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Ministry of Cultural Heritage, Tourism  
& Handicrafts - MCTH  
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*In the name of God*

**Dr. Mechtild Rössler,**  
Director  
World Heritage center

**Subject:** Submission of requested reports regarding the  
*State of Conservation report of "the Persian Qanat" and "Susa" World Heritage Sites*

**Dear Ms. Rössler,**

I would like to express my appreciation for the continued efforts of the World Heritage Center for promotion and preservation of WH.

Here I write to respond to the enquiries regarding State of Conservation reports of the two World Heritage Sites of "the Persian Qanat" and "Susa."

For any further information, I am at your disposal.

Please accept, your Excellency, the assurance of my highest consideration.

Yours sincerely,

Mohammad Hassan Talebian

Deputy for Cultural Heritage & Secretary for the Iranian world heritage properties  
Iranian Cultural Heritage Handicrafts and Tourism Organization

**Islamic Republic of Iran**

Ministry of Cultural Heritage, Tourism & Handicrafts

**MCTH**



**Risk Management Plan of the Persian Qanat World Heritage Site**

*UNESCO*

*World Heritage Convention*

*Tehran 2019*

*In the name of God*

## **Introduction**

Held from 10<sup>th</sup> to 21<sup>st</sup> July 2016 in Istanbul (Turkey), the 40<sup>th</sup> UNESCO Conference approved of inscribing Persian Qanats (No. 1506) due to satisfaction of third and fourth criterion. This includes 11 Qanats located in different geographical regions of Iran and a water management system with advanced underground structures and channels for transferring water from mountains to arid areas of the country. Qanat are cultural-natural sites consisting of different types of natural factors such as water resources, topography of natural ground, and certain species of animals and plants as well as diverse traditions, customs and events. The Qanat are still operating due to persistence of their traditional management and they play a significant role in sustainable economic developments, persistence of local rural and urban life, and promotion of agricultural activity and development of infrastructure. At the moment, it is estimated that there are more than 37.000 Qanats in Iran out of which 11 Qanats have been inscribed on the World Heritage List.

These Qanats are located in Khorasan, Yazd, Markazi, Isfahan and Kerman provinces which are significant due to their different aspects of technology as well as geographical, cultural and socio-economic innovations. In Iran, Qanat have played a significant role in development of society as they were the cornerstone of development and boom of cities and villages in deserts and most of agricultural and industrial activities were established around these Qanats. Apart from transferring drinkable water to valleys and borders of deserts, the Qanat could, depending on geological layers of the site soil, be used for drainage and transfer of salty water and keeping it away from aquifers with drinkable water. As a result, persistent protection and monitoring of Qanat and proper planning during times of crises are highly significant. Due to importance of Qanat in national development and well-being, Persian Qanats Risk management plan was developed which will lead to the completion of Persian Qanat Management Plan consequently.

At the first step, identification of probable risks in regards to Qanats for further development of comprehensive Risk management plan is essential.

## **Probable Physical and Non-physical risks**

Among the most significant likely threats of Qanat structure, one could point to mechanized use of deep and semi-deep wells into aquifers in which main well and Tare Kar (Water Transport section) of the Qanat are located. Digging such wells adds to level of ground water in such regions and reduces the water output of the Qanat.

Lack of in-time dredging of Qanat is another damaging factor which could destroy such structures depending on type of climate, exploitation of natural resources, and over compression of soil, inflow of floods into Qanat wells and flow of floods in dry Qanat. After flood level declines, its deposits in Qanat shafts could block the water flow path and deposition of flood small particles in Tare Kar of Qanat could reduce water penetration into the section.

Among other likely damages, one could point to natural fall of a part of the Qanat shafts especially in Tare Kar sections. This could increase water level of the horizontal shaft, fall of its roof and blockage of the whole Qanat path. For instance, one could point to flow of Zarch water to Zarch Sarcheshme neighborhood. In this case, one of the wells of the Qanat near the road fell and blocked the path. The diggers draw on their technical and traditional knowledge to excavate soil, stabilize the site and install 8m long coils. The main reason of the fall was dryness of Qanat channel for a long time. Penetration of water into the site and sabulous ingredients of the site contributed to subsidence of one of Qanat shafts.

Among other risk factors, one could point to likelihood of water contamination due to increase of industrial and home wastewater, violation of Qanat premises by digging wells and illegal construction activities near Qanats.

Urban development and migration of rural population to cities have led to forgetting Qanat as support system and one of the factors supporting sustainable development of human population. As a result, water resource development plans near Qanat premises such as building dams, developing irrigation and drainage grids, transfer lines, loss of farming lands and their changed functions, change of path or destruction of the path of seasonal rivers contribute to destruction of Qanat and deprivation of Qanat from their proper share of the water. Finally, occurrence of natural disasters such as earthquakes, drought, flood, landslide and natural fall of a part of Qanat horizontal channel and shafts are among major risks and challenges of such structures.

Based on above-mentioned challenges, one could point to certain solutions for prevention and/or minimization of probable damages. By analysis of seismic and tectonic condition and faults of each region and feeding floods to aquifers, one could prevent from destruction of their structure. The use of new materials such as cement and cement coils instead of mud-made ones, sealing the gaps between coils and use of tar emulsions are some adoptable solutions to water-impenetrability of dry sections of Qanat. Drawing on experiences of traditional managers of Qanat and training Qanat diggers with new technical knowledge could significantly contribute to improved condition of Qanat during pre-event times and they will be very useful when crises occur as such measures reduce Risk-caused losses in terms of time and financial burden.

## **Effects of Current and Predicted Risks and Damages on Outstanding Universal Values and Structure of Site by Taking Extent of Destruction or Damage into Account**

The factors, ignorance of which, could lead to significant damages to Qanat can be grouped into three categories, namely physical damages, natural damages and human damages.

Physical damages are the ones which occur under influence of internal factors and if ignored, they will cause destruction. This type of damages could be identified by a little attention. The monitoring should check the whole Qanat few times a year.

Natural damages are the ones which develop under influence of natural factors such as flood overflow into Qanat wells. In order to prevent from such events, flood-prone sites should be identified and flood path should be modified through obstacles. Meanwhile, all external path of the Qanat should be checked annually before seasonal rains. If the well does not have a cover, the top of the well should be blocked. After each rain, all of the paths should be controlled so as to make sure that flood walls have not been significantly damaged.

Human Damages are a wide range of activities which can be classified into agricultural, developmental and lifestyle activities.

Damages to Lifestyle consist of those damages which do not directly affect the Qanat but provide a condition for destruction of Qanat. Increase of immigration to cities is accompanied by turning productive communities to consumers. In current situation, agricultural activities are economically unjustifiable.

Determination of Stakeholders, Institutions and relevant entities and description of their duties:

- Regional Water Distribution Company;
- Urban and Rural Water and Wastewater Treatment Company;
- Central offices of environmental protection of principalities and their subordinate entities;
- Industrial and urban management institutions;
- Agricultural Jihad organizations of towns;
- Meteorological organizations and seismic monitoring agencies;
- Principalities;
- Ministry of Cultural heritage, Tourism and Handicraft;
- Provincial Government Office;
- Development Department of Provincial Government;
- International Center of Qanat and Historical Aqueous Structures;
- Non-governmental organizations;
- Traditional Qanat management (Qanat management boards, etc.);
- Mortmain and Endowments Office;
- Police Forces;
- Firefighters;
- Health service and medical emergency institutions (hospitals, Red Crescent, etc.);
- Islamic councils of cities;
- National Broadcasting Organization;
- Universities;
- Local representative of the public;

No.	Name of Organization, Institution and Agency	MoU	Description of Tasks of Executive Entities
1	Civil Development Department of Provincial Government		Coordination, provincial budgeting and management of actions of all governmental entities at provincial scale
2	Cultural Heritage Organization	*	Monitoring of premises of Qanat and protective activities
3	Principalities		Implementation of urban development measures, urban services, public transportation in urban areas
4	Islamic councils of cities		Budgeting and monitoring of all activities of principalities within premises of sites
5	Provincial Government Office		Coordination and monitoring of executive actions of entities at urban scale
6	Agricultural Jihad Organization	*	Dredging, repair, reconstruction and development of Qanat
7	Ministry of Power	*	Review, study and documentation of up-stream projects and control of licenses.
8	Regional Water Distribution Offices	*	Review and control of exploitation licenses and monitoring legal premises of sites
9	Road and Urban Development Office/ Cultural Heritage Organization		Planning of urban development projects, planning of topical-local projects based on a protective approach
10	National Broadcasting Organization		Communication and cultural promotion of values of sites at local, national and international scales, news coverage at time of crisis
11	Universities		Studies of different physical cultural, social and economic aspects of sites
12	Road and Urban Development Office/ Cultural Heritage Organization		Planning of urban development projects and topical-local projects based on protection approach
13	National Gas Company	*	Monitoring and development of gas infrastructure grids by satisfaction of regulations of premises and area of historical sites.
14	Water and Wastewater Treatment Company	*	Monitoring and developing water and wastewater grids and monitoring the status of urban wastewater treatment system.
15	Power Distribution Company	*	Monitoring and developing power distribution grids based on premises of sites
16	Road Police and Police Force		Organization and control of vehicle traffic
17	Police Force		Arrangements to establish security of residents, job owners and tourists in and around sites.

