# To cooperate or not to cooperate...? : collective action for rehabilitation of traditional water tunnel systems (qanats) in Syria

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# Chapter 1 Introduction

> *Although often mundane, the details of village economic and social life can be of vital importance to understanding Middle Eastern polities. In recent years, anthropologists and social historians have shown a renewed interest in understanding the Middle Eastern village, peasant (and proletariat) ideas of self and society, work and health, and community and responsibility in the context of historically specific economic and political formations.*
>
> Dale F. Eickelmann, 1989

## *Introduction*

An encounter in the Syrian Desert that ultimately led to this study was at the same time a reflection on my own frame of reference to life in general. One day in 1998, I came upon a desert village of 122 people all closely related and depending on only one source of water; a Byzantine tunnel called "qanat". In its physical nature, this type of groundwater extraction seemed a water utopia; it had been supplying water for 1500 years and minor maintenance works ensured a continuous flow of water even in the driest periods. A qanat irrigation system is a so-called *common property regime* (CPR) characterised by the fact that the water resource is owned collectively, where the user's community has relative autonomy and authority to internally establish the rules, rights, obligations and procedures regarding resource management and distribution (Boelens *et al*., 2002, 2003). But this qanat tunnel was poorly maintained and silted up with debris. The villagers were poor, their free water supply was slowing down and ultimately their livelihoods were in acute danger.

The tunnel was in a dire state, a mere trickle filled one third of an irrigation reservoir per day to irrigate small fields of vegetables and fruit trees. The tunnel required major cleaning and maintenance. With community effort, the village should have no further problems with their water supply. Instead, maintenance works had not happened since the mid-50's and people were moving away, settling in urban areas to start new lives. I could not understand why the people did not cooperate to maintain the tunnel to improve their livelihood, like their great-grandfathers had done. I asked myself why the people of this small village were not spontaneously joining together for the common good, when there was no obvious physical constraint? This was a mystery to me, clearly some other factors played a strong role in preventing collective action on

maintaining qanats. I wanted to find out what it was, in other words I began a journey to uncover my own assumptions of what was "logical" in terms of collective action, cooperation and community based natural resource management.

## 1.1 Short introduction to Syria

Before embarking on an explanation on what qanats are, I would like to provide a short introduction to Syria. It will place the study area and daily lives of the people described in this dissertation in a wider context. Syria lies in the East Mediterranean and has a total land area of 185.180 km2. Turkey borders the north, the east and southeast is bordered by Iraq, the south by Jordan, the southwest by Israel and the west by Lebanon. The average annual rainfall is 252 mm. There are 16 main rivers and tributaries in the country, of which 6 main international rivers: the Euphrates (Al Furat), Afrin, the Orontes (El-Ass), the Yarmouk, the El-Kebir, and the Tigris (Salman & Mualla, 2003).

Life expectancy at birth in Syria was 73.3 in 2003 and adult literacy rate (% ages 15 and above) was calculated at 82.9 %. In 1975, the total population was 7.5 million and in 2003 the population had risen to a total of 18.1 million people. In 2004, the annual population growth rate was estimated at 2.45% (Zakarya, 2005). It is estimated that the total population will reach 23.8 million in 2015[2]. More than half of this will be living in urban areas. Although in terms of human development, Syria is ranked as a middle-income country, pockets of poverty are found in the remote rural areas and among Bedouin communities. This is where most people without sustainable access to an improved water source live (21% in 2002).

Arabic is Syria's official first language, other languages used in the country are Kurdish, Armenian, Turkish, Aramaic and Syriac. Syria is a diverse country with many different social, religious and ethnic groups. The majority is of the Arab ethnic group (90%) with minorities such as the Kurds, Armenians, Circassians and Turkomans. The dominant religions are Sunni Muslim (74%), Alawite, Druze, Ismaili and other Muslim groups (16%) and 10% Christians (Zakarya, 2005). The diversity of peoples and languages is the result of a long history of the coming and going of ancient civilizations and outside invasions. Geographically Syria is an archaeological paradise as it lies at the strategic cross-roads of early Neolithic settlements as well as the ancient Assyrian, Mesopotamian, Phoenician, Persian, Greek, Roman and Islamic Empires. The region is the birthplace of agriculture and the Alphabet. The spread of Christianity

[2] http://hdr.undp.org/statistics/data/hdi_rank_map.cfm

started in northern Syria, which subsequently formed a major cultural and spiritual centre during the Byzantine Empire. The invasion of Muslim Arabs established Damascus as the main Islamic capital and seat of the Umayyad Empire where philosophy and science flourished extending from India to Spain. Crusaders invaded the country and established themselves in the western coastal area until the 14th century. In the meantime, various outsiders like the Seljuk Turks and Mongols regularly attacked and rampaged through the country leaving behind a trail of destruction. From 1516 until the end of World War I, the Ottoman Empire brought relative stability when Syria became an Ottoman Province.

