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

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Chapter 2 Collective action for community water management, a human ecosystem approach

Introduction

The objective of this study is to analyse and compare how local users at two sites in Syria, Shallalah Saghirah and Qarah, work together to maintain their common property namely a *qanat system*. A better understanding of these processes will help to place qanat maintenance and repair as a specific form of collective action in a development intervention context. To understand the local level processes between actors of collective action, we should consider three aspects in this study. Firstly, qanat systems can be seen as human-made ecosystems. Therefore, studying the relationship between people and their environment is a main theme in this study. Secondly, the qanat as human-ecosystem can only be kept alive through regular maintenance of its tunnel(s) and the attached irrigation system. This requires cooperation of its users. As a result, the concept of collective action is central. Lastly, qanat users use their own ways of exchanging ideas and information and generating local knowledge, therefore special focus is placed on the role of communication in collective action for ecosystems maintenance. The two case study sites differ considerably from each other in terms of the social and economic background of its resource users, population size and proximity of urban areas (e.g. as exit options). Consequently, the importance of heterogeneity and contextualization and individual roles of dominant agents in the community are vital to help unravel some of the questions posed in this study.

Studying collective action for qanat maintenance as a socio-technical process requires an interdisciplinary approach and respect for different frames of theoretical references, terms, jargons and study units. The interplay between culture and the natural environment has always been central within anthropology (Reenberg and Paarup-Laursen, 1996; McNetting, 1974). Interconnectedness between people and the environment, is also one of the grand questions in environmental geography (Dietz, 1996). The theme is also known as: human ecology, behavioural geography, cultural ecology, and earlier as "man-environment relations." Human ecology, as the science of human-environment interaction, attempts to provide a perspective that bridges the gap between the natural and the social sciences (Marten, 2003; Dietz, 1996; McNetting, 1974). The goal of interdisciplinary studies is to provide a comprehensible text for both a social and biophysical scientist. The effective combination of different disciplines can thus be achieved by using a common language that joins the analyses (Heemskerk *et al.*, 2003). Concepts in human

ecology can possibly provide this and we see that in the process of finding solutions for interdisciplinary conflicts, new ecological paradigms arise.

Why people cooperate and do not cooperate is a question that has occupied researchers from a variety of disciplines over quite some time. Hence the body of literature on collective action is tremendous. Specifically cooperation for environmental management emerged as a major subject for research over the last two decades (Adhikari & Lovett, 2006; Abraham & Platteau, 2000, 2004; Baland & Platteau, 1999; Gillinson, 2004; Katon, Knox & Meinzen-Dick, 2001; Kurian, 2003; Kurian & Dietz, 2004; Marshall, 2003; Meinzen-Dick, 1984, 2002; Mollinga, 2001, 2004; Nelson & Wright, 1995; Olson, 1965; Ostrom, 1986, 1990, 1998, 2000, 2002; Somanathan, *et al.* 2002; Uphoff, 1996, 1998, 2000; Vermillion, 2001, 2004). Recent developments within that field stress the importance of history, situation and context and focuses on the relationship between collective action and heterogeneity, day-to-day politics, power and leadership (Adhikari & Lovett, 2006; Kurian & Dietz, 2003, 2004; Dietz, (Th), 2002; Somanathan, 2002; McCay, 2002). The debate stems from a general concern about the effectiveness of devolution and participatory approaches as conceptualized by New Institutionalism and evaluates the evidence of successes of community-based or community driven development based on a neo-institutional approach (Mansuri & Rao, 2003; Mollinga, 2001). This study attempts to contribute to that debate using a human ecosystem approach to analyse non-economic motivations for cooperation at individual and community level in Syria.

Water in the Middle East is a very political matter (Allan, 2002; UNDP, 2006) and a great number of political studies discuss water conflicts and sharing riparian rights at regional and international level in the Middle East (LeMoigne, 1992; Bulloch & Darwish, 1993, Biswas, 1994; Rogers & Lydon, 1996; Waterbury, 2002; Allan, 2002). Most of the studies on Middle East water conflicts apply rational choice theory in their analysis (Mollinga, 2001). Only a few focus on the role of the Islam in collective action (Burke, 2004). In agriculture, the studies of Vincent (1990, 1995) look at politics and irrigation in Yemen as well as some interesting recent publications on participatory irrigation management (PIM) in Iran and Morocco (respectively Hoogesteger and Vincent, forthcoming; Van Vuren *et al.*, 2005). For Syria, Ngaido *et al.* (2001) have done some interesting work on property rights and natural resource management¹⁴. Schweers *et al.* (2004) quantify and analyse farmer's

¹⁴ *Within the framework of IFPRI's project on Property Rights and Resource Management in the Low-Rainfall Areas of North Africa and West Asia, a component of the Mashreq and Mahgreb (M&M) project*

responses to water scarcity. However not much has been written about specific local level processes and the role of social change, history and leadership, trust and power, human emotion, information and communication and other non-economical dimensions as forces for collective action for community based natural resource management in Syria. The most interesting socio-cultural publications are by Rabo (1984, 1986) on the Euphrates Irrigation Project and perceptions of “development” and Rae *et al.* (2002) on technology adaptation and collective action in arid land management.

Organisation of this chapter

The first section describes a brief overview of concepts in human ecology and resource management and why we chose a human ecosystem approach for this study. The second section is a review of recent issues and debates on collective action for community based natural resource management. The third section is dedicated to the importance of information and communication for both human ecosystems and collective action. It builds a case for using the concept of video feedback in filming of collective action

2.1 Qanats as a complex human ecosystem

There has been an increased awareness of the deep connection between the biophysical and the social dimensions of our shared existence that shape choice of technology and resource delivery (Etzioni, 1998; Vincent, 2003). Ecology is the science of connectedness between living organisms and their environment. As one of ecology's most fundamental concepts (Pavao-Zuckerman, 2000) Tansley coined the concept "ecosystem" in 1935 as a system composed of organisms in an ecological unit and effective inorganic factors of its environment (Stepp *et al.*, 2003). The Convention of Biological Diversity (CBD) defines an 'ecosystem' as: "*a dynamic complex of plant, animal and micro-organism communities and their non-living environment acting as a functional unit*"¹⁵. Human ecology studies relationships between people and the environment. The term was first used when urban sociologists used ecological metaphors for their observations (Marten, 2003). We use the term "human ecosystem" based on the definition by Vitousek and Mooney (1997) as described by Stepp *et al.* (2003). They define human ecosystems as "*human-dominated ecosystems in which the human species is the central agent*".