18	Red Crescent		Providing medical, healthcare and rescue services at time of crisis
19	Local and provincial firefighting organizations		Presence in determined locations for provision of intended services, rescue operation and facilitation of affairs during crisis, arranging for rescue and training maneuvers before crisis
20	Active NGO		Cooperation and association with people and government to help and enhance public cooperation and formation of social groups.
21	Local representatives of people		Cooperation in planning and making decisions in all programs, reflection of public demands and wants to government and principalities and close cooperation to enable better implementation of plans
22	Mortmain and Endowments Office	*	Review of condition of endowed Qanat
23	Traditional Management of Qanat/ Qanat Council	*	Field visit, review, repair and reconstruction of Qanat, training of solutions before crisis and training of experienced and young Qanat workers.

*Table 1. Stakeholders, Institutions and relevant entities and description of their duties*

## Data Analysis

### Approaches to Dealing with Natural disasters of Qanat

**Drought:** In terms of protection of water reserve of Qanat during drought and in order to deal with such a crisis in wet periods, Tirre Garan<sup>1</sup> (water mudders) make the water muddy. This action helps maintain the water level at a logical and suitable range. To do so, Tirre Garan separate water stream from main path of the Qanat so that the stream can be passed through washable lands. By doing so, the water becomes dark colored and muddy. Since muddy water contains suspending particles it can penetrate more into dry lands. During year, especially at the time of droughts, this measure can play an effective role in water crisis control. Among the most significant characteristics of water mudding, one could point to impenetrability of stream walls, slow rate of water evaporation due to high content of suspending particles and proper management of water by users of main Qanat water stream. The muddy stream flows into a pool which prevents from water loss. The muddy water deposits its heavy particles in these pools and therefore they are treated to some extent.

**Flood:** In the case of Baladehh Qanat, local knowledge of Qanat workers suggests that time of crisis caused by flood and storm are 6<sup>th</sup>, 36<sup>th</sup> and 60<sup>th</sup> day after Newruz. Attention to movement of clouds, their density, wind flow and monitoring of moon shape in those days are actions done to determine the likelihood of crisis in the area. For instance, if it does not rain at 36<sup>th</sup> day, storm will start at a higher likelihood and this will challenge the trees around the main Qanat current.

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<sup>1</sup> a job in hierarchy of traditional Qanat management



The collection of 15 Qanats are located in river beds with coarse grains which could cause serious problems for Qanat during heavy rains. During movement of river water, cavitation occurs which leads to destruction of Qanat channel. During summer, in order to prevent from collapse of Qanat's horizontal gallery at Tare Kar sections, as well as emergence of holes, a number of small soil dams will be made at these pathways.

Development and use of hand-dug structures called Mardkhane (shelter) at the path of Qanat and in mountains is one of the arrangements which help protect the life of water protection agents since these experts know where something happens and where maximum damage occurs. In the case of traditional Qanat management, hierarchy of human resources is completely taken into account and jobs are ranked. For instance, protection of main current is done by current watch whose job is critical during floods.

In the case of above-mentioned Qanat, spring floods create a stream called "spring steam" which purposefully takes water from the river during first two months of spring and adds to flow rate of Qanat and main water current without damaging Qanat structures.

**Earthquake:** Due to structure of Qanat at heart of the ground, these structures are sufficiently stable during earthquake and ground vibrations. As a result, significant earthquake-caused damages have not been reporting over the past years.

**Unpredicted Risks:** Gas poisoning in Tare Kar sections due to use of limestone and other materials, physical damages of Qanat workers during carriage of materials, Qanat workers' entrapment in Tare Kar sections of falling wells are among major problems of human resources. In order to address such problems, Cultural Heritage Ministry is cooperating with Qanat management board and Agricultural Jihad Organization so as to do the following measures:

- Reconstruction of difficult-to-pass routes, change of a part of the path and widening of routes.
- Securing routes, removal of debris, use of thick iron plates at falling sections and roofs, making walls, and installation of coils inside of Qanat.
- Use of experienced Qanat workers to enter falling wells and equipping them with their required tools.

## Policies and Strategies

### Goal

The primary goals of Risk management plan are conservation, presentation and protection of traditional management of Persian Qanats and their outstanding universal values.

### Policies

Based on previous reviews of all Qanats, general policies for protection and maintenance of Qanat were developed by taking the following items into account:

- Attention to indigenous potentials.
- Training to create local and national benefits.
- Presentation of major values of site.
- Attraction of social capitals and cooperation with beneficiaries and stakeholders.
- Increase of resilience.
- Physical and non-physical protection.

Strengths	Weaknesses	Threats	Opportunities
Diversity of architectural structures	Location in low-rainfall area	Environmental pollution	Tourism development
Novelty of Qanat	Lack of integrated management	Natural crises	Tourism development
Green space		Imbalanced development	Fertile agricultural lands
Diversity of herbal species		Lack of local knowledge transfer	Diversity of beneficiaries and stakeholders
Traditional Qanat management		Non-managed investment	Public interest
		Location of a part of the site premises in privately owned lands	Expert Personnel

Table 2. SWOT Analysis

### Approaches:

- Interaction with Qanat management board and other shareholders and beneficiaries for optimal use of traditional experiences of managing Qanat during crises (protection, cooperation, training and communication).
- Developing guidelines of safety and security for proper protection of Persian Qanats.
- Forming expert workgroups and review of solutions to dealing with crisis (drought, earthquake, flood, subsidence, landslide, and urban and rural pollutants) with the help of relevant authorities.

### Plans

#### Short-term (Two Years)

- Preventive pre-crisis measures

- Periodical reviews and updating fundamental studies such as analysis of stone materials, structures within the area of Qanats to determine their physical qualities and define penetrability of surface waters and feeding of Qanat aquifer;
- Document and collection of data from relevant entities on ecologic and biologic conditions of premises of Qanat;
- Developing GIS database;
- Completing the re-organization maps of Qanat boundaries;
- Making diagnosis map, documentation and seasonal review water route of transfer channels, well shafts and Qanat Galleries in a periodical and consistent manner;
- Primary diagnosis of environmental risks and making topical maps for natural factors (earthquake, flood, and environmental pollutions) and human risks (theft, damages caused by visitors and developments);
- Providing preventive and protective measures based on risk maps (flood dams, inflow wells, water conduction channels, sensors and seismic warning systems);
- Monitoring outgoing water flow rate of the Qanat monthly and seasonally (during droughts and wet years);
- Monitoring the activities of stakeholders and beneficiaries such as dredging, study and adjustment of slope and dimensions of Qanat galleries periodically during wet periods and droughts, equipping and cleaning well shafts, closing the top and middle parts of inflowing channel of well shafts to prevent from entry of pollutants, improvement of waterways, channels and beds, reinforcing, coil installation, brick laying and reinforcement of Qanat galleries through traditional methods such as laying stone pieces and bricks;
- Determination of rescue route and easy access to Qanat location;
- Monitoring and checking dams, underground dikes periodically and consistently for controlling the loss of Qanat water;
- Coordinating the affairs with Risk management board to use their available means;
- Separating river route from Qanat route by developing large trenches to prevent Qanat collapse;
- Devising a deviation route to river during water flow rate rise (more than 200L up to 250L) of main current and balancing water content;
- Mixing the water with mud at the main path of Qanat current during insufficient water flow rates;
- Developing small muddy dikes which are vertical to Qanat galleries and transverse to river by using materials which reduce cavitation of river bed and galleries of Qanat and protect the Qanat during floods;
- Making necessary caps for blocking main well shafts;
- Arranging for training courses and cultural promotion for local people and farmers (residents within the area of Qanat);
- Updating anthropological studies, surveys of demographic structure, quantitative and demographic analysis of growth of family population around Qanat;
- Determining of methods of maintaining Qanat and determination of post-crisis entities and people-in-charge;

- Determining proper locations as temporary shelter of people and accommodation of firefighting forces, police and Red Crescent members;
- Updating guidelines on engagement of beneficiaries and stakeholders in protection of Persian Qanats;
- **measures during Crisis**
  - Arranging expert workgroup meetings to analyze the situation, offer solutions under critical conditions and determine stakeholders' duties in traditional management of Qanat;
  - Proper management of different entities and putting rescue teams in pre-determined locations based on pre-developed plans;
  - Change or control of water current by using traditional methods and non-concentrated local forces for emergency evacuation and reactions;
  - Sending expert forces to Qanat location for reviewing the damages during first hours of crisis;
  - Receiving reports for each Qanat and sending them to traditional Qanat management system, Agricultural Jihad Organization and Disaster Mitigation and Management Organization;
- **Post-crisis measures**
  - Cooperation with relevant entities to arrange for field visits and periodical reviews, conduct environmental review of region, and study the factors affecting Qanat and evaluate extent of loss and making plans for addressing damages and resolution of disrupting factors;
  - Emergency stabilization and protection of damaged parts;
  - Review and check-up of well shafts in terms of post-crisis structural strength to consider the probability of destruction;
  - Reconstruction, compensation of damages to Qanat after filling the reports of damages by cooperation with Agricultural Jihad Organization, local people and traditional management panels of Qanat;
  - Analysis of water quality through quantitative and qualitative methods to control and reduce pollution;
  - Monitoring the duties of stakeholders and beneficiaries based on relevant plans and guidelines;
  - Physical actions and through protection by different entities;