After the break up of the Ottoman Empire, France governed Syria as a protectorate until 1946 when the country gained independence. The country experienced several military coups during the first decades as a nation. Syria shortly united with Egypt from 1958 until 1961 to form the "United Arab Republic". But this cooperation did not hold and in 1961 the Syrian Arab Republic was officially re-established. Syria lost the Golan Heights to Israel in the 1967 war and since then occasional peace talks, although unsuccessful, have taken place between the two countries. In 1970, Hafiz al-Asad seized power and brought political stability. He was a member of the Socialist Ba'ath Party and institutionalised an autocratic rule over the country. Being of a small Shi'ite Alawite sect his policy favored other religious minorities above the Sunni majority. Gradually halfway through the 1990s, the regime relaxed slightly, giving more freedom of information and openness to the outside world. After his death in June 2000, Hafiz al-Asad's son Bashar succeeded him. He favours a free-market economy and attempts to guide the country towards both an economic and political modern system (Zakarya, 2005).

Due to Syria's past, ancient irrigation systems such as qanats are still found today. After several centuries some of them continue to provide water in the desert. But can qanats survive the new economic and political environment that is emerging?

## 1.2 What are qanats ?

I should further explain what the elusive qanats are. Qanats are subterranean tunnels, intersected by airshafts, that tap groundwater and bring it to the surface using only gravity (Salih, 2006; Lightfoot, 1996, 1997, 2000, 2003; Vincent, 1995; Beaumont *et al.*, 1989; Wulff, 1968). The tunnel system is an ancient method and some scholars claim that the art of constructing qanats was spread more than 2500 years ago by the Persian Achaemenid Empire throughout much of the Mediterranean world and the Arabian peninsula (Briant, 2002; Beaumont *et al*. 1989; Goblot, 1979; Wilkinson, 1977; Wulff, 1968). The precise dating of qanats is

virtually impossible unless their construction was documented or inscribed (Lightfoot, 1996). In Syria, qanats are still in use at various sites.

