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**Research Article** 

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# Water Resources Management of Hababah Town, Yemen

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# Abstract

Hababah town is a part of the District of Thula, one of the twenty districts of the Governorate of Amran. Hababah is suffering from water supply due to the fact that water supply from the public network comes once a month for a few hours. Communities are starting to repair and maintain their previous traditional cisterns and constructing new cisterns in cooperation with the local population and charity men without any support or supervision from the Government or local council. More than fifteen cisterns have been rebuilt and rehabilitated for the sustainable use of water resources. More than seven villages around Hababah town are now relying for water from cisterns. Each year, more than 70,000 cubic meters of water cisterns are being used. More than 1,700 families and 13,000 inhabitants are dependent on water cisterns.

Keywords: Water supply; Sustainable; Hababah town; Cisterns; Yemen

# Introduction

Yemen faces immense water challenges such as scarcity of water, low rainfall rate per year. The Yemen Government has identified the water sector as one of the key priorities for government policy. Yemen has been vulnerable to the effect of the climate change. Topographical variations of Yemen give rise to a wide range of climatic conditions. In general, the climate of Yemen can be classified as semi-arid to arid. Averages annual rainfall is 130 millimeters in the western coastal plain Tihama and 127 millimeters in the southern coastal plain Aden. The highest mountainous areas of southern Yemen receive from 520 to 760 millimeters of rain a year [1]. Amran Governorate is located north of the capital Sana'a around 40 km and contains twenty districts (Figure 1). Between November and January, temperatures in these mountain areas can drop down to 0°C particularly in Amran Governorate. Humidity is very high, on the coastal plains up to more than 80%, whereas it goes down toward the high land where it reaches its minimum rate in the desert areas to be around 15%. The hottest season



in Amran Governorate is from May to July, and the coldest season is between November and January, with maximum and minimum monthly temperatures in May 33°C and December 4°C, respectively. The average monthly humidity in Amran ranges between 35 % in July and 52 % in May. Thula district is one of the Amran Governorate, it is contains six towns, one of these town is Hababah. It is located north west of Sana'a around 40 km.

Hababah town contains seven villages (Al Saidah, Watar, Bait Behr, Al Mahla, Bait Hebah, Khoshar and Al Rawnah) (Figure 2). The elevation of Hababah is about 2,600 m above sea level. The water resources in Hababah are rain, runoff, and surface water e.g. springs and cisterns. Rainwater harvesting have been used in Hababah since ancient times and evidence of roof catchments systems date back to more than 4000 years ago in the Middle East where most of the cities were designed to take advantage of rain water as the principle water source for drinking and domestic use. The economic activities are agriculture and commerce. Farming mainly relies on the rainy seasons. The priority in this area is water as well as electricity. According to the census [2], the population in Hababah and the surrounding villages is 13,000 inhabitants and families' number is 1700. The family size is the highest in terms of number of family 8 persons (Table 1).

The public water network started in Hababah in the year 1980. This made the people trust the public network for a period of time. As a result communities neglected their traditional cisterns. For the past ten years the public network in Hababah has provided water only one day every two months for a few hours from Shibam city, around 20 km from Hababah. The municipal water utility of Shibam is often unable to guarantee the basic service of water supply and unable to provide people with a continuous drinking water supply due to the growing population and the increasing water demand. The number of hours supply available seems insufficient. The local people believe that water vendors or cisterns could deliver water more reliably than

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	Nr. Families	Male	Female	Total (M+F)
Hababah	1174	4333	4232	8565
Al Saidah	108	357	352	709
Watar	108	379	390	769
Bait Behr	44	122	129	251
Al Mahla	131	665	553	1218
Bait Hebah	61	226	230	456
Khoshar	82	390	357	747
Al Rawnah	86	293	282	575

Table 1: Demographic indicators in Hababah and their villages, Thula district, Amran Governorate [2].