I am not the only anthropologist with an interest in ecosystems; since the 1960s there has been an upsurge of interest in ecology within the social sciences and vice versa. In 1971, Odum started the thinking about energy and power and analysing human ecosystems when he published his influential book on environment, power and society (Odum, 1971). It is an attempt to apply basic laws of energy and matter to the complex systems of nature and man. He proposes that ecology may move closer to social sciences. However, the attempt of trying to view everything in quantitative analytical terms brought several limitations in the analysis of human processes in relation to environment. This critique was brought forward by McNetting (1974) in his discussion of the relationship of study between anthropology and agriculture. Specifically at microlevel, Odum's rather rigid systems approach lacked analytical power. In the 1980s the interest slowed down due to these strong critiques of the static nature of systems thinking in anthropology (Able & Stepp, 2003).

The discipline of human ecology has since moved on to a more process oriented approach to analyse different thematic areas of the complex relationship between humans and ecosystems. However not much attention has been given since to the emerging "new ecology" that provides an opportunity to explore more fully the implications of complex systems theory¹⁶ for ecosystems science and the study of humans therein

¹⁵ <http://www.fao.org/docrep/005/Y4586E/y4586e12.htm>

¹⁶ *Complex systems theory views systems as nested open networks with flows of energy, matter and information between subsystems. It supposes*

(Able & Stepp, 2003; Scoones, 1999). The internet, the spread of diseases, information, social trends and natural ecosystems can all be seen as dynamic complex systems (Amaral & Ottino, 2004). Amaral & Ottino (2004) attempt to give a definition, which will suffice for this study; *a complex system is a system with a large number of elements, building blocks or agents, capable of interacting with each other and with their environment*. “New ecology” proposes theory and methods to address the dynamics of ecosystems as complex systems (Able & Stepp, 2003).

Developments in quantum physics and postmodern paradigms provide further theoretical reflections on ecosystems ecology (Uphoff, 1996). The evolving intellectual debate on parallels between social science, ecosystems and quantum physics looks at the dynamics of human-environment interaction. Parallel to the Heraclitean “panta rei”, everything flows and is constantly changing¹⁷, we can see that everything is in constant movement. It is a question of scale; an ecosystem might seem static or in “equilibrium” when looked at from a distance, but the closer you look, the more dynamic it becomes until at micro level the elements of the wider system are continuously changing and exchanging, similar to a chair that looks static from the outside but at quantum physical level its quarks are showing the relative dynamics of the chair. You could say the same of a traditional society that seems static from afar but observed closely at various spatio-temporal levels is very dynamic. Nothing is static whether it concerns biophysical or social phenomena.

With “ecosystems management”, which is the applied component of ecological science used for practical problem solving (Vogt *et al.*, 1997; Able & Stepp, 2003), ecosystems are firmly back on the agenda of development. The completion of the Millennium Ecosystem Assessment (MA) in 2005, opened a door to regular integrative and interdisciplinary evaluation of the status of the worlds’ ecosystems. The MA focuses on the relationship of human wellbeing and ecosystems and develops response

multiple non-linearity of cause and effect, sees relationships between elements as reciprocal and history is deemed important because systems have a “memory” (Amaral & Ottino, 2004).

¹⁷ Uphoff (1996) compares Plato’s essentialist worldview with the rival existential philosophy of Aristototele. Their dispute became cast in ‘either-or’ terms whilst in the postmodernist paradigm ‘both-and’ thinkers are more comfortable with Heraclitus’ notion of the world as a continuously changing river. Essentialist worldviews look for inherent, fixed qualities, in contrast with the more Heraclitean or existential concern with contingent, emergent properties (Popper 1972, p. 194). ‘Both-and’ combines the two; an observed tangible thing is regarded both as a material object and at the same time an idea.

options to improve ecosystem management at local, national and global scales to contribute to poverty alleviation¹⁸.

Four future scenarios for global ecosystems are developed and in all, desertified areas are likely to increase, due to higher food demand and unsustainable land use (Adeel, 2005). The scenarios are based on the dichotomies *global* versus *regional* and *reactive* versus *proactive*. Maintenance of qanats would fit in the *adapting mosaic* scenario, a regionalized world with proactive ecosystem management. Which scenario will be present in 2050 depends on present conditions and trends, but in each scenario sustainable use of freshwater is of vital importance and qanats could play a unique role to combat desertification and sustain local water supply.

Global orchestration:

Globalised world with **reactive** ecosystem management: environmental problems addressed after emergence and emphasis on equity, economic growth, and public goods such as infrastructure and education

Order from strength:

Regionalised world with **reactive** ecosystem management: environmental problems addressed after emergence and emphasis on security and economic growth

Adapting Mosaic:

Regionalised world with **proactive** ecosystem management: long-term ecosystem service maintained and emphasis on local adaptations and learning

TechnoGarden:

Globalised world with **proactive** ecosystem management: long-term ecosystem service maintained and emphasis on green technologies

Source: Millennium Ecosystems Assessment

Box 1 - Four future Millennium Ecosystems Assessment scenarios

2.1.1 Including humans into ecosystems

Many biophysical scientists regard humans as disturbances to the ecosystem, focusing on the negative effects. In this view, humans are not natural ecological entities but stand outside the ecosystem (Pavao-Zuckerman, 2000). Humans, as “consciously living mammals”, could be integral part of an ecosystem and be included if they form active entities. Although some attempts have been made by ecologists to include humans

¹⁸ www.millenniumassessment.org

into the concept of ecosystems, progress is slow; it adds a considerable amount of complexity because humans exist in cultural, political and social environments as well as physical and biological environments (Pavao-Zuckerman, 2000). However, an ecological approach is often used in environmental studies in an attempt to bridge the gap between “hard” and “soft” science, physical and human geography, anthropology and bioecology (Dietz, 1996; Pavao-Zuckerman, 2000; Marten, 2003). Including humans into the ecosystem concept provides a “common ground” and could assist further with this attempt. It is also a move away from the sharp distinction between the natural world and the human experience in a postmodernist attempt to break down the social construction of “nature” and “culture” following a need for pragmatic approaches to tackle “real world” problems (McCay, 2002; Escobar, 1996)

Dietz (1996) discusses two extreme points of view in ecological approaches; those who regard environmental conservation as much more important than people’s livelihood (ecototalitarian) and those who prefer local level solutions and stress local experience with a mistrust of outside innovations (ecopopulism). Ecototalitarianism can be too rigid and harsh, with authors calling it ecofascism whilst ecopopulism tends to be too soft and weak, idealizing local communities and with an overly optimistic view of participation of all members (Dietz, 1996). Although including humans into ecosystems tends to be more at the “ecopopulistic” side, it is the idealization of the community where the difficulty lies. In development circles there is a certain mythical capacity assigned to communities, which are in reality complex political entities (Clever, 2001; McCay, 2002; Abraham & Platteau, 2004).