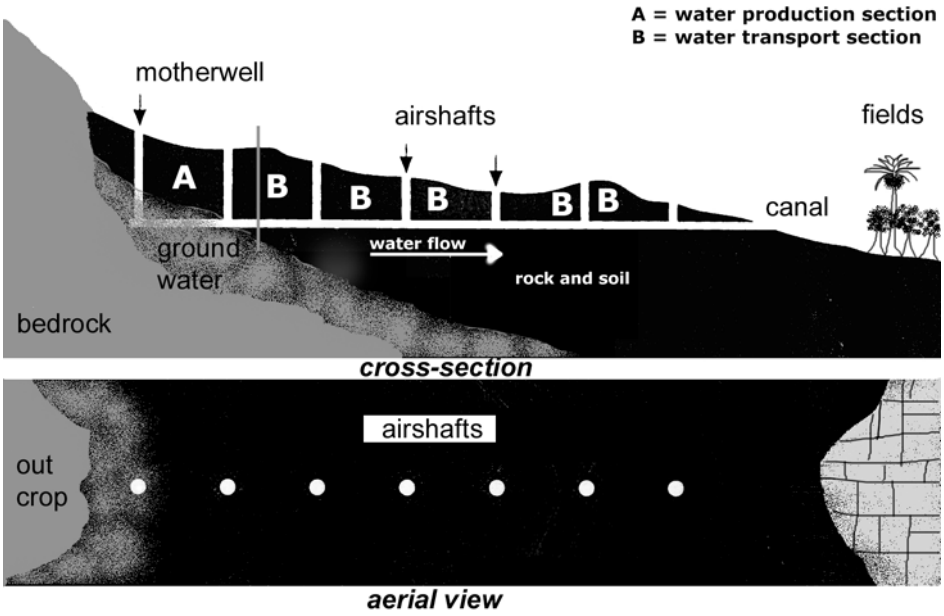


*Figure 1 - Schematic picture of a qanat system (adapted from Lightfoot, 1996)*

A qanat consists of a water production and a water transportation section. In the water production section, the tunnel is porous and groundwater is tapped and led into the tunnel. In the water transport section the tunnel is lined to prevent loss of water and the water is led to a human settlement to provide water for drinking, domestic uses, animals and irrigation. When the qanat is constructed, the so-called "Motherwell" is dug first to establish the groundwater level (Lightfoot, 1996; Beaumont *et al*, 1989; English, 1968, 1998; Wilkinson, 1977; Wulff, 1968). Once this level is established, the excavators calculate where the water will surface if a tunnel with a specific gradient (between 1:500 and 1:2,500) is dug (Lambton, 1989; Wilkinson, 1977). From this calculated point the excavators dig back to the mother well. The length of a qanat is controlled by the depth of the mother well and the slope of the ground surface (Beaumont *et al*, 1989; Beaumont, 1968, 1971; Wulff, 1968). The diggers construct airshafts to remove spoil and provide air to the excavators and to maintenance workers later on. The construction of the slope of the tunnel should be very precise, as Lambton (1989) explains, "if the gradient is too

steep, the water will flow too fast and erode the walls and the tunnel will fall in". Digging can take from two up to 17 years and is a dangerous activity (Beaumont *et al.*, 1989; English, 1968; Noel, 1944). Due to health and safety reasons, the digging of qanats has ceased; the last qanat was dug in the late 70's in Iran[3].

Much research is currently being done on the origin and diffusion of qanats. Its technology can be found in Iran, Iraq, Syria, Afghanistan, Central Asia, China, Japan, Mediterranean countries and islands, Canary Islands, Egypt and the Maghreb and even as far as Mexico and Chile. Each region has its own terminology of the technology; in Afghanistan and Central Asia as well as China the tunnels are called "Karez", whilst in Japan the tunnels are known as "Mambo". In the Maghreb they are known as "Khettara" or "Foggara". In Spain and other latin countries they are also known as "Gallerias". In Syria, the tunnels are known as "Qanat Romani" since it is common belief that the Romans have built them. For this study, I will use the term "qanat".

Many disciplines are involved in the research on qanats worldwide. It also means that the body of literature is wide. Treatises on them were written as early as the 11th century and British administrators studied them in Northwest India in the 19th century. Western geographers and hydrologists began to investigate them in Iran since the 1960s. I do not want to go back very far in history and will mainly discuss research dating from end 20th Century A.D. and beginning of the 21st Century. However, the account of Polybius which was written over 2,000 years ago, sheds some light on how qanats and their organization have always intrigued spectators. He describes the amazement of the army of Antiochus the Great during their campaign in 212-205 B.C. over the Parthians: *"these people at infinite toil and expense constructed these underground channels through a long tract of country, in such a way, that the very people who now use the water are ignorant of the sources from which the channels are originally supplied*"(Wilkinson, 1977). It is that very same amazement that until today has constituted a small but determined interdisciplinary scientific community that aims to crack the many questions about qanats; who built them first, how were qanats built, how did the technology spread, where are qanats found and which ones are still used, what role did qanats play in human development, why are qanats being abandoned and maybe most importantly today, how can qanats be re-used to serve as a basis for sustainable development ?

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[3] *Personal communication with "muqannis", traditional Iranian qanat diggers, invited as guests of honour during the International Conference of Qanats in Yazd, Iran, May, 2000.*

## 1.3 Research on qanats since mid 20th century

Since mid-20th century, various geographers, army personnel, foreign services and hydrologists have described qanats and published articles in international journals, in particular about the qanats of Iran. Often these articles described the physical attributes of underground water tunnels with reference to their construction, history and some of the social organisation around it. One of the first applied accounts, aimed to deliver solutions for qanat use, was a technical and practical publication by Colonel E. Noel (1944). In this publication he describes common terms used in qanat construction and the way in which muqannis[4] determine where to dig the tunnels and how much labour is needed to construct a qanat. The publication is practical and describes the various difficulties that muqannis are facing while constructing and maintaining qanats. The economical and hydrological values are described from a development point of view in which Noel concludes that rehabilitation of qanats could be a beneficial investment for the then Persian government. He suggests that a public company could well receive a grant to carry out necessary research work.

