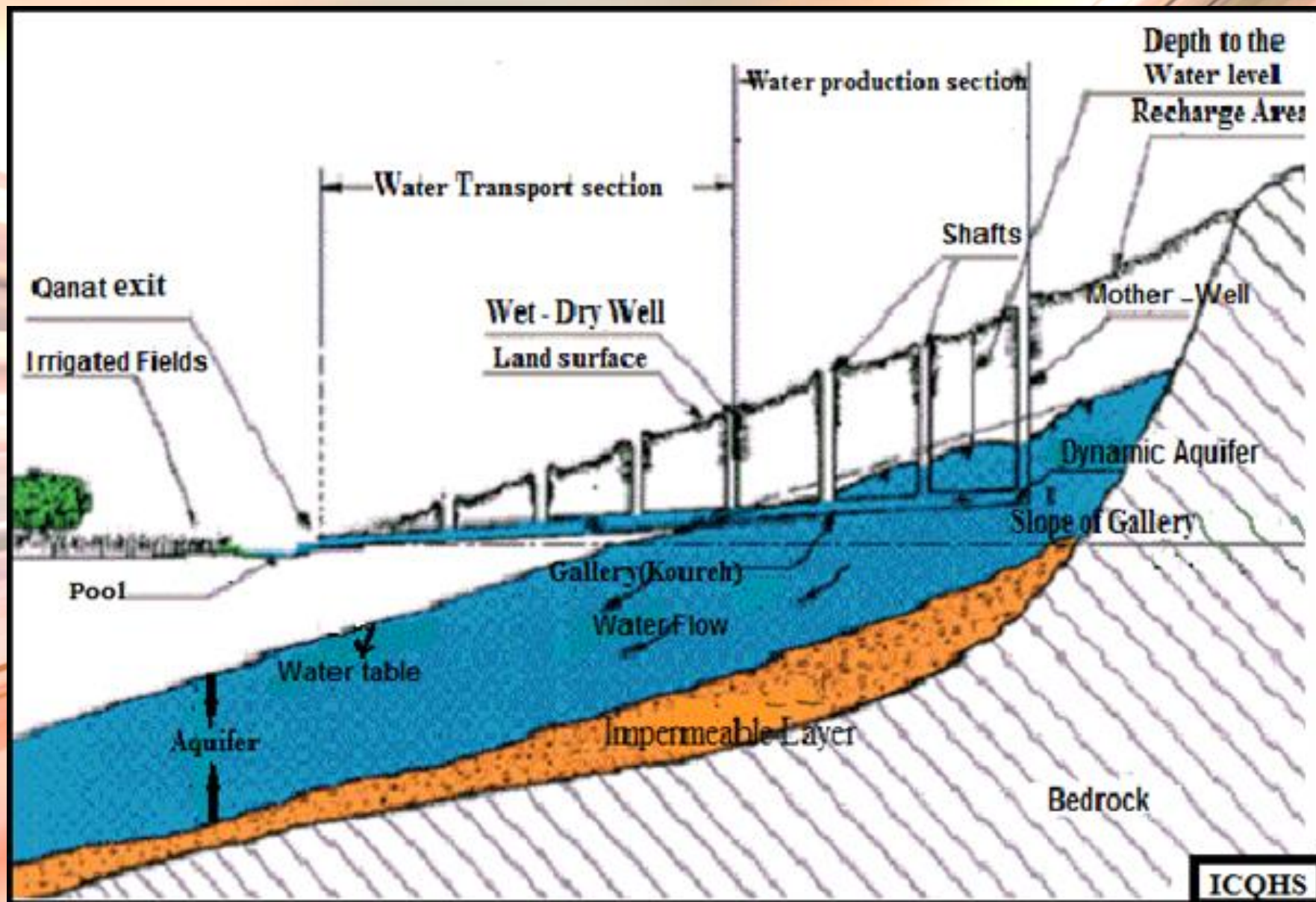
The background of the slide is a composite image. The upper portion features a light blue sky with soft, white clouds, overlaid with a faint, semi-transparent world map. The lower portion of the slide is a solid, vibrant green field of grass, which appears to be growing densely. The text is overlaid on this background.