The close-knit village community is not the ideal “democratic” community that many would like to perceive, on the contrary, together with Abraham & Platteau (2000, 2004), we argue that a small community (in the Middle East) is least likely to be democratic. Conflict and power dimensions are part and parcel of even the smallest communities because they consist of different types of individual resource users. Vincent (1990, 1995) reminded us that argument and opportunism are human qualities and disputing and conflict are means of social interaction sometimes to overcome unequal or unjust distribution of resources. Politics are integral to resource management and Dietz (1996) proposes to use the concept of entitlements as core in political environmental geography. It forces studies of environmental geography to view natural resources and landscapes as “contested political arenas” (Dietz, 1996).

Despite the challenging politics, Vincent (1990) called for the potential of community management in an environment where water supplies are scattered and the influence of central government limited. Studies undertaken earlier on community irrigation management in the

Andes (Beccar, Boelens & Hoogendam, Apollin) and India (Uphoff, Wade) have proven the high potentials that exist in users' communities to initiate, develop and maintain their own local water management structures. This approach applies similarly to the water supply and sanitation sector. Indeed, the world made great strides towards the end of the 20th century in providing water and sanitation services to a growing population (Hunt, 2004) but limited availability, collapse of systems and failure of local maintenance forced the water supply sector to look at community level. In their study on water supply and sanitation in six different countries (Kenya, Colombia, Guatemala, Cameroon, Pakistan and Nepal) Schouten & Moriarty (2003) show the power and creativity of communities in their management of drinking water supply schemes, they also stress that communities are not islands isolated from the rest of the world; they are part of a larger enabling environment that can and should provide support. They warn that community management should not be a reason for agencies to escape their role (Schouten & Moriarty, 2003).

From a "new" ecology perspective, the importance of communities is highlighted in the finding that human groups such as pastoralists play a crucial role in ecosystems maintenance. A complex ecosystem knows four stages in the complex system cycle; growth, equilibrium, dissolution and reorganization (Marten, 2003). Non-equilibrium, or unstable, ecosystems are strongly influenced by exogenous factors and often found in dry and pastoral areas. The non-equilibrium nature of ecosystems seemed to rule out the selection of a return to "pristine" equilibrium conditions as a feasible goal for any restoration effort (Wyant *et al*, 1995). But research on nomadic groups in Mongolia¹⁹ and Africa shows how human adaptation to non-equilibrium systems led to distinctive patterns of growth and development among populations (Leonard & Crawford, 2002). Consideration of the complex socio-political and economic context for ecosystem maintenance is therefore promoted by the "new" human ecosystems approach.

Today, many major international development organizations have adopted community-based natural resource management (CBNRM) as one of their core natural resource management strategies (Min-Dong, 2002). This approach is modeled after local systems of natural resource management, where local knowledge, norms and institutions have co-evolved over long periods of time with the ecosystem in question (Uphoff, 1998). Qanats are examples of such human ecosystems. The main

¹⁹ http://www.ihdp.uni-bonn.de/html/publications/update/update00_01/IHDPUpdate00_01_research.htm

conditions for long term sustainability of the system are regular cleaning of the qanat, preservation and controlling the supply-demand balance. CBNRM *starts* with people as a focus and foundation for assessing natural resource uses, potentials, problems, trends and opportunities, and for taking action to deal with adverse practices and dynamics (Little, 1994). This study looks at the local level processes and non-economical dynamics of community based natural resource management.

2.1.2 Why a human ecosystem approach for qanats ?

Research on qanats cannot be done without considering both the physical and the social attributes that make up the system. I think a human ecosystem approach could serve well for the analysis of various processes connected to qanats and their maintenance. The qanat seen as human ecosystem draws its water from the hydrological cycle driven by a constant supply of solar energy to the Earth and contains attributes like climate (rainfall), evaporation, recharge, geology, groundwater level, groundwater aquifer (quality/quantity), qanat tunnel construction, irrigated agriculture, soil and the user community with its social organization of irrigated agriculture. The user community itself is affected by changing livelihoods that have direct impact on the ecological sustainability of the qanat system. Collective maintenance of the qanat tunnel as well as collective action on distribution of the water are both conditions for ecological sustainability of the qanat as human ecosystem.

The human ecosystem approach is thus useful for qanat studies since it encompasses relationships between both biotic and non-biotic elements within the context of human society (Honari, 1989). Physical, social, economic, political and cultural factors interplay in the qanat ecosystem (*ibid.* 1989). Honari (1989) describes a qanat as a good example of an ecosystem that interacts between biotic and non-biotic environments within the context of human society and qanats seen as an example of human cultural achievement requires a holistic approach. Honari (1989) justifies the ecosystem approach for qanats based on the following:

- *Culture is the heritage of human beings; it is both dynamic and multi-dimensional. Different groups of people have contributed to the enrichment of this heritage in different periods of history. The qanat as an example of human cultural achievement should be described using a holistic approach*
- *All the physical, social, economic, political, cultural and behavioural aspects of the environment in the qanat system represent all the factors interacting within the surrounding culture.*

- *The qanat is a good example of an ecosystem which interacts between biotic and non-biotic environments within the context of human society*
- *One of the themes in the ecological approach is adaptation and resilience. The qanat is a way of adaptation. The qanat has enabled humans to adapt to the extreme environment of arid zones.*
- *The holistic approach of human ecology takes account of appropriate technology. Learning from past experiences is applied to the future. Most of these experiences are well adapted to the environment and meet social needs. The qanat represents the concepts and application of appropriate technology.*
- *The world wide geographical distribution of qanats calls for an international co-operation to protect them and relevant settlements in the arid parts of the world. It is the system of water supply which ensures the flow of water with natural energy.*