Noel's surprising article shows how the research on qanats can easily develop in a practical and applied exercise in which further solutions for qanat use are sought. What Noel briefly touches upon are the water laws concerning qanats, but much further research into the lifeworld of qanat communities was necessary to determine and describe the various social aspects. The research community was very small and much aimed at the qanats of Iran. English and Beaumont have published extensively about the Iranian qanats. The main questions they posed were about the origins of qanat technology and the diaspora of the technique, which are, to date, still valid research questions on which much debate is on-going[5]. A third question that came up was the settlement pattern of local communities in relation to qanat technology. The Wilkinson publications on settlement patterns in inner Arabia are a good example of the widening research both geographically and holistically.

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[4] *Iranian qanat diggers and traditional specialists*

[5] *The most difficult task for archaeologists is to date qanats. Without inscriptions, artefacts do not give a sound clue for the exact digging date, and without further extensive circumstantial evidence it seems an impossible task to date the tunnel. The origin of the technique is also much debated and politically colored, some particular countries would claim the invention despite scientific evidence; whilst Goblot attests the Achaemanid origin, many present scholars question the data found and with the emergence of new archaeological data, the exact origin and spread of the technology is still a research area with gaps to be filled.*

In the late sixties and early seventies of the 20th century, the research community was growing. Archaeologists, geographers, mining engineers and hydrologists all attempted to research and describe parts of the qanats systems. Wilkinson (1977) studied the qanats systems in Oman (called Aflaj *plur.*) and concludes that studying qanats requires wideranging research with the tools of respective disciplines. His study represents the "Water, Earth and Man" approach to Oman, which was introduced by Chorley in 1969. He finds that authoritative specialist studies on qanats in the various fields are rare. In his own research he tries to tackle the issue but fail in his ambitious attempt that, he admits, will need re-assessment with every new data set that emerges in the future. Following the holistic approach, the department of Geography of the University of Tokyo, under the guidance of Professor Iwao Kobori, set out to conduct a comparative research of qanats in oases in the arid zone of the old continent. It was an attempt to clarify the natural and technical foundation, including an analysis of the water-man-land relationships. It resulted in some interesting publications that compare qanat communities in Syria and Algeria (Kobori *et al*, 1969, 1973, 1976, 1980, 1982, 1989, 1990). The monumental publication of Henry Goblot that appeared in 1979 "Les Qanats; une technique d'acquisition de l'eau" was a first attempt to describe the history, spread and origin of the technology. Goblot develops a theory that the origin of the qanat lies in the northern part of Persia and the spread mainly begun during the Achaemanid and Parthian periods.

The various research projects and disciplines concerned with qanats called for a gathering of scientists. Some regional conferences had been organized in the nineteen seventies, but it wasn't until the eighties that scientists started to gather on an international scale. In 1987, an important conference on qanat systems was organized at the Centre of Near and Middle Eastern Studies, SOAS, University of London in London which resulted in a major publication by Bonine and McLachlan called "Qanat, Karez and Khattara". Several presentations shed light upon the transformation of qanat systems in modern times and the conflict between qanats and other forms of water exploitation such as diesel pumps (presentations of Kielstra, Joffe and Dutton). Although many think that the introduction of pumpwells were the main cause of the decline of qanats, MacLachlan in his contribution to the London conference showed that karez systems in the Hari Rud basin in Afghanistan were already in decline before the advent of new pumping technologies and causes of decline should also be sought in internal factors. In 1984 publications by Sutton and Birks described the modern difficulties and the social and economics challenges facing qanats in Oman (Sutton, 1984; Birks, 1984). In the London proceedings, Dutton gives an example of a qanat renewal in

Araqi, Oman and concludes that rapid economic and social change is threatening the existence of qanats, it suggests a long-term programme to help ensure and maintain, in a modern context, the important role of qanats.

The London conference was followed by several international conferences in China (1990) and Iran (2000). The Yazd conference in Iran was a first step in the direction of recognizing qanats as a cultural heritage that needs to be protected. With the concluding presentation, it emerged that there is an urgent need for international cooperation and action for comparative qanat studies. Consequently UNESCO assisted in the establishment of an International Qanat Research Centre in Yazd that was finally inaugurated in 2005. Nowadays, scientists from Europe, the USA, Japan, China, Iran, Oman and other Arab countries are conducting research in one form or another on these intriguing water systems. A growing body of literature is being established on qanats.