### **Mid-term**

- Updating documentations and physical studies such as analysis of materials of rocks and structure of sites around Qanat and determination of their physical characteristics for further determining of penetrability of surface water and feeding aquifer of Qanat;
- Updating GIS database;
- Updating diagnosis maps and seasonal reviews of water transfer channels, well shafts and Qanat galleries in periodical and consistent manner;
- Updating diagnosis results of analysis of environmental risks and making topical maps for natural factors and human risks;
- Promotion of protective and preventive equipment based on risk maps (flood dike, water conduction channels, sensors and seismic warning systems);

### **Long-term (10 Years)**

- Reorganizing the visitor routes for Qanat galleries;
- Making a comprehensive plan for reinforcing Qanat and their relevant structures;
- Identification and revival of abandoned Qanat based in the boundaries of the Persian Qanats;
- Developing a health tourism plan to convey the influence of Persian Qanats;
- Cultural promotion and training of children in voluntary assistance plan of Qanat development;
- Including the boundaries of Qanats in comprehensive and detailed plans as well as territorial planning;
- Study and identification of Qanat networks in urban and rural areas of the Persian Qanat and their influence on each other;
- Arranging for certain events about Persian Qanats to introduce outstanding universal values of Qanat and their effect on sustainable economy of local communities;

## Development of Monitoring Mechanism and Measures

According to the guideline of duties for stakeholders and beneficiaries based on agreements with traditional entities and relevant ministries, each member is allocated a certain duty and according to his/her duty is evaluated according to certain frameworks. In this area, monthly, seasonal and annual monitoring enables precise monitoring, prepares the global site to deal with crises and finalize the job descriptions of entities.

The monitoring tables should be collected from relevant entities in certain periods of time and they should be delivered to Ministry of Cultural Heritage, Tourism and Handicraft for further actions. Analysis and interpretation of tables will contribute to development of future plans for protection of a site.

Type of Risk	Monitoring Area	Monitoring Indicators	Period of Analysis	Monitoring Tools
	Flood	Water Inflow	Monthly	Flow rate measurement device/ periodical report
	Earthquake	Natural Aquifer	Annually	Chemical Test of Water
	Drought and Climatic Change	Vertical and Horizontal Conduits	Seasonally	Field visit/ periodical report/in-vitro sampling/ documentation
Physical	War	Farms and Gardena	Monthly	Aerial Image/GIS/ Development and field plans/ Periodical Reports
	Development	Qanat-related Structures	Monthly	Aerial Image/GIS/ Development and field plans/ Periodical Reports
	Subsidence	Environment	Monthly	Aerial Image/GIS/ Development and field plans/ Periodical Reports
		Natural and historical view	Monthly	Aerial Image/GIS/ Development and field plans/ Periodical Reports
	Change of management systems	Migration	5 Years	Consensus/ Statistical Center of Iran
		Population	5 Years	
Non-physical	Change of socio-cultural systems	Expert forces and Qanat workers	Annually	Consensus/ Statistical Center of Iran
		Lifestyle	5 Years	Consensus/ Statistical Center of Iran
		Ownership	5 Years	Consensus/ Statistical Center of Iran
		Water use system	5 Years	Consensus/ Statistical Center of Iran

Table 3. Monitoring Mechanism and Measures



*Figure 1. Water level measurement rod (2018)*



*Figure 2. Analysis of Qanat water level rise in 2018 by center experts*

**4.A-Continue enriching the documentation centers with collected data related to each Qanat in the relevant regional offices of the Iranian Cultural Heritage, Handicrafts & Tourism Organization (ICHHTO), and ensure the availability of this data to members of the local communities and internationally,**

In order to obtain highest level of cooperation in local communities, promote awareness and introduce the structures of Qanat and communicate their significance in terms of development of sustainable rural economy to local communities, promote beneficiaries' participation in promotion of outstanding universal values of the site and its role in sustainable development of the region and use of natural and cultural potentials among world heritage sites, a document center was established in Tehran in 2018. The center operated alongside of local world heritage bases of the Persian Qanat.

As mentioned before, there are currently local document centers collecting data on serial nomination of the Persian Qanat. Considering the extent of actions done about Iranian Qanat

to register them among world heritage, lots of the information required by interested readers and visitors are available through website and data center of central office of Qanat. Due to significance of nature and function of Qanat in different areas and extensiveness of materials on each single Qanat, the Iranian Qanat enlisted among world heritage sites were periodically reviewed and completion and equipping of document centers at the locations of Qanat were done.



Figure 3. Central Office of Iranian Qanat Center (right; 2019)

In addition, available documents in the center consist of specialized information on Qanat enlisted as world heritage, report of previously conducted studies and operation of Qanat during past few years. Some of the following books are included in the office.

Work	Author	Press (Year)	Work	Author	Press (Year)
Collection of works on promotion and irrigation	Abulfazl Naseri		Geography and rural development: A case study of Gonabad	Mohammad Hussein Hojrati	Aba Cultural Center (2000)
Soil and Water Engineering	Gholam-Hussein Haqnia & Amin Alizadeh		Kakhak as Parthian capital	Seyed Mohammad Husseini	
Dominant System of Water Use Laws	Abbas Bashiri		History and Geography of Rashnavand and Gonabad: A review of problems of Rashnavand Village	Mahmood Emami	Pashang (2009)
Set of Agreements in International Conference of Qanat	Bahonar University of Kerman and Jahed-Daneshgahi of Kerman Province	2005	Ahsan Alnaqasim fi Maragat Alaqanim	Moqadasi	Din Press
Collection of papers in National Conference of Qanat	Congress of Water Use and Watershed	2014	Hodod Al-alam Min Al-mashreq Elal Maqreb	Edited by Sayed Jalaledin Tehrani	



and Qanat Maintenance	Management of Birjand University				
Collection of papers on Qanat	Regional Water Distribution Company of Birjand University	2000	Historical geography and human in history		
Collection of papers in International Conference of Traditional Knowledge of Water Resources and Management	Ministry of Power, Jihad	2011	Water and wastewater technology	Hammer & Hammer (Trans by Amir Hussei Mahvi et al.)	Khaniran Press (2012)
Collection of papers in National Conference of Archeology and Architecture of Aqueous Structures of Dezful		2011	Interaction of architecture and technology	Mohsen Vafamehr	
Collection of papers in Second National Conference of Gonabad Qanat		2004	Culture and development: anthropological approach to development	UNESCO (Trans by Namatollah Fazeli & Mohammad Fazel)	Publication Organization Press of Ministry of Culture and Islamic Guidance (1997)
Collection of papers in International Conference of Human, Water and Anthropology	Cultural Heritage Research Center	2004	A tour of architecute of water storage of Yazd	Gholamhussein Memarian	Science and Industry University of Iran (1992)
Qanat Tourism	Emad Yazdi & Majid Liaf Khaniki		End of spring-based civilization in Iran	Mehdi Tachi	
Writing experience of Qanat experts	Ali Asghar Samar Yazdi	Water Resources Management Company (2010)	History of water and irrigation in Kerman Province	Mohammad Mershan	Kermanshenasi Press (2009)
Developing Qanat and managing them	Abdol-karim Boniad	Academic Publication Center (2001)	Encyclopedia water, irrigation and aqueous structures experts	Nader Karimian Sardashti	National Committee of Irrigation and Drainage (2002)
Qanat and its characteristics	Arash Fazeli		Water and Irrigation Technique in Ancient Iran: Technical Irrigation and Drainage Culture	Ministry of Water and Power: National Committee of Irrigation and Drainage	Analysis of Irrigation Efficiency

Qanat and underground conduits of Iran			Global experiences of farmers' participation in irrigation management	Hassan Rahmi	Committee of Irrigation and Drainage of Iran, 1998
Qanat in Iran	Mohammad Reza Haeri		Culture of Water and Traditional Irrigation	Nader Karimian Sardashti	Committee of Irrigation and Drainage of Iran, 1999
Bibliography of Qanat	Abdol-karim Bedia	Regional Water Distribution Company of Yazd (2000)	Supply and demand of water in world during 1990-2025: Scenarios and problems	Trans by Homan Khaderi & Mohammad Reza Al-Yasin	Committee of Irrigation and Drainage of Iran, 1999
Terminology of Qanat	Abdolvahid Aqasi, Javad sanfinejad, Organization for Development and Training of Power Ministry	Regional Water Distribution Company of Yazd	History of Science in Iran	Mehdi Farshad	Amirkabir Press (1985)
Qanat in one's own land	Ali-asghar Samsar Yazdi	Shahed (2011)	Qanat: A technique for water acquisition	Haeri Koiloo papeli	

Table 4. List of some works in library of Qasabi Qanat Center (2019)

In regard to introduction of Iranian Qanat to audiences, numerous brochures and movies were made in English and Persian language and they were made available to interested audiences. Design and development of following websites were also intended to communicate necessary information to different parts of the community.