(source: Honari, 1989)

A human ecological approach for small-scale irrigation systems such as qanats is further espoused in the book of Mabry (1996) on canals and communities. The sustained success of local irrigation systems and the widespread resilience to cope with dry land challenges raises important questions about their origins, designs, governance, resilience and development (Mabry, 1996). One of the main issues is whether they are sustained by a similar set of operational rules? The book is a collection of case studies and essays comparing a wide range of irrigation systems covering various environments, cultures and historical contexts (Mabry, 1996). Ethnological insight into specific cases is needed to investigate the cultural ecology of irrigated agriculture and cooperative social formations (Mabry, 1996). The main conclusion based on ethnology is that local responses to water stress (whether floods or droughts) result in solutions adapted to different environments, historical contexts and cultural traditions of resource ownership and use (Mabry, 1996).

Important in Mabry's book with regard to qanats is Bonine's study on sustainable agriculture and irrigation cultures in contemporary Iran. His study shows the intrinsic relationship between hydrological cycles, construction of qanats, human settlement patterns and social structures (Bonine, 1996). He also highlights the various responses of Iranian qanat communities to climatic stress (droughts) and interventions such as the introduction of modern pump wells, which have led to major ecological and social problems in Iran (Bonine, 1996). He stresses that a new evaluation of qanat systems is needed as they represent a system that

is in equilibrium with the environment.

Uphoff (1998) also justifies an ecosystem approach in community-based natural resource management (CBNRM). The protection of biodiversity, maintenance of ecosystems is important for their multiple benefits to the world and preservation of global cultural diversity. Uphoff (1998) continues that where cultural preservation is the objective, like in qanat renovation, CBNRM is more likely to be a viable alternative because the capabilities and incentives for communities to preserve ecosystems and their attendant resources are greater under such conditions. Regarding the fact that qanats are part of the vast cultural heritage in the Middle East, it is especially attractive to use the ecosystem approach for qanats. In the CBNRM approach special focus could be given to the ecological and cultural value of qanats. The various intrinsic values of qanat systems as a productive system can thus be assessed in the light of the livelihoods of the users' communities. The CBNRM approach as a strategy reflects in social and policy terms the parallel *nestedness* of organisms, species, associations and ecosystems in the natural universe (Uphoff, 1998). Uphoff (1998) states that biological systems do not exist in isolation and need to be maintained within conceptions that comprehend the connectedness between micro and macro levels.

Therefore when looking at qanats as nested human ecosystems, it is of uttermost importance to study different levels. The various transformations at different levels should be considered in order to reach a conclusion of the effects on the sustainability of qanats; water resources need to be understood from local microenvironments to landscape and watershed levels, and ultimately to larger systems at regional, national and even international scales (Uphoff, 1998). The inventory and assessment of natural resources should ultimately lead to collective action on the preservation of these resources at micro-level fanning out to higher levels.

“Part of the process of CBNRM is to identify what socio-geographic units can function and work out sufficient agreement to undertake management and conservation of the natural resources within their purview on a collective basis. The units for management may be groups below the community level or localities above this level, aggregating a number of communities or groups within a larger landscape (.....) CBNRM assumes that processes of resource inventory and appraisal, consensus building and conflict management can inform and empower communities to engage in collective action to utilize and sustain natural resource endowments.”

(source, Uphoff, 1998)

In order to ensure continuous flow, the qanat tunnel has to be maintained on a regular basis and rules are implemented not to draw the

water from the aquifer that feeds the qanat. The main condition of ecological sustainability of the qanat system is a continuous underground water supply. The qanat water is used for drinking water, domestic use and irrigation and should be regarded as a multiple use system. In viewing qanats as human ecosystems qanats are part of a incessantly changing universe which, if properly maintained, could environmentally perpetuate.

2.1.3 Conceptualising the complexity of qanats as human ecosystems

To develop a basic conceptual model for qanats as a human ecosystem is a difficult and ambitious exercise due to its fuzziness and complexity. But it can be a solution to improve communication for interdisciplinary science in the practice (Heemskerk *et al.*, 2003) of placing qanats in a development context. Disagreement between scientists arises when they interpret terms, jargons and study units differently (Heemskerk, *et al.*, 2003). In this section we try to find common grounds.

Areas of collective action such as source maintenance, distribution and irrigation management, are part of the qanat system as a whole and qanats can be regarded as user-managed irrigation systems. Beccar *et al* (2002) describes irrigation systems as a complex set up to control water combining and inter-relating physical elements (water sources and flows, the hydraulic infrastructure), normative elements (rules, rights and obligations related to access), organizational elements (human organization to govern, operate and sustain the system) and agro-productive elements (soil, crops, technology, capital, labour force and the capacities and knowledge of the art of irrigation). A combination of these elements makes the system work (Beccar *et al*, 2002). Vincent (1995) includes qanats in her typology of hill irrigation systems and refers to its entirety – water extraction technology, conveyance canals, control structures and local distribution technology. Beccar *et al.* (2002) continues to outline components for successful community irrigation management;

- 1) *The hydraulic infrastructure to capture, conduct and distribute the water,*
- 2) *Clear definition of users' rights and obligations*
- 3) *An irrigators' organization to plan and implement tasks and decision making*
- 4) *A productive and economic structure to enables users to maintain the infrastructure (Beccar et al. 2002.)*

As it is important for this study on qanats and collective action, we would like to add social and relational elements, such as power

relationships and conflict management assuming that the user community consists of individuals with their own frames of reference, consciousness, state of mind, worldview, knowledge and their opinions on compassion and sense of justice.