## 1.4 From science to practical application

In his study on Omani qanats (called Aflaj) Wilkinson (1977) highlighted the reliability and the extra-ordinary longevity of a well-constructed and maintained qanat withstanding severe drought in a desert environment. In the beginning of the nineteen eighties, some projects on qanat renovation emerged from Oman, triggered by scientists who deemed it necessary to push for a better understanding of the benefits of qanats. Today the Omani government has an active and welldeveloped government policy on the protection of their qanats and has designated a special directorate of Aflaj and support wells that works under the auspices of the Minister of Irrigation. Other Arab countries realised the importance of the use of their traditional water systems and in the second half of the eighties, a UNESCO/ACSAD project was developed to assess the use and conservation of water resources with an emphasis on the traditional water systems[6] in the Arab world. Next to other techniques on water harvesting and surface run-off, the project describes an assessment of the traditional water systems, that are called foggara[7]. In five countries,

[6] *UNESCO/ACSAD, 1986, The major regional project on rational utilization and conservation of water resources in the rural areas of the Arab States with emphasis on the traditional water systems*

[7] *The different terms of qanats (Falaj, Foggara, Karez, Khattara, Galleria) are important for the research on spread and semantics in qanat technology. Some debate is on-going whether they actually mean different part of the original system. For example Falaj means divide or division (of water) while Khattara might actually mean the outlet and Qanat describes the underground tunnel (pers. comm. Wilson and Salesse). The*

Algeria, Tunisia, Oman, Egypt and Morocco the effect of improvement of the foggaras can be considered promising. The general conclusion of the UNESCO/ACSAD project concerning qanats is that a detailed study of the hydro-geological conditions of the region is necessary before any development work can be contemplated.

The major earthquake in Bam, Iran, in 2003 drew worldwide attention to the ingenuity of qanats in sustainable management of groundwater in arid zones. At the same time the importance and vulnerability of groundwater as one of earth's primary natural resource became stringent (Salih, 2006). The earthquake in 2003 in Bam, Iran, that devastated the city and killed an estimated 26,000 inhabitants also destroyed most parts of the thousand year old qanat systems that were still in use in this historic city (Salih, 2006). A major international relief effort was launched and studies undertaken afterwards revealed the region's hydrogeological, archaeological and geo-historical wealth (Salih, 2006). Bam district is a typical desert oasis and its qanats belong perhaps to the oldest in the world. Rebuilding the city will take years and enormous funding efforts are being unleashed, to complete the almost impossible task of restoring the ancient qanats. It made the global community realise the unique application of qanats as a groundwater management tool in arid regions.

Overall, groundwater management is among the most important challenges facing the Middle East and North Africa (MENA) region (World Bank, 2000, 2002; UNDP, 2006). The publication of the UNDP Human Development Report in 2006, focused on the world's water situation, definitely set the stage for a strong link between water and human development. The Middle East and North Africa region is the world's most arid region and with only 1,200 m3 per person annually, the most water stressed region in the world (UNDP, 2006). In the beginning of the 1990s, eight countries in the Middle East (Kuwait, Qatar, Bahrain, Saudi Arabia, United Arab Emirates, Jordan, Yemen, Israel) crossed the red line of "absolute water scarcity[8]" (Engelman & LeRoy, 1993; Swain, 1998). The population of nearly 300 million has doubled in the last three decades and is expected to double again by 2025 (Blanche, 2001). The projected population increases over the next half-century are daunting: Saudi Arabia's from 21 million to almost 60 million; Iraq's from 23.6 million to 53.6 million; Egypt's from 69 million to nearly 114 million; and Yemen's from 19 million to 49.4 million by the year 2031 (Obaid, 2002;

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*semantic research could well be instrumental to develop categories of qanat techniques that eventually serve as a dating tool in the future.*

[8] *"Absolute water scarcity" in hydrological terms is reached if the per capita annual fresh water availability of a country falls below 500 cubic meters*

UNDP, 2006). This means a massive pressure on the already scarce water resources. Yet newer technologies – especially groundwater pumping devices- cannot keep pace with rising water demand for long, and may instead deplete now viable aquifers and preclude their use even for lower-impact traditional irrigation (Lightfoot, 1996).

But all is not doom and gloom, Allan (2002) claims that the reason why Middle-Eastern countries could sustain their exponential population growth was by the import of "virtual water" hidden in food imports and rarely reported in national water balances. Virtual water is water embedded in commodities and looking at the growth of food imports as indicators for water deficits, the MENA region ceased to have enough water to meet its food and other economic needs in about 1970 (Hakimian, 2003; Allan, 2001). Noting that producing a tonne of wheat requires 1,000 tonnes of water, Allan argues that wheat imports have spared governments the need to find scarce freshwater to grow food at home[9]. Nonetheless at local level people feel the immediate effects of water scarcity in the Middle East.