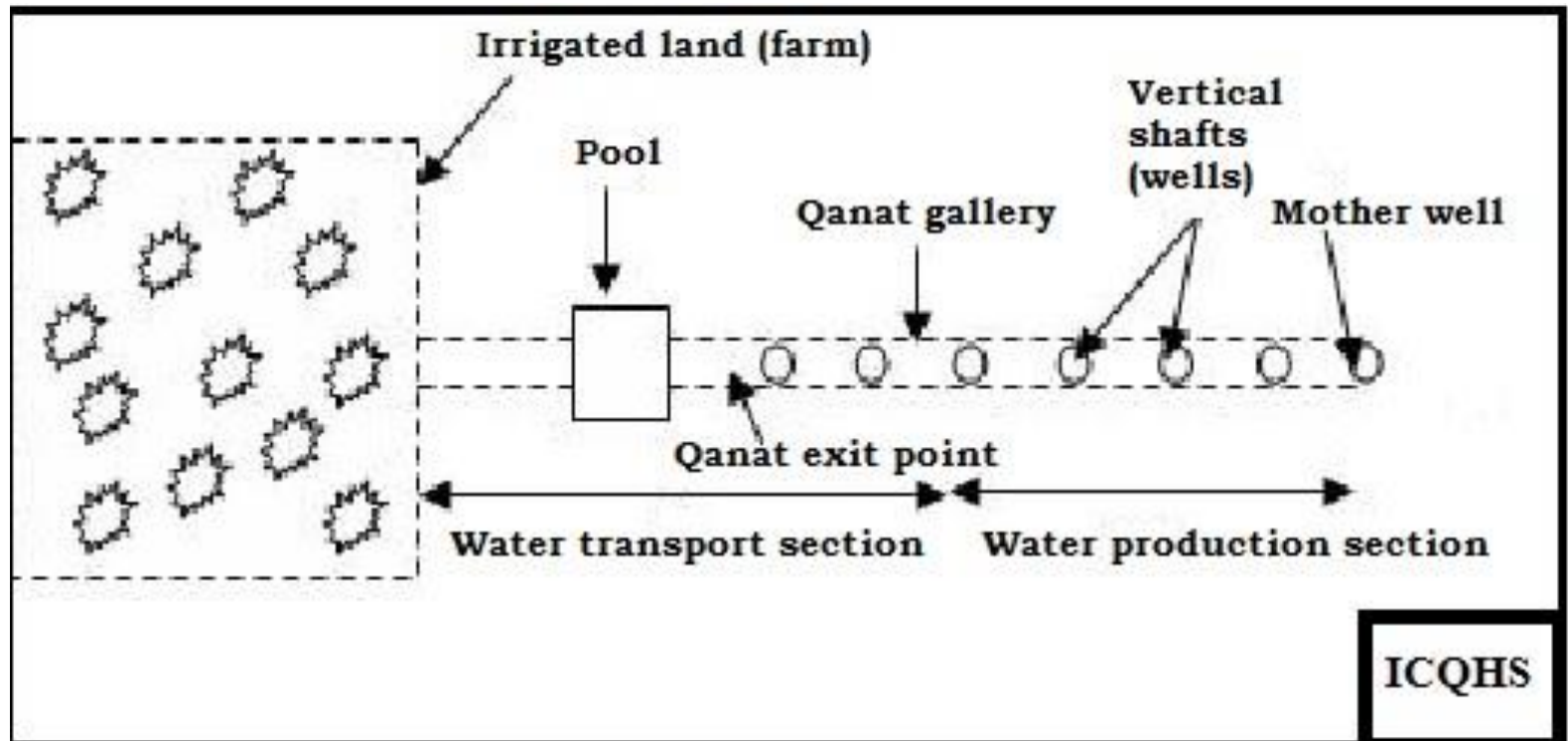
❖To the west, qanats were constructed to the shores of the Mediterranean, as well as southward into parts of Egypt. To the east of Persia, qanats were constructed in Afghanistan, the Silk Road settlements of Central Asia.

❖The expansion of Islam prompted another major diffusion of qanat technology.

❖In modern times, however, social, technological, and economic changes generally have led to the widespread abandonment of the traditional use of qanats; with their decline, a large proportion of the traditional knowledge and social organization surrounding the systems also is vanishing.

- ✓ The qanat is an underground gallery that conveys water from an aquifer or a water source to less elevated fields.
- ✓ In practice, vertical shafts in sloping ground, interconnected at the bottom by a tunnel with a gradient more gentle than that of the ground.
- ✓ The first shaft (mother well) is sunk, usually into an alluvial fan, to a level below the groundwater table. Shafts are sunk at intervals of 20 to 200 meters in a line between the groundwater recharge zone and the irrigated land. From the air, a qanat system looks like a line of anthills leading from the foothills across the desert to the greenery of an irrigated settlement.





Wonders of Qanats in Iran

- ! According to the Iranian Ministry of Energy, the number of qanats in Iran is about 36,300. The average length of these qanats is about 6 kilometers and the average depth of all shaft wells of a qanat together is some 4 kilometers. So if we take it as a sample of all qanats, we have about 376,068 kilometers gallery and shafts in Iran
- ! The total length of the qanats equals to 9.4 times as long as the Equator, and about 97.9 percent of the distance between the moon and the earth.

Structure

Gallery : the qanat gallery or tunnel which is an almost horizontal tunnel dug to get access to groundwater reserves, and to transfer this water to the earth's surface. The dimensions of the tunnel are such that the workers can easily go through and work in it: between 90 and 150 centimeters high, and its width is less than half the height.

Exit point of the qanat: Where the tunnel and the ground surface eventually intersect is the exit point of the qanat which is called the "mazhar" meaning where water appears.

Shaft wells: there are some vertical shafts sunk along the tunnel to connect the surface to the horizontal gallery. The main application of these wells is to haul the debris and excavated materials from the tunnel on to the surface. These wells play an important role in repairing the qanat, by making it possible to send down the needed facilities and tools and remove the debris.

Geographical distribution of qanats in Iran

- ✓ In Iran the system of qanats has played a vital role. Historical records confirm that some qanats in Iran are very ancient, dating back to before Islam.
- ✓ The longest qanat is the qanat of Zarch with a length of 80 km and the deepest is the qanat of Gonabad that is about 300 meters deep.



Conclusion

که قدر آب را لعل لب خشکیده می داند

Thirsty knows how valuable, water is.

A scenic landscape featuring a grassy hill in the foreground, a single tree on the right, and a blue sky with clouds and birds. The text "Thank you for attention" is overlaid in the center.

Thank you for attention