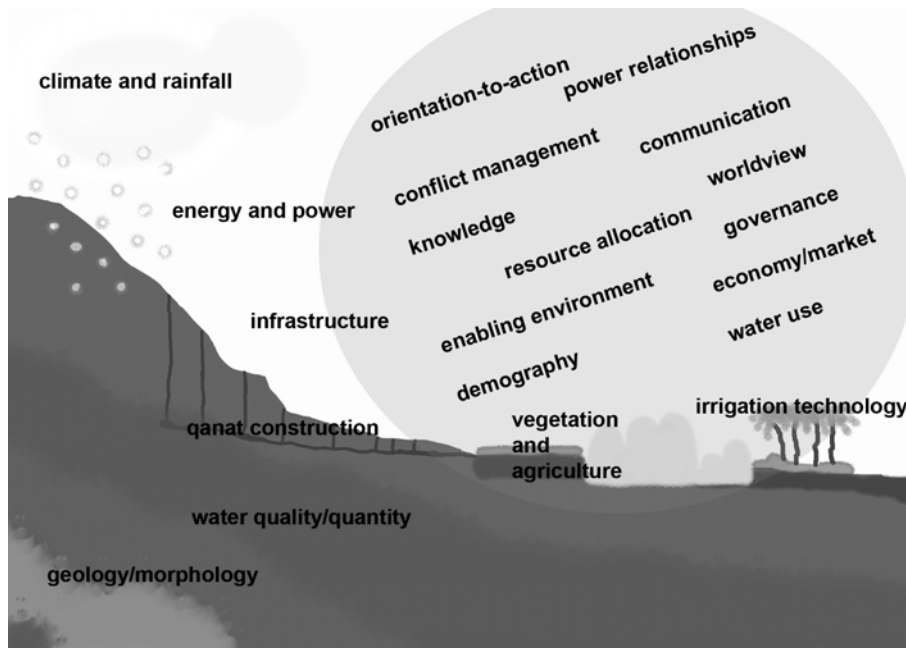


Figure 2 - Partial representation of a qanat as human-ecosystem

The qanat is an integral part of the livelihood of the user community. The aim of this study is to explore local level processes on collective action within the community in relation to its environment. Community as a concept is difficult to define due to its continuously changing nature. O'Fallon & Deary (2002) define communities as units of identity; *groups of people connected through social networks, family or neighbourhoods*. In the qanat ecosystem, community is defined as user community i.e. those individuals using the qanat water either through inherited right or access. This user community is instrumental for the collective maintenance of the qanat system.

The user community is symbolised by the green circle in the cross-section in Figure 2 their collective action determines the longevity of qanats. Other determinants are elements like tunnel construction, water supply, geology, climate and other biophysical factors. Constructing a conceptual model for qanats is extremely complex but it aims to integrate the diverse disciplines such as hydrogeology and anthropology. In this

study hope to add analytical elements based in my empirical findings to construct a more elaborate conceptual human ecology model of qanats based on the data presented.

2.1.4 Multiple environments and a scaled hierarchy of systems

To further explain their conceptual human ecosystem model, Stepp *et al* (2003) provide an elaborate definition of human ecosystems as input and output systems and added “multiple environments” to its concept. The multiple environments are symbolised through concentric spheres around a system representing a human population or individual as a transformer/consumer of matter, energy and information (Stepp *et al.*, 2003 after Odum, 1983). The individual or human population receives information, matter and energy as input and interprets these through an epistemological field or “screen” in the process of cognition leading to output (for example action or inaction). Multiple environments and belief systems influence this process (Stepp *et al.* 2003; Pavao-Zuckerman, 2000).

In their description of multiple environments, Stepp *et al.* do not differ much from the various scales that are considered in the human ecological concepts of Mabry (1996) and Bonine (1996). It stems from the concept that ecosystems are closely interrelated at various scales and levels. Interesting in this field is the study of Molle *et al* (2004) on hydrology and water rights in a qanat village in central Iran. They conclude that interventions that induce hydrological changes work across scales, and across levels of social and political control. When river basins become “closed” through water scarcity and all water is fully allocated, minor interventions such as the introduction of wells depleting the aquifer have major effects and the interdependence between water users at various levels and scales grows (Molle *et al*, 2004).

The main difference between the conceptual “new” human ecosystem of Stepp *et al.* and the human ecology approaches of Mabry, Bonine and Molle is their stronger emphasis on energy, matter and information exchange and the use of energy symbols in their visual representations (*cf.* Odum, 1971). The “new” human ecosystem approach I find interesting because the concept of “energy” can be considered both from a sociological point of view i.e. the *social energy* between people that induces collective action and from a more biophysical point of view i.e. *water and nutrient flows* between scaled ecosystems. Parallel to Stepp’s “new” human ecosystem approach and wider socio-environmental linkages of hydrological basins, the qanat could be approached as an socio-hydrologic input-output system that is continuously exchanging

energy, matter and information with the wider environment and scales. Subsequently, these systems are arranged in a scaled hierarchy with reciprocal flows of energy, matter and information. Higher-level systems are at regional and global level whilst lowest level systems are at individual level. All levels influence each other in the output environment (based on Patten, 1978). Below we present a partial concept adaptation of Stepp *et al* (2003) and Pavao-Zuckerman (2000) within the context of this study. We distinguish three partial levels: the individual users' level, the level of the qanat community and the level of the users within a regional watershed. This distinction is not conclusive, many different configurations of scales can exist. As Pavao-Zuckerman (2000) explains: "*The multiple environments of human ecosystems can be nested and arranged in a spatially scaled hierarchy, so that human ecosystems can be located anywhere from the level of organisms and families up to the level of nations and world systems*".