The Alicante Declaration in 2006 stresses the global importance of groundwater and calls for action for its responsible use, management and governance[10]. It is anticipated that by the middle of the 21st century nearly 65 per cent of the world population's may experience conditions of water stress and water scarcity (Lonergan, 1996; Swain, 1998). The UN Millennium Development Goal on environmental sustainability (MDG 7) states that by 2015 the proportion of people who are unable to reach, or to afford, safe drinking water should be halved. But Hunt states that even allowing for high levels of irrigation efficiency will not prevent that nearly 2 billion people will live in regions of "absolute water scarcity" by the year 2025 (Hunt, 2004). The dominant paradigm of water management has been one of scarcity, assuming that the lack of water is the underlying factor to all water resource problems (Soussan, 1998). Soussan thinks this analysis is too thin. Scarcity is not a simple, one-dimensional concept – it is multi-faceted, dynamic and finds expressions across the range of uses of water resources (Soussan, 1998). He warns that a simple analysis may lead to an increase of supplies to "solve the demand problem", but if scarcity is viewed as limited availability, then fair distribution and allocation are more in the line of a solution. The 2006 UNDP Human Development Report underlines that the world's water crisis is not a crisis of physical water shortage but a problem of asymmetric power relations,

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[9] *Email message SOAS water issue group, 06/08/02 on news article by Alistair Lyon, Reuters News Agency.*

[10] http://aguas.igme.es/igme/isgwas/ing/defaultc.htm

poverty and other inequalities. It is a crisis of governance. Qanats could form a useful contribution to using groundwater sustainably and fairly; properly maintained and governed qanats can never withdraw more than the rate of recharge. But with the abandonment of qanats, a large proportion of the traditional knowledge and the social system attached to qanats, thus the conditions for regular maintenance are also endangered.

## 1.5 Placing qanats in a development context

This thesis will mainly endeavour to place qanats and their communities in a development intervention context. Qanat maintenance and repair could be seen as a specific form of collective action serving as development intervention to protect and conserve scarce water resources. The conservation and protection of water resources in the Arab region is a major development issue (UNDP, 2005; 2006). In trying to place qanats in a development context it seems logical to look at the role of traditional irrigation systems for the sustainable use of water resources. Much work on traditional irrigation communities in the Andes gives valuable insight into how traditional irrigation systems could be placed in the context of development. The Rehabilitation of the Ancient Irrigation Systems in Urcuqui and San Blas (RIEGUS) project in Ecuador and the work done by Apollin (2002), Boelens (2002, 2003) and Hoogendam (2002) and many others, is instrumental in developing approaches to irrigation water management and methodological proposals for development. Qanat systems can be placed in such a development context and seen as a unique form of community based management of natural resources (CBNRM). At the Earth Summit in Rio de Janeiro in June 1992, world leaders committed themselves to a comprehensive programme to bring sustainable water supply and sanitation services to the hundreds of millions of people who currently lack them (Lammerink *et al*, 1998). From that day onwards, development projects that deal with community based water management have mushroomed worldwide and qanats seemed to fit perfectly well in that category.

The elaborate work done on Andean irrigation systems shows the potential for ancient systems. However, within the development industry, there has not been a development of reported standards and approaches for studies on similar ancient irrigation systems in the Middle East. Development professionals have overlooked the environmental and developmental potential of qanat technology. Moreover, compared to other development countries, Syria and the Middle East is not often the focus of mainstream development publications apart from the regular World Bank/IMF publications.