[http://Qasabehqanat.com/fa\\_Borooshoor\\_Ghanat.aspx](http://Qasabehqanat.com/fa_Borooshoor_Ghanat.aspx)

<http://Qasabehqanat.com/>



Figure 4. An instance of brochures designed to introduce sites to tourists (2018)

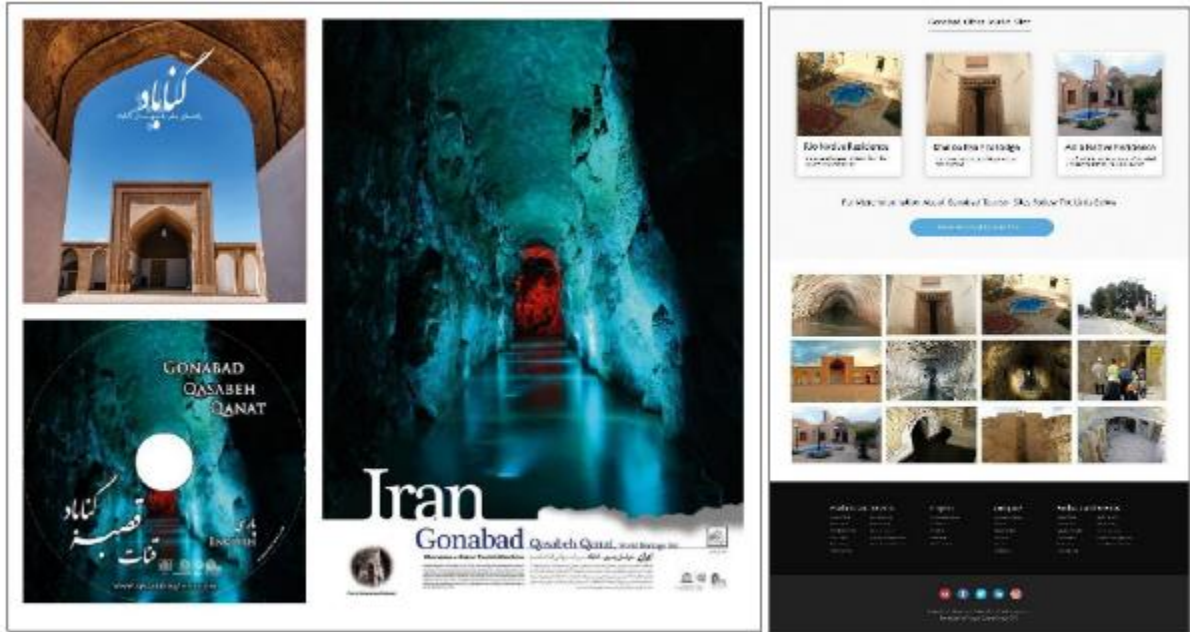


Figure 5. An instance of posters and DVD covers (left, 2018); design of website with three languages (right)

**4.b- Extend the monitoring system to identify the responsible authority for each key indicator;**

The central Office of the Persian Qanat World Heritage, as the base in charge of integrated management of Iranian Qanat, signed some agreements with interested entities. Considering the job descriptions of such entities and by depending on consistent cooperation for retention and promotion of qualitative and quantitative levels of above sites, a chart for integrated management of Qanat was developed and delivered to relevant entities. In order to obtain a mutual understanding in approaches to management and monitoring of intervention in area and site of Qanat, field visitation and analysis were done monthly, seasonal meetings were held and necessary correspondences were done.



*Figure 6. Field visit of Qanat by engagement of trustees' board and employees of Cultural Heritage Organization*

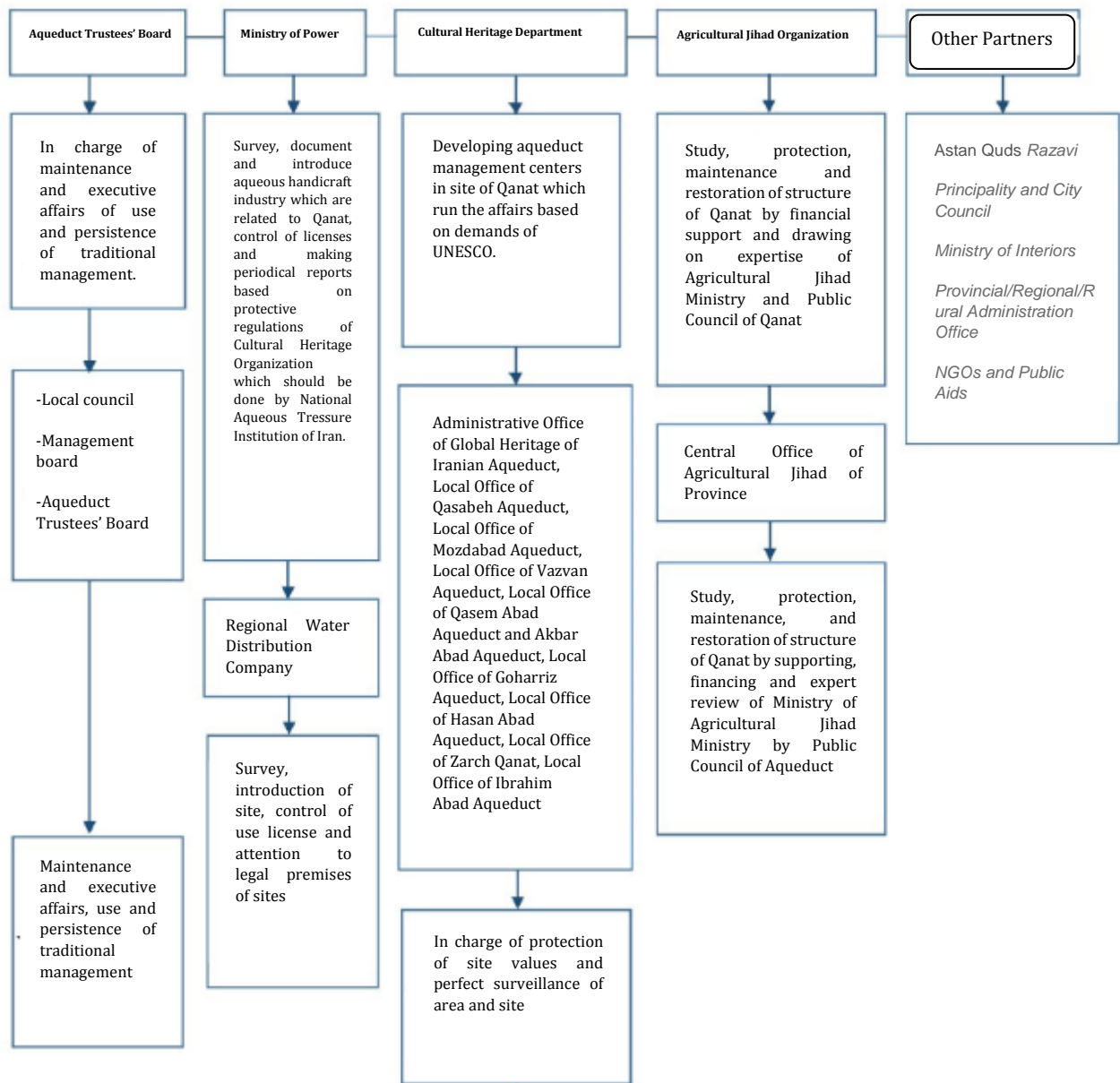


Diagram 1. Job description of relevant entities of Qanat by reference to agreement between relevant entity and Ministry of Cultural Heritage, Handicrafts and Tourism (2018)

A major part of area and premises of Iranian Qanat have diverse ownership by public, endowment, private and governmental sectors. In this regard, methods of management and using them requires integrated management. Certain beneficiaries and stakeholders such as Ministry of Agricultural Jihad, Ministry of Power, local communities and Mortmain and Endowments Office will directly participate in protection of Iranian Qanat. Meanwhile, certain entities such as Ministry of Interiors (provincial governments, principalities, etc.) are indirectly engaged at urban, rural and regional affairs. Considering the written duties of each of involved parties, agreements were reached with Ministry of Cultural Heritage, Tourism and Handicraft for further determination of main areas of cooperation. Local offices of the Persian Qanat World Heritage Sites are responsible for monitoring the management of these sites.