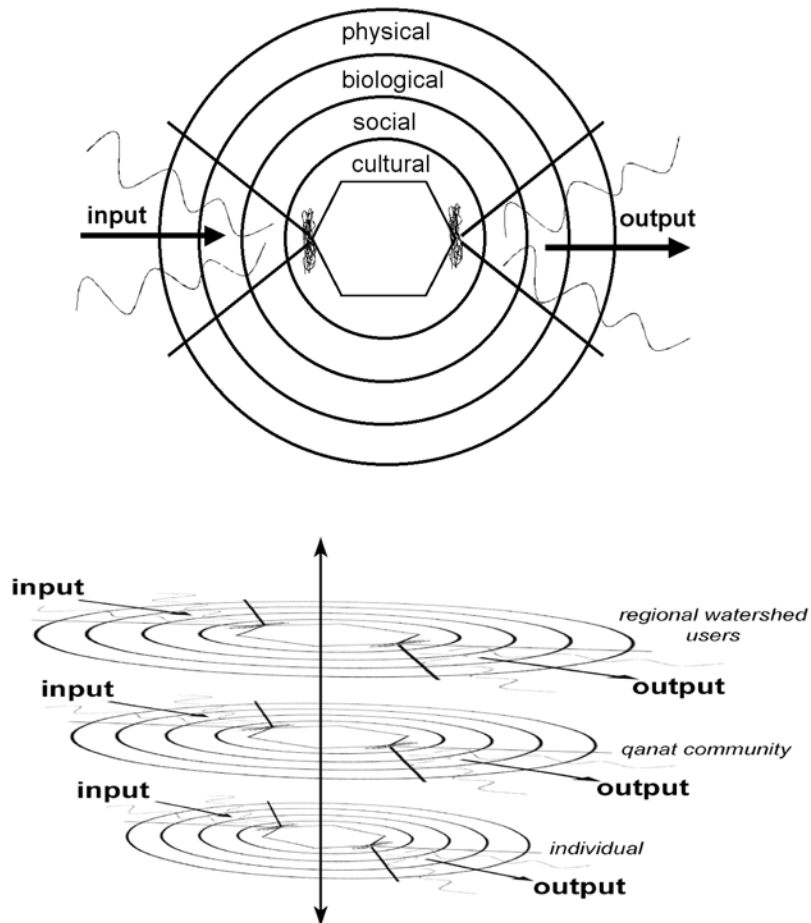


Figure 3 - Qanats as human ecosystems in a scaled hierarchy

Although the qanat user community is geographically defined, a group of users can be a part of a village or town, encompass it completely, or even be distributed over several villages. The descriptive and analytical approach of study is different for micro and macro levels. At and below community level, we try to find endogenous explanations for (lack of) collective action on qanat maintenance. What is happening with the respective individuals of the qanat community over time and by what and by whom are they influenced to act or not to act? At higher level, the multiple environments and scaled hierarchy enable us to analyse transformations in “the wider world” and explore exogenous relationships

between the individuals, the community and the region and vice versa. McCay points out that including vertical and horizontal linkages among social entities is crucial in identifying what role external forces such as international organizations, NGOs and government institutions play in collective action and institutional change (McCay, 2002).

For the individual micro-level, a psycho-social approach is needed. At this level Uphoff (1996) describes three realms based on the continuum developed by John Eccles and Daniel Robinson (1984); the first realm is the physical realm of matter and energy, within which the brain exists and operates, the second realm is the realm of consciousness or mental states associated with mind, thinking, feeling, memory, imagination and so forth, the third realm is that of knowledge, which becomes objective when being shared by many “consciousnesses” (realm 2). In the third realm, that of knowledge, cognition and information, we find different frames of mind and culture, determining how we perceive, frame and understand the biophysical world, i.e. our worldview. Research at this micro-level calls for a strong emphasis on qualitative data to provide insight into the individual household dynamics at and below community level.

For research on qanats at a wider level, a quantitative approach should be devised to complement the qualitative approach. Exogenous explanations for the abandonment of qanats, the physical and social factors that influence sustainability of qanats and government policies in the wider political environment are all part of an enabling environment. The enabling environment is wide, complex and consists of the different scales, institutions, agents and actors on various levels in the public, private and civil society sector (Uphoff, 1998).

2.1.5 Potential shortcomings of the “new” human ecosystems approach

To summarise, this study takes a human ecology approach to explore collective maintenance of a qanat system in a holistic and interdisciplinary manner and place qanats in a development context. It includes human beings as dominant agents inside the complex ecosystem. The input and output processes of information, matter and energy are influenced by multiple environments at the individual, community and regional level. These multiple environments, cultural, social, biological and physical, subsequently influence the outcome of action or inaction for ecosystem maintenance. In other words, to maintain the qanat as a human ecosystem, action (both individual and collective) is needed at several levels.

The “new” human ecosystems approach is characterized by several aspects; it includes humans as active entities rather than unnatural external disturbances, it has a wider notion of environment using the concept of “multiple environments” and it stresses the importance of information flows next to energy and matter (Pavao-Zuckerman, 2000; Abel and Stepp, 2003). Further, it highlights the complex holistic, dynamic and inclusive nature of ecosystems. In this holistic approach, a qanat as human ecosystem is a complex functional unit of various components including individual types of resource users. In turn, a higher-level ecosystem concerns the groundwater extraction and water users at regional level. It consists of different types of human dominated systems or user managed irrigation systems including the ones supplied by diesel operated pumpwells. Collective action in the form of social energy within the qanat community, the multiple environments and other enabling environments in the higher and lower ecosystem levels are needed for maintenance of the qanats.

An important flaw in the “new” human ecosystems approach is that its visual representations and conceptual notions of scaled hierarchy and complex systems cycles (equilibrium, dissolution, reorganization and growth) may fail to adequately take into account the temporal and spatial complexity of social history, culture, politics, change and mobility. In the systems approach, populations seem to be portrayed as a-historical entities. Taking into account local histories is important for restoring qanats as human ecosystems. Does ecosystems maintenance really mean a return to a historic pristine state of “equilibrium” (Wyant *et al.* 1995) ? Is this a feasible goal for restoration projects ? Did a historic pristine state of “equilibrium” ever exist? Dietz (1996) warns that static systems thinking is in danger of using the concept “equilibrium’ too easily. Not even the earth system can be understood as in a constant state of “equilibrium” (Dietz, 1996).

Secondly, if the goal is to understand human-environment interaction, adopting a model *a priori* bears the risk of oversimplifying and “naturalizing” complex cultural, social and political phenomena (McCay, 2002). Strict theoretic models and units of study create awkward observation biases in the field and can make scientists blind to certain situational factors. McCay suggests using the term “people ecology” and allowing more freedom to interpret empirical evidence based on explanatory “question driven” research. Indeed the use of models bears this important risk and we need to be wary of it. On the other hand, if the goal is to create a comprehensible text for a variety of disciplines, the use of similar terms and concepts creates the “common language”. The use of complex systems models is then, if you like, an “interdisciplinary concession” towards the natural sciences.