Names of the cisterns	Area (m <sup>2</sup> )	Capacity (cm <sup>3</sup> )	Location	Purposes
Al Hajarn	1540	10010	Old city	Domestic use
Al Dalae	176	1414	Old city	Domestic use
Shabar 1	774	3870	Northern part	Spring-Drinking
Shabar 2	100	300	Northern part	Spring-Drinking
Mahdi	200	1400	Eastern part	Domestic use
Al Safa 1	5200	41600	Northern part	Domestic use
Al Safa 2	4200	29400	Northern part	Domestic use
Al Qasr	375	1875	Western part	Spring-Drinking
Al Sannaf	510	2805	Western part	Spring-Drinking
Al Harawah	800	4000	Southern part	Domestic use
Hejar Al Sood	512	4096	Southern part	Domestic use

Table 2: Names of the cisterns in Hababah town, Amran Governorate.

governmental supply. Therefore, rehabilitation the traditional cisterns around Hababah not only to manage the water, but also to help poor families who cannot afford to buy water from private water providers. This paper presents the role of community participation on sustainable water supply and resources management and shows how they have helped to improve the conditions in poor rural areas and protected the resource for future generations.

#### The Geological Background

The surrounding mountain of Hababah from south and west are Cretaceous Tawilah sandstone whereas Hababah town is located on Jurassic limestone which is part of Amran group that considered being the oldest sedimentary formation in the region [3]. The underlying Amran group consists mainly of fossiliferous carbonate (shallow-water limestone and marls) of upper Jurassic with total thickness between 410 and 520 m [4]. The Amran limestone is generally considered to be a poor and semi-confined aquifer. Well yields range from 3 to 6 l/s [5].

#### Toward Sustainable Used

Historically, the region is known for their traditional domestic and drinking cisterns. For centuries, local people in this region have carefully adapted to their local environment and needs. Increasing water demand and lack of access to water resources enable local people to come back to traditional cisterns and undertake activities and responsibilities for the conservation and management of natural resources independent without any support or supervision from the

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Government. Around two third of the population has no access to water supply in Hababah due to the public network is covering only 30%. Therefore, the people depended on water vendors and cisterns. The phenomenon of purchasing water from vendors is appearing in Hababah. Vendors bring drinking water from Hawshan village about 10 km to the east from Hababah. The water in Hawshan village based on dug and dug/bore wells.

The repairing cisterns start on 2005 because of the public water supply not sufficient and the cost of water tank truck. The cisterns in Hababah town more than 15 and most of them old and need for rehabilitate (Table 2). The supporting of funding to maintain previous traditional cisterns and built new one come from charity men and local people without any assistance from the Government or local council. Local authorities who are responsible for providing water supply such as General Authority for Rural Water Supply Projects (GARWSP) and National Water Resources Authority (NWRA) are absent in the region. Social Development Fund (SDF) which is support by World Bank built one cistern in Hababah. The cost of this cistern was five times of other cisterns which fund by charity men. This cistern also has defect in design and construction.

The first stage was repairing Shabar (1) and Shabar (2) which are based on spring water and will be used for drinking water for northern Hababah (Figure 3). Al Hajarn, Mahdi and Al Dalae cisterns are the oldest in Hababah town. These cisterns are cleaned two times per year during runoff and provide the inner town. The second stage was repair Al Safa (1) cistern which is the biggest in the town. The two spring waters in the western part of the town are Al Qasr and Al Sannaf cisterns which have been rehabilitated at the third stage. The last stage which was under construction and rebuild for Al Safa (2), Hejar Al Sood and Al Harawah cisterns. The domestic cisterns filled by rain water during the flooding season and used predominant sources for animals and washing clothes.

Total capacities for all cisterns are 70,000 cubic meters. Two third of the capacity of fifteen cisterns water have been used each year. More than 1,700 families and 13,000 inhabitants are dependent on water cisterns. The task of water transportation is mainly done by women and children.

### Conclusions

The community improved sustainable water use and introduced this approach for other villages using traditional cisterns. The repair of cisterns in Hababah not only improves the management of water, but also helps poor families who can afford to purchasing water. The local people understood the concept of the rebuild the cisterns. It is perfect solution for rural areas that cannot access for public network services. It promotes and create a strong motivation for future generations how to find alternatives for water resources.

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