## An instance of monitoring tables by Local offices of the Persian Qanat World Heritage Sites

Row	Entity, Public Entity, and Local Community	Name of Activity/ Action based on Agreement Text	Cost/ Budget (Rial)	Period of Time
1	Principality/ City Council	1-Design of tourism complex around Qanat 2-Reconstruction and organization of gates leading to Akbarabad Qanat 3-Organization of neighboring streets of Qanat such as asphalt and division of spaces 4-Organization of surrounding walls of Qanat 5-Soil operations 6-Arranging for holding shows 7-Arranging for relevant cultural and public events	1-1.000.000.000 2-900.000.000 3-2.000.000.000 4-400.000.000 5-36.000.000 6-20.000.000 7-150.000.000	2017 and 2018
2	Qanat management board and traditional system of management in local entities	Bottom and side digging	128.000.000 and 75.000.000	2016-2018
4	Ministry of Agricultural Jihad and subordinate entities	Digging sides, arc laying, and debris removal	250.000.000	2017
5	Ministry of Cultural Heritage, Tourism and Handicraft and subordinate entities	Developing a center for monitoring at vicinity of Qanat and participation in organization of area of Qanat		2017

Table 5. Quantitative and Qualitative Monitoring of Performance of Institutions, Public Entities included in Case of Akbar Abad Qanat World Heritage Site

Row	Entity, Public Entity, and Local Community	Name of Activity/ Action based on Agreement Text	Cost/ Budget (Rial)	Period of Time
1	Principality/ City Council	1-Design of tourism complex around Qanat 2-Reconstruction and organization of gates leading to Akbarabad Qanat 3-Organization of neighboring streets of Qanat such as asphalt and division of spaces 4-Organization of surrounding walls of Qanat 5-Soil operations 6-Arranging for holding shows 7-Arranging for relevant cultural and public events	1-1.000.000.000 2-900.000.000 3-2.000.000.000 4-400.000.000 5-36.000.000 6-20.000.000 7-150.000.000	2017 and 2018
2	Qanat management board and traditional system of management in local entities	Dredging and digging new layers	1300, 1500 and 1800 million	2016-2018
4	Ministry of Agricultural Jihad and subordinate entities	Digging sides, arc laying, and debris removal	200.000.000 million	2017
5	Ministry of Cultural Heritage, Tourism and Handicraft and subordinate entities	Developing a center for monitoring at vicinity of Qanat and participation in organization of area of Qanat		2017

Table 6. Quantitative and Qualitative Monitoring of Performance of Institutions, Public Entities included in Case of Qasem Abad Qanat World Heritage Site

Row	Entity, Public Entity, and Local Community	Name of Activity/ Action based on Agreement Text	Cost/ Budget (Rial)	Period of Time
1	Agricultural Jihad Organization of Ferdos Town	Summer insurance for Qanat workers of company	62.220.390	2018
2		Summer insurance for official personnel of company	69.577.981	
3		Two-month summer wage of Qanat workers	212.040.000	
4		Three-month summer wage of official company personnel	302.113.731	
		Last two month of spring wages for Qanat workers	318.060.000	
		Last two month of spring insurance for Qanat workers	90.598.268	
		Purchasing coiling materials (sand, clay and wire) during summer	103.974.200	
		Cost of company vehicles (tractor, machine and motorcycle) during summer	31.451.750	
		Total	1.190.036.420	
2	Regional governments of Ferdos Town (Baghestan Olia Rural Administration Office)	Repair and restoration of Baldeh Qanat	2.580.000.000	2018 Summer
3	Mortmain and Endowments Office- Ferdos Town	Restoration and dredging	N/A	2017-2018
4	Ministry of Cultural Heritage, Tourism and Handicraft and subordinate entities	Survey and Development of Tree Monitoring System	500.000.000	2017-2018

Table 7. Quantitative and Qualitative Monitoring of Performance of Institutions, Public Entities included in Case of Qasem Abad Qanat World Heritage Site



Figure 7. Seasonal meetings with managers and relevant entities by central office of Qanat in Tehran

In the following, some correspondences between Central Office of Iranian Qanat and entities, managers of local offices are included and relevant guidelines were imparted.



Figure 8-Follow-up of process for completion of bars around the area, establishment of monitoring offices and document centers in regional offices and forwarding guidelines to regional managers (right), invitation of local office managers to participate in periodical meetings (bottom)





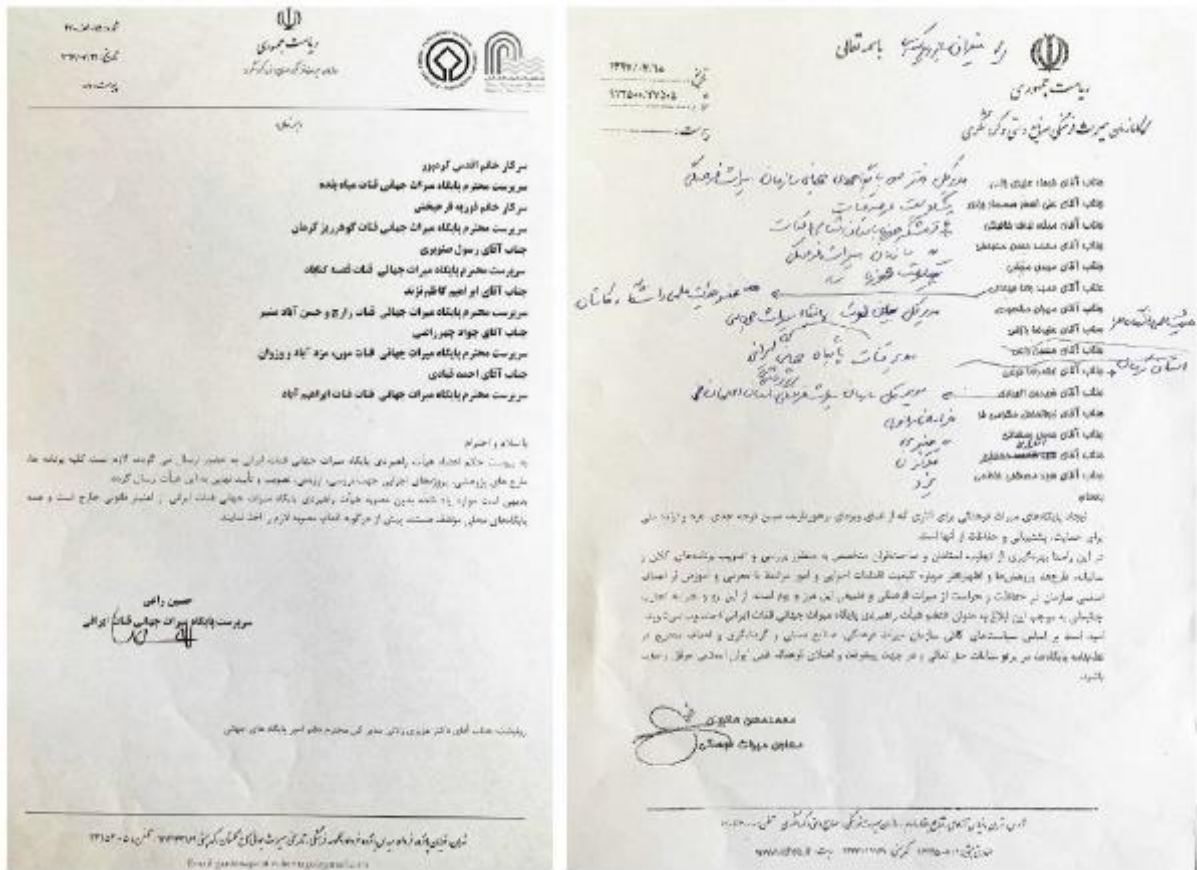


Figure 10. Forming Qanat steering committee and announcement of members (right); communication of duties and positions of steering committee to managers of local offices (left)

For instance, Qasabeh Qanat Monitoring Office is regularly checking monitoring indicators for different cases. Qasabeh Qanat is one of the selected cases by Regional Water Distribution Company for monitoring flow rate of water in Gonabad Town. As a result, a copy of reports of water level changes measured monthly and seasonally will be sent to local managers. In the section of Qanat structure, monitoring of cleaning activities including dredging of channels, main wells and Dolab-no gallery led to follow-up of management board of Ab-baran Cooperative for Qasabeh Qanat with cooperation of Agricultural Jihad Organization, Astan Qods Razavi, Owghaf and Endowments Office and Qasabeh Qanat World Heritage Base. As a result, project of dredging and opening blockage points of Qasabeh Qanat was done during 9 months and this led to 31-liter increase of Qanat flow rate.