As a development country, Syria ranks in the middle-income countries[11] as World Development figures show; Syria's GNI per capita (formerly GNP per capita) grew from 1980 to 1983, from $1400 to $1800. Then it dropped massively to $820 by 1989. From 1989 to 1991, partly due to the Gulf war boomlet, GNI per capita increased to about $1200. It then dropped off again and leveled at about $1050 to $1100 until 1996 (Sullivan, 1999). In 2000, it fell to $950 and it increased to $1130 in 2002. In 2003, America's Iraq invasion staggered Syria's economy. The 2003, growth rate was down from 2002's rate of almost 4% due to the war. In 2005, the World Bank reported a GNI per capita of $1,420. The latest figures report a GNI per capita of $1,570[12]. However a variety of developments now burden the economy, such as expected declining oil revenues, international economic sanctions, a continuing demographic pressure and a labour force growing at a rate of 4% per annum. Another developmental concern is the rapid increase of Iraqi refugees. Syria has taken in more than a million Iraqi refugees since the Iraq war, primarily in and around Damascus. It has meant among other things a rapid rise of local housing prices and an increase of the prostitution industry. Syria provides Iraqis with free health-care and education facilities and the government estimated in 2007 that the annual cost of the Iraqi influx was US$1 billion[13]. The UNHCR and international development NGOs have now started to focus their attention and funds to the Iraqi refugee problem in Syria.

There is a broad difference between the oil-rich Middle Eastern countries and the poorer economies many of which are agricultural-based. Around 70% of poor people in the Middle East and North Africa live in rural areas (World Bank, 2002). In 1997 the World Bank published the

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[11] *A country having an annual gross national income (GNI) per capita (equivalent to more than $760 but less than $9,360 in 1998 is categorized as middle-income. The standard of living is higher than in low-income countries, and people have access to more goods and services, but many people still cannot meet their basic needs. In 2003, the cutoff for middle-income countries was adjusted to more than $745, but less than $9,206. At that time, there were about 65 middle-income countries with populations of one million or more. Their combined population was approximately 2.7 billion. (source: The World Bank)*

[12] *Latest figures as published by the World Bank, World Development Indicators Database, in 2007. Sources: World Bank SIMI data base, World Bank, World Development Report and other sources.*

[13] *http://www.irinnews.org/Report.aspx?ReportId=73895*

report *Rural Development: From Vision to Action for the Middle East and North Africa Region (MENA)* which set the global stage for rural development strategies. But it was not until the wars in Afghanistan, Iraq and Lebanon that the Middle East is getting much more attention from development professionals. Strategies have been altered and international donor organisations have been channeling their funding into various projects throughout the Middle East. With Afghanistan and Iraq high on the list of priorities, NGOs, international development and research institutes and networks in the region, have been benefiting from these developments since 2001.

The main challenges for development in the Arab countries can be divided in three areas: 1) respect for human rights and freedom, 2) empowerment of women and 3) active knowledge acquisition (UNDP, 2003). Although many Arab countries have taken steps towards improvement in each of these areas, the region remains far behind in these principles and finds itself in a crisis of human development. The rural development strategies currently being developed for the MENA region are aimed at reducing rural poverty, decreasing vulnerability of rural populations, empowering communities and civil rights movements and ensuring the sustainable use of natural resources. Water policy and issues related to natural resource degradation are considered critical in most of the countries. Community driven development and reform are the key implementation instruments associated with all MENA strategies for rural development. Ensuring community participation in the design implementation, operation and maintenance of projects and programs, and implementing policy and regulatory reforms linked to the strategies are critical (World Bank, 2002). But the question remains how ready the Arab region is for the introduction of community empowerment and participation? This study sheds light on dimensions of participation at local level. As well as being a practical application to a scarcity problem, the relevance of research on qanat rehabilitation lies in the field of commons research. Qanat systems are communally owned systems of groundwater supply, and as Agrawal (2001) states, the practical importance of commons research has never been greater; in the past decade, governments in nearly every developing country have turned to decentralised community-level institutions to localize their environmental policies and make them more effective. In 2006, Syria started a major reform of their governmental water institutions and calls for devolution are already heard. This study on collective action for qanats will give valuable insights into the importance of contextualization, the relationship between collective action and heterogeneity, the role of leaders and initiators, non-economic dynamics at community level and specifically the

conditions that make rural people in Syria cooperate to maintain a *common property regime* (CPR).

## *Organization of this book*

This book is divided in descriptive and analytical parts. Chapter 2 will outline some theoretical viewpoints deemed relevant to this study. Theories on human ecosystems and collective action for environmental management will be discussed. Chapter 3 discusses the structure and methodology of the study and poses relevant questions to guide us through the thesis. Chapter 4 briefly discusses the current status of qanat sites and groundwater resources at national level in Syria. Chapters 5 and 6 zoom in on the case study site of Shallalah Saghirah. Chapters 7 and 8 discuss the results of our case study in Qarah. Chapter 9 is an analytical comparison of the two case-study sites and provides conclusions and reflections.