Another potential pitfall is analytical; boundaries of the units determined by physical phenomena such as watersheds or aquifers are not the same as social boundaries. The only ecosystem where social and physical boundaries are parallel would be the largest on earth, the *global* ecosystem²⁰ or “living Earth” (Lovelock, 2007). Furthermore, cultural, social and community boundaries do not have to be physical. If based on relationships through distant communication such as internet communities in cyberspace, how to include those in a biophysical ecosystem? Even with qanats, although there is a strong physical attachment of the users with the traditional technology, the multiple environments of the different types of individual resource users cross the boundaries of the biophysical qanat system. It poses an interdisciplinary conflict that also Vincent (2003) pointed out in her attempts to reform hydrological analysis and include social forces shaping choice of technology, water allocation and delivery. Her solution is to focus on the smallholder perspective with an approach that sees technology and its outputs evolving from the interface of natural resources with society (Vincent, 2003). The focus on the smallholder perspective can be translated as the study of the lowest level complex systems in the scaled hierarchy of a human ecosystem approach. The question remains if the multiple environments as described in the “new” human ecosystems approach have potential to solve the interdisciplinary unit boundary conflict.

The “new” ecosystem approach allows us to include many conceptual approaches and formulate interdisciplinary visual representations of complex systems (Pavao-Zuckermann, 2000). Based on the above text, we pose three questions: 1) Which various elements and entities in the qanat as human ecosystem can be distinguished? 2) Which type of symbols and terms can be used to represent a conceptual model of qanats as human ecosystem to enable all relevant disciplines to understand? 3) How can we include spatio-temporal variety such as socio-historical and political dimensions, change and internal differentiation of the user community? To build a picture of a qanat as a complex system is just a beginning to understand the importance of the context of collective action. Collective action will take place in changing multiple environments that either enable or hamper the collective action. The main biotic attribute inside the qanat ecosystem is humankind. Focus of this study is thus on the collaborative relationships between these humans in their effort to sustain the qanat ecosystem and ensure a constant flow of

²⁰ cf. James Lovelock’s “*Gaia Theory*” (*Apart from the negligible amount of cosmonauts, astronauts and occasional “space tourists”*)

water. Therefore it is now time to focus further on collective action as a theoretical concept.

2.2 Studying collective action, a forest of theoretical debates

The above section offers us a flavour of the complexity of human ecosystems. It also gives a different definition of environment where humans as dominant agents are surrounded and influenced by “multiple environments”. Subsequently this complex context of collective action is of utmost importance to understand the reasons why people do or do not cooperate.

Collective action is often approached as an economic concept. The primacy of economics is still dominant in global development strategies (Mollinga, 2001; Chambers, 2005). Chambers (1998, 2005) describes two paradigms; things and people, adapted from the work of David Korten. In the inter-disciplinary polarisation of things and people, quantification and judgement are opposites; hard physics have a high status, with things as its subject matter. Economics comes next, quantifying and dealing with people as numbers and their behaviour as describable in laws, design principles and equations; the other social sciences, dealing with the greater complexities, diversity and uncontrollability of people, have lower status, with social work lowest of all (Chambers, 1998, 2005). But it is in the non-economical social sciences where some contextual “mysteries” of collective action might be further explained.

The theoretical debate of collective action for the commons really started in 1965 with the publication of “The Logic of Collective Action” by Mancur Olson followed by Garret Hardin’s monumental 1968 article “The Tragedy of the Commons” in *Science* (Uphoff, 1996; Ostrom, 2000; Dietz, Th., 2002; Kurian, 2003). Olson and Hardin stated that no self-interested person would contribute to the production of a public good “unless the number of individuals in a group is quite small, or unless there is coercion or some other special device to make individuals act in their common interest” (Ostrom, 2000; Kurian, 2003). Hardin’s central Malthusian²¹ theme is the devastating impact of population growth on Earth’s resources. Thus, the “tragedy of the commons” became a central concept in human ecology and environmental studies (Dietz, Th. 2002). Using a game theoretical model to illustrate the complexities of the tension between individual and collective best interest, Hardin pointed out

²¹ *In 1798, demographer Robert Malthus made the famous prediction that population would outrun food supply, leading to a decrease in food per person. (Case & Fair, 1999).*

how self-interest exhausts the earth's resources and threatens the effectiveness of community-based natural resource management (Uphoff, 1996; Ostrom, 1990, 2000; Gillinson, 2004).

The Olson-Hardin publications created a wave of controversy and a vast interdisciplinary patchwork of literature erupted. Two extreme positions can be found. At one side of the spectrum we find the "Olson-Hardin" viewpoint with a negative view on people's ability to cooperate for the commons and a strong belief in the dominance of self-interest. The earlier described "ecototalitarians" (Dietz, 1996) fall into this category. Secondly, there is a more positive view on human cooperation with a somewhat naive belief in human's natural tendency for altruism. This is where the "ecopopulists" (Dietz, 1996) usually find themselves. Most publications on the subject can be found somewhere on the continuum between these two extreme positions. Another axis running through the debates is the opposition between *rational choice* as used in New Institutionalism or New Institutional Economics (NIE)²² and *cultural theory*²³ concerned with human agency (Mollinga, 2001). It would be impossible to discuss the many different viewpoints, debates and discourses on collective action in this study. A lifetime would not be enough. We will only give a selective overview of literature in environmental studies²⁴.

²² *New Institutionalism is also referred to as the "rational choice paradigm", the new political economy, public choice theory etc. This is a family of approaches that uses game theory to explain the origin of economic and social institutions (Mollinga, 2001; Kurian, 2003). The New Institutional approach moved forward from game theory and stressed the importance of property rights and design principles which led indirectly to increased devolution in development intervention strategies such as the implementation of new "democratic" institutions and water user associations (WUAs).*

²³ *"cultural theory" is the result of the monumental work of anthropologist Mary Douglas where she suggests that "cultural biases" affect how people perceive cause and effect. She identified egalitarianism (collective action), hierarchy (reliance on authority), individualism (individual behaviour) and fatalism (reliance on fate) as the generic biases that are distributed within and among society and culture. (McCay, 2002; Clay, 2003)*

²⁴ *For an interesting brief overview of literature on common property resources and community natural resource management see also Kadekodi, 2002.*