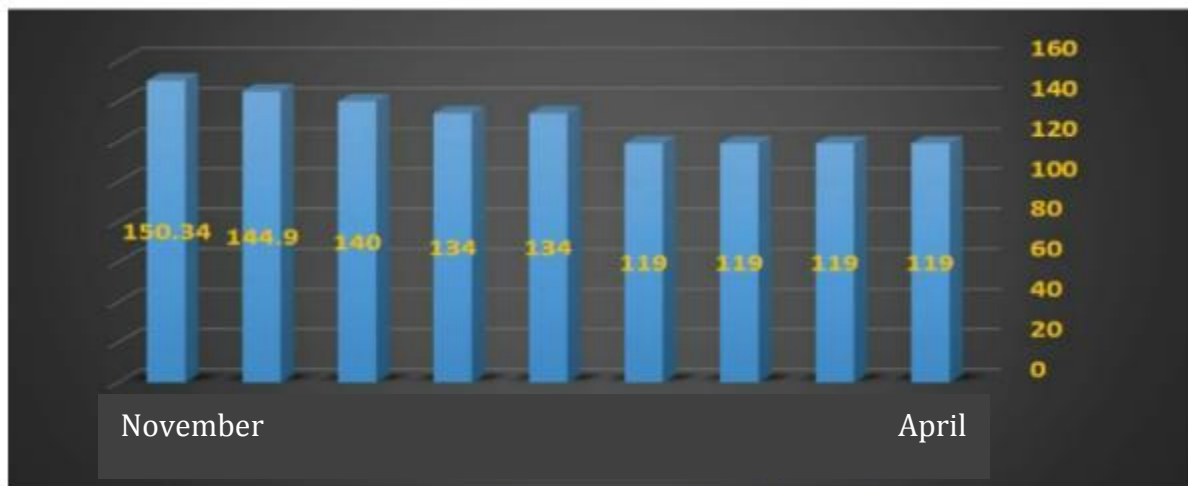


Diagram 2. 31 liter per second increase of water outflow in Qasabeh Qanat in 2018

Monitoring Water Level Changes in Qasabeh Qanat								
Year	Season	Flow Rate	Year	Season	Flow Rate	Year	Season	Flow Rate
1997	Spring	123	2004	Spring	133	2011	Spring	157
	Summer	127		Summer	128		Summer	140
	Fall	128		Fall	135		Fall	148
	Winter	109		Winter	139		Winter	135
1998	Spring	124	2005	Spring	140	2012	Spring	137
	Summer	116		Summer	135		Summer	135
	Fall	105		Fall	130		Fall	127.1
	Winter	115		Winter	127		Winter	
1999	Spring	119	2006	Spring	134	2013	Spring	128
	Summer	100		Summer	131		Summer	149.1
	Fall	127		Fall	128		Fall	
	Winter	120		Winter	130		Winter	143
2000	Spring	115	2007	Spring	141	2014	Spring	127.6
	Summer	111		Summer	127		Summer	
	Fall	125		Fall	144		Fall	130
	Winter	134		Winter	140		Winter	134
2001	Spring	129	2008	Spring	138	2015	Spring	131
	Summer	120		Summer	137		Summer	122
	Fall	121		Fall	136		Fall	127
	Winter	128		Winter	139		Winter	130
2002	Spring	125	2009	Spring	141	2016	Spring	120
	Summer	121		Summer	138		Summer	117

	Fall	129		Fall	137		Fall	123
	Winter	133		Winter	135		Winter	130
2003	Spring	141	2010	Spring	134.5	2017	Spring	110
	Summer	121		Summer	133.4		Summer	120
	Fall	130		Fall	130.35		Fall	95
	Winter	135		Winter	131		Winter	119.3

Table 8. Flow Rates during 1997-2017

Monitoring Water Level Changes for Ibrahim Abad Qanat			
Row	Month	Year	Flow Rate (mm)
1	April	2017	12.8
2	May	2017	12.9
3	June	2017	11.7
4	July	2017	11.34
5	August	2017	11.72
6	September	2017	12.42
7	September	2017	15.9
8	October	2017	16
9	November	2017	14
10	December	2017	15
11	January	2017	15
12	February	2017	15
13	March	2018	15
14	April	2018	15

Table 9. Measuring Flow Rate of Ibrahim Abad Qanat

Monitoring Water Level Changes for Baladeh Qanat		
Row	Year	Flow Rate (L)
1	2003	185
2	2009	141.5
3	2011	210
4	2014	166.85
5	2017	100
6	2019	223

Table 10. Measurement of Water Flow Rate for Baladeh Qanat

In Baladeh Qanat, monitoring of greeneries was accompanied by rescuing storm-damaged trees, exposure of tree roots to air, pruning and artificial nutrition of trees, injection of fertilizer

and periodical spraying of bentonite on trees next to main gallery as is provided in comprehensive system of management and protection.



Figure 11. 10-A snapshot of comprehensive management and protection system for historical and old trees of Baladeh

#### 4.c-Completion of Permanent Drawn of Boundaries of Property Components and Buffer Zones on the Ground;

As mentioned in previous reports, demarcating the area of the Persian Qanat started before inscription on world heritage list by physical elements and this is at its final steps. In the following, some instances of correspondence and drawings on this matter are provided.



Figure 12. An instance of written correspondence on completion of Permanent Drawn of Boundaries of Property Components (2018)



Figure 13. Issuing details of boundaries of Qanat by Central Office of Cultural Heritage to Provincial Government and all relevant entities (2015, left) and instance of warning to violators of the surrounding area of Qasabeh Qanat (2019; right)

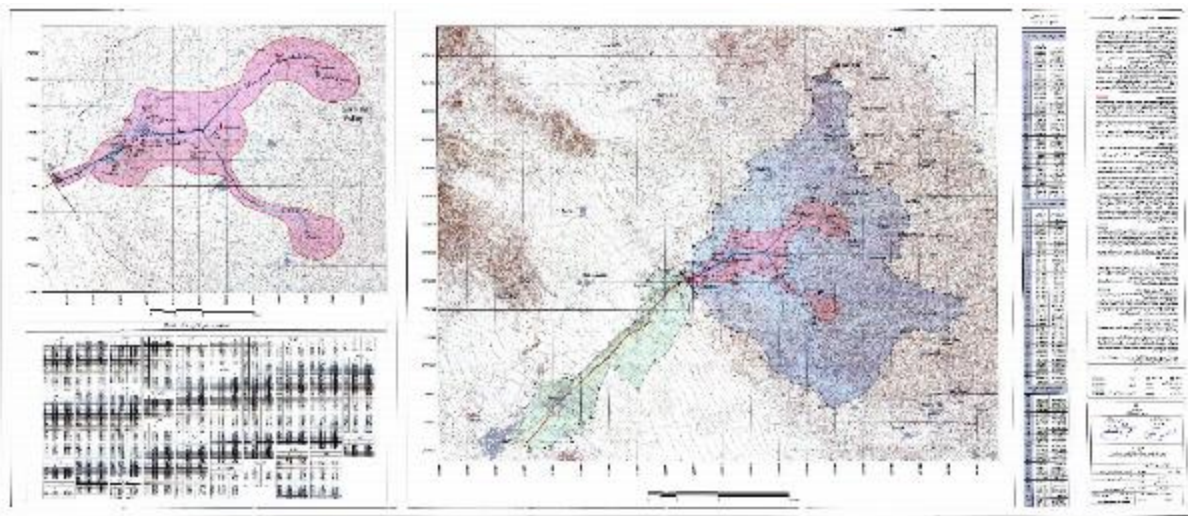


Figure 14. Installation of demarcating bars for representation of area of Baladeh Qanat (2019)

### Major measures implemented in the Persian Qanat World Heritage Sites

Since Qanat require integrated management, meetings were held monthly by engagement of local offices in the central office. The managers are supposed to introduce protection and restoration plans, specify their interactions with relevant entities and communicate the problems in such meetings.



Figure 15. Monthly meetings with managers of local offices of Qanat (2019)

**Among the most significant measures done during 2018-2019 one could point to the following:**

- Determining organizational identity of the Persian Qanat World Heritage Site in terms of logo for Persian Qanats, design and development of Persian Qanats website ([www.qanatirani.com](http://www.qanatirani.com));
- Designing brochures for 11 Qanat World Heritage Sites;
- Arranging for cultural and scientific events such as International Symposium of Baladeh Qanat in Southern Khorasan Province;
- Design and printing the journal of Persian Qanat World Heritage Site;
- Developing guidelines for participation of stakeholders of Persian Qanat World Heritage Site and communicating them to managers of local offices;
- Developing guidelines for organization of area and borders of Qanat and issuing them to relevant centers and principalities;
- Developing executive operation plan for restoration of roof of Ibrahim Abad Hammam as one of the relevant structures of Ibrahim Abad Qanat and monitoring their implementation;
- Arranging for expert meetings and training of Qanat managers (4 meetings);
- Field monitoring of Qanat boundaries in Isfahan, Markazi, Khorasan Razavi, Southern Khorasan, Yazd and Kerman provinces (monthly);

#### **Qasabeh Qanat (Gonabad)**

- Debris removal, excavation, documentation and restoration of upstream mill by participation of Higher Education Centers;
- Design and implementation of phases 2 and 3 of reinforcement of gate two of Qasabeh Qanat for visitors in Persian New Year duration (2019);
- Implementation of phase 3 of power-line for the distance between gates 1 and 2 of Qasabeh Qanat;
- Mapping and developing plan for restoration of Qasabeh Qanat;
- Management of project, reinforcement and dredging of Qasabeh Qanat by participation of Astan Qods Razavi, Owghaf and Endowments Office and board of trustees;
- Providing an information unit and equipping it;

- Uploading all of the movies taken of Qasabeh Qanat on Cultural known websites and other virtual means by the name of “World Heritage of Qasabeh Qanat”;
- Cooperation with Agricultural Jihad Organization of Gonabad in World Heritage Inscription of Saffron plant in Gonabad by referring to Qanat-based irrigation;
- Drafting the comprehensive tourism plan based on current status of site;
- Holding periodical meetings with students and training them as tour guides of the sites;
- Implementing strategic studies by emphasis on protection and sustainability of measures in Qasabeh Qanat;
- Monitoring and reviewing genetics of aqueous creatures (fishes) in Qasabeh Qanat by cooperation with Department of Fisheries (Ferdowsi University of Mashhad);



*Figure 16. Tourists during 2019*

In addition, monthly meetings of Qasabeh Qanat trustees’ board were held to coordinate, promote and maintain traditional management, further improve protection and maintenance of the Qanat and follow up the issues of this historically valuable site until they are resolved.



*Figure 17. Cooperation of trustees’ board in different affairs (2018)*

Among other cultural and touristic measures implemented during 2017-2019, one could point to the programs specific to New Year such as local games and matches, horse riding, camel riding and chariot riding, sales of handicraft products, introducing saffron and traditional foods of the region, visiting garden-alleys and the custom of cleaning the area by engaging local



communities. The above actions contribute to promote quality of life, local development and higher interest of individuals in maintaining their local Qanat.



Figure 18. Traditional wood dance (right); horse riding matches (left; 2019)

In addition, holding certain events for cleaning world heritage sites annually through Qasabeh Qanat tourism course. This activity covers a path from water-park to the Mazhar. To do the activity, non-governmental organizations and principalities participated.



Figure 19. Tradition of site cleaning on Qasabeh Qanat (2018)



Figure 20. Development of phases 2 and 3 for reinforcing inflowing gate no.2 of Qasabeh Qanat (2018-2019)



Figure 21. Reinforcing and dredging of Qasabeh Qanat (right), dropping sand and flattening of main touristic route (left, 2018)



Figure 22. Dredging parts of Gonabad Qanat (2018)

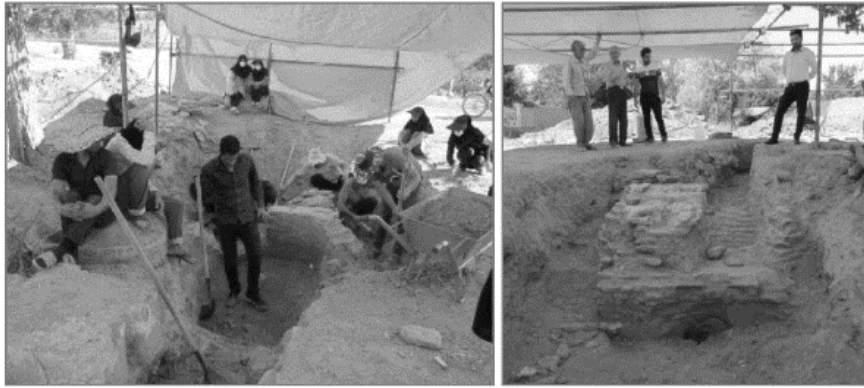
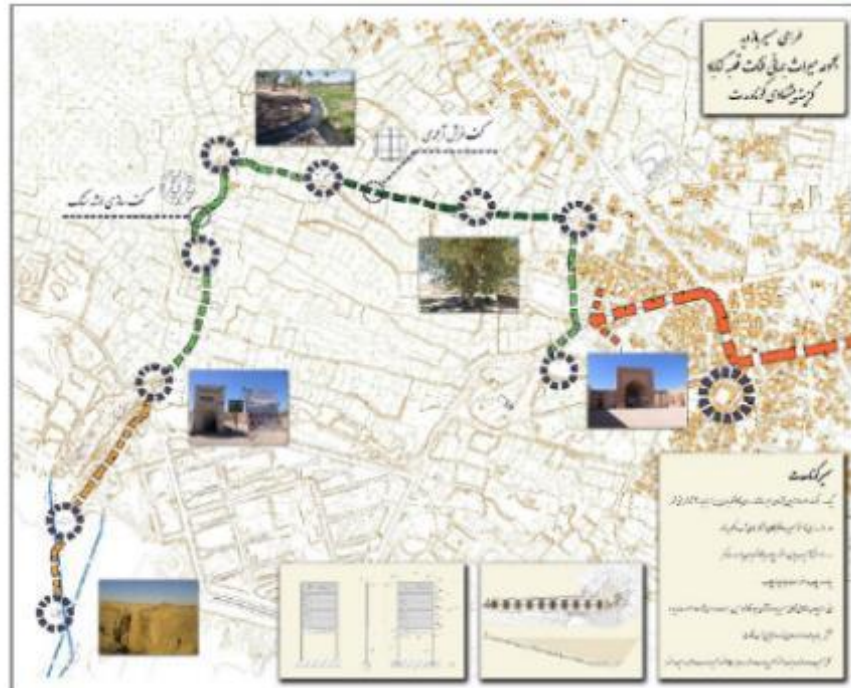


Figure 23. Debris removal and excavation of upstream mill of Qasabeh Qanat in cooperation with Gonabad Higher Education University (2018-2019)



Figure 24. Phase 3 of electrification in area of Qasabeh Qanat world heritage site (2018)



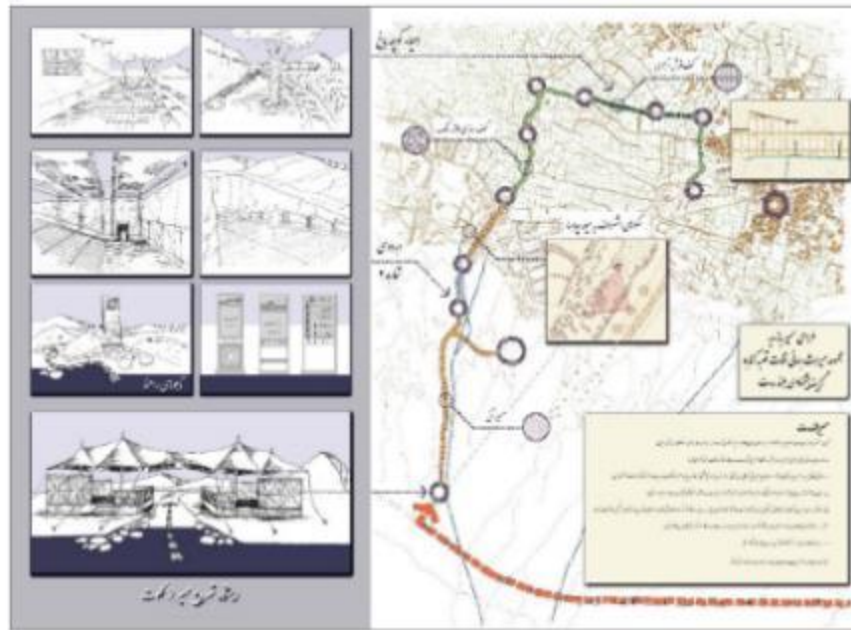


Figure 25. Developing primary study plan of tour path of Qasabeh Qanat (2018-2019)

### Baladeh Ferdos Qanat

- Rescuing a number of damaged trees by cooperation of rural administration offices and councils;
- Landscaping and developing shelters through Abarkhesht (specific adobe-laying) system in touristic station of Karriz-e Garm;
- Restoration of streams and access routes to Baladeh Qanat;
- Developing water dikes to control flood flow at vicinity of Qanat Gallery;
- Dredging well shafts and Qanat Gallery;
- Collecting flood flowing into Zaneh Karriz and dredging it;
- Dredging Boreh Karriz;
- Restoration of Qanat Gallery coils and pool of Shoqad Karriz;
- Dredging and debris removal of flood in Shoqad Karriz;
- Restoration of Karriz-e Garm Gallery and substitution of worn out and damaged coils;
- Pavement of the joint streams of Majra and Garm Karriz;
- Dredging Shashtoo Karriz, developing roofed streams near Shashtoo Karriz;
- Restoration of Mardkhaneh and Masoomeh water storage from already used materials of Baladeh Qanat;
- Lightening the roof of water storage and restoration of destroyed surrounding walls of Mardkhaneh;
- Reconstruction of the dome of destroyed pool and laying brick walls for water storage;
- Reinforcing walls and laying surrounding walls with mud bricks taken from Mardkhaneh of Baladeh Qanat in urban area;
- Construction of brick-laid wall around Haji Jafar Pool;
- Arranging tours for introducing the Baladeh Qanat World Heritage Site to students and visitors;
- Cooperation with authors to introduce the complex;

- Holding public meetings with residents of upstream and downstream Baghistan villages to inform them about world heritage values of Baladeh and protection of main course route trees;
- Installing panels to introduce the characteristics of Shoqad and Boreh Qanat within the premises of Mazhar;
- Holding public events for protection of site, promotion of public participation, and developing tourism and ecotourism cooperates for further improvement of income and economic boom of the region.
- Among the most significant measures done to engage relevant entities is holding regular meetings at different periods of time. In those meetings, relevant problems of Qanat will be reviewed and better solutions will be introduced.



*Figure 26. Meetings held with mayor of Ferdos Town and Miras Sabz Bamdad NGO (2019)*



*Figure 27. Dredging well shafts and Golavi Karriz Gallery (2018)*



*Figure 28. Removing collected debris inside of coils of Zaneh spring coil (right) and substitution of broken coils and restoring them (right, 2018)*



Figure 29. Constructing water dike to control flood flow rate in vicinity of Qanat path (right) and dredging well share and Zane Qanat Gallery (left, 2018)



Figure 30. Restoration and construction of different parts of Shoqad Karriz (2019)



Figure 31. Dredging and modification of sides of Baladeh stream in adjacency of Baghestan Village (right); dredging Zaneh spring in initial water flowing section of Baladeh (2018, left)



Figure 32. Dredging and removing flood debris in Shoqad Karriz (right) and dredging the streams of Shashtoo Karriz (left, 2019)



Figure 33. Restoration of Mardkhane and water storage from available materials in Baladeh (right) and construction of destroyed pool roof and laying bricks walls for it (left, 2019)



Figure 34. Cutting worn out sections of Baladeh shelters in urban area (right) and reinforcing walls and surrounding wall with mud bricks (left, 2019).



Figure 35. Installing a post with characteristics of Boreh Qanat in the area of Qanat outflowing gate (right) and installation of a post with characteristics of Shoqad Karriz at vicinity of Qanat outlet (left, 2019)

### **Ibrahimabad Qanat (Arak)**

- Organizing Qanat route and main entrance walls;
- Cleaning the architectural elements of the Qanat (Hammam and water storage);
- Dredging channels and galleries of Qanat;
- Diagnosis of complex;
- Lightening of Hammam roof and laying bricks at external wall;
- Making tourism plan (phase 1);
- Holding workshops for introducing and training the volunteers in schools and for local community;
- Designing and installation of specification signs and eco-friendly furniture;
- Arranging for local celebrations and events;
- Arranging for handicrafts and local souvenir exhibitions;
- Designing and printing brochures, posters and English and Persian guide books;

- Carrying out a mapping survey the Qanat complex;
- Study and documentation of historical structures of Qanat and relevant architectural structures;



Figure 36. Cleaning the adjacent area of Qanat Mazhar (right) and removing improper furniture in the route leading to the Qanat (right, 2017)



Figure 37. Cleaning internal space of water storage (right) and stone flooring of adjacent spaces of water storage (left, 2017)



Figure 38. Restoration of Hammam related to Ibrahim Abad Qanat (2017)

### **Goharriz Qanat (Kerman)**

Goharriz Qanat is a dynamic and functional Qanat which supplied water for farming and drinking purposes. As a result, local community participated in maintenance of it and helped the experts of Ministry of Cultural Heritage, Tourism and Handicrafts. There was no problem in terms of local community's protection of the site. As a result, the local office embarked on consistent monitoring of protective, restorative and managerial measures so as to administer the valuable site efficiently.



- Restoration and organization of well shafts at vicinity of inlet and outlets of Qanat;
- Restoration and reorganization of the relevant structures of the Qanat such as mill, and Hammam;
- Revival of openings of wells;
- Restoration and protection of internal paths for transferring water;
- Restoration and provision of means for visitors's higher welfare;
- Landscaping and establishing entertainment means for visitors;
- Designing touristic route;



Figure 39. Restoration of well opening (right), reorganization of well shaft at entrance and exit of the site (2018)



Figure 40. Restoration of Qanat outlet for optimal use of water (2018)

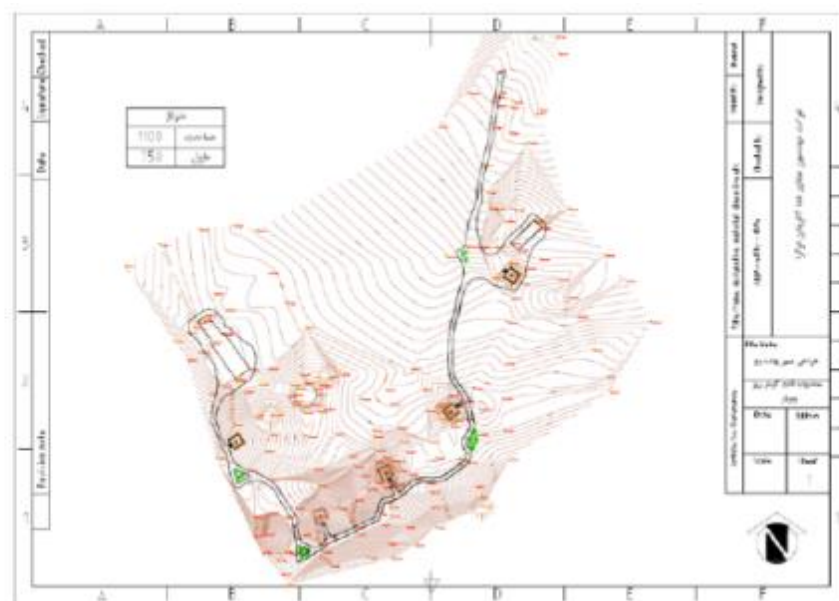


Figure 41. Designing visitation path (2018-2019)

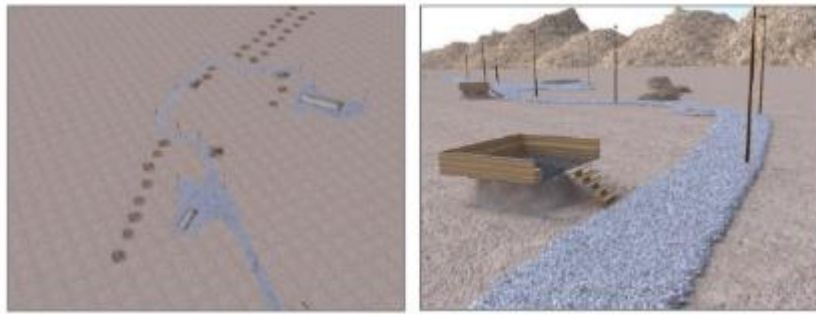


Figure 42. Designing visitation path (2018-2019)

In the following, some of the protective measures done within the area of above-mentioned Qanat will be pointed out:

Protective and Restorative Measures	Unit	Value
Dredging up to 20 and 30m above water level	cm <sup>2</sup>	683.68
Dredging up to 20 and 30m below water level	cm <sup>2</sup>	511.33
Dredging up to 40 and 50m below water level	cm <sup>2</sup>	237.756
Building structures with typical stone and cement sand mortar (1:3)	cm <sup>2</sup>	149.899
Laying blocks	cm <sup>2</sup>	126.66
Laying bricks and sand-lime bricks	cm <sup>2</sup>	11.606
Coating with 3cm thick cement-sand mortar (1:3)	cm <sup>2</sup>	73
Making facades from resistant stones	cm <sup>2</sup>	88.775
Filling the gaps between façade rock tiles	cm <sup>2</sup>	8.775
Mud coating of vertical surfaces with 3cm thickness	cm <sup>2</sup>	249
Framing	cm <sup>2</sup>	7.2
Cement pipe installation	m	87
Removal of soil from Qanat outlet	m	1700
Fencing	kg	5658
Anti-corrosion materials	kg	5658
Flat concrete lid with 100cm diameter and 10cm thickness	No	10

### Qasem Abad and Akbar Abad Qanat (Bam)

- Bed and sides digging operations in Qanat;
- Restoration and reorganization of well shafts;
- Restoration of well openings by installation of a number of cement pipes for few well shafts;
- Restoration and protection of catchment area of the Qanat;
- Excavation of sides, arch laying and removal of debris;
- Reconstruction and organization of inlets ending to Akbarabad and Qasem Abad Qanat;
- Digging and dredging;
- Modification of adjacent streets of Qanat including base, asphalt and division of spaces;
- Organization of walls around Qanat complex, streams and walls of gardens around Qanat;
- Making and installation of protective lid of opening in a number of well shafts of Qasem Abad Qanat;
- Organization of parts of garden walls and reorganization of the channel walls of Qanat streams;

- Reconstruction and reorganization of inlets leading to Akbarabad and Qasem Abad Qanat;
- Substitution, restoration and fabrication of covers of vertical wells in the path of Qanat (done for a number of wells);
- Landscaping and providing proper means and facilities for visitors (guiding and specification tools);
- Designing a touristic path for surrounding space of Qanat;
- Arranging for handicraft and local products Exhibitions.



Figure 43. Manufacturing and installation of opening lid for a number of well shafts (2018)



Figure 44. Design of touristic visitation path (2018)



Figure 45. Opening ceremony of touristic path of Qanat in Bam Town with participation of a number of state officials (2018)