2.2.1 Limitations of New Institutionalism

New Institutionalism pointed out that in the game theoretical model of the Olson-Hardin thesis, the commons are essentially open-access leading to a “free for all”. New Institutionalism strongly believes in people’s ability to cooperate for the common good and states that implementation of an equal and economic system of common property rights and design principles would lead to collective action and solve the overuse and “free riding”. In the environment sector it gave the rise in the 1980s to what became known as the *era of reform*; where new institutions were introduced in a process of decentralization (Vermillion, 2001). At the heart is the “theory of devolution” arguing that empowerment of local users of a common resource will lead to more efficient and sustainable management than a centrally- financed government agency (Vermillion, 2001). The argument is based on institutional transaction costs analysis as well as an enormous collection of studies on the commons in various countries where local groups engaged in successful collective action (Wade, 1988; Baland & Platteau, 1999; Ostrom *et al.*, 2002; Agrawal, 2001; Marshall, 2003). Ostrom’s work on common property regimes (CPR) led to a further endorsement of devolution to promote participatory strategies such as proposed by CGIAR’s System-wide Programme on Collective Action and Property Rights (CAPRI) and the World Bank’s Water Users Associations (WUAs) concept (Katon *et al.* 2001; Vermillion, 2001, 2004; Kurian, 2003). Together with Chambers’ plight to “put the farmers first”, New Institutionalism led to an extreme popularity of participatory techniques. It also led to an increase of interdisciplinary work (Ostrom, 1990, Meinzen-Dick, *et al.*, 2002; Kurian, 2003).

Lately, some fundamental flaws in the New Institutional approach and its formulation of concepts specifically with regard to heterogeneity and contextualisation have been pointed out by a variety of scholars (Baland & Platteau, 1999; Leach *et al.* ,1999; Abraham & Platteau, 2000, 2004; Cleaver, 2001; Mollinga, 2001; McCay, 2002; Boelens, 2002; Kurian, 2003; Adhikari & Lovett, 2006).

The overall criticism refers to NI’s oversimplification of human and ecological reality thus misleading guidance to be translated into operational development strategies (Leach *et al.*, 1999). New Institutionalism’s strong focus on community-based natural resource management (CBNRM) and decentralisation is based on the basic and potentially flawed assumption that an ecological harmony and balance between community livelihoods and natural resources existed until it was “disrupted” by other factors (Leach *et al.*, 1999). McCay (2002) is concerned with the essentialist structuralist manner in which New Institutionalism uses sets of “design principles” and “facilitating

conditions” which make it hard to appreciate the role of contextual and external factors (McCay, 2002).

Abraham & Platteau (2004) point out the “paradox of participation” and warn that the rush in promoting values of equality and democracy clashes with traditional patterns of authority (Abraham & Platteau, 2004). Together with McCay, they argue for a more cultural-political perspective to gain a better understanding of pitfalls that may undermine participatory development (Abraham & Platteau, 2004) and to explore how internal and external dynamics shape collective action.

Kurian (2003) discusses various shortcomings of New Institutionalism with respect to context and community. First, he highlights New Institutionalism’s inability to account for non-economic motivations for cooperation or lack of cooperation when analyzing institutions. Secondly, he points at New Institutionalism’s overemphasis of homogeneous communities leading to a neglect of the effect of heterogeneity and other historical and contextual factors that influence why people do or do not participate. Lastly, most New Institutionalist approaches fail to account for the internal differentiation of communities and environment (Kurian, 2003).

Adhikari & Lovett (2006) find no conclusive correlation between measures of heterogeneity and levels of collective action and recommend that local adaptation should be allowed.

Mollinga (2001) quotes Moore (1987) on the limitations of New Institutionalism or rational choice to account for political elements of affectivity, expressiveness and identity as opposed to material self-interest as motivation for action. In their critique of New Institutionalism, the work of Boelens (2003) and Mollinga (2004, 2001) is instrumental for the study on politics, property rights, legal pluralism and power dimensions in irrigation. In his literary overview of the vast area of “water and politics” Mollinga (2001), distinguishes three levels of study: hydropolitics (at inter-state level), water resources policy (within states) and every day politics (at community or regional level). Every day politics looks at local power relations and how they are shaped by water resource use practices (Mollinga, 2001). Core themes are distribution and allocation of water, inequity, property rights, participation and a renewed interest in irrigation for poverty alleviation (Mollinga, 2001).

2.2.2 The role of power in every day water politics

Humans are political animals and the use of natural resources is a political act in which people interact at different levels between which various power relations exist (Dietz, 1996). Political ecology calls for a greater emphasis of study on local power dynamics on common-pool resources and the environment (McCay, 2002; Dietz, 1996). Water as

fundamental source of life is a great basis for power. A water right is an expression of power among humans and understanding the rights on access and use of a water resource, will give a more in-depth view on the “power of water” (Boelens, 2003). The relation between water rights and

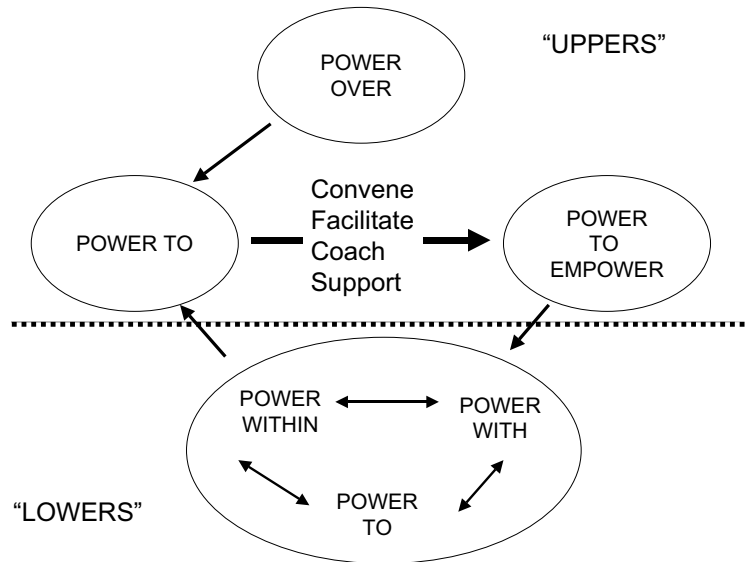


Figure 4 - Power and relations in a development process (source: Chambers, 2005)

power is two-sided; power relations establish the pattern of distribution, contents and legitimacy of water and in turn, water rights produce, reproduce or restructure power relations (Boelens, 2003).

Ian Gray calls for a greater emphasis on the role of community power relations and natural resource management (Gray, 1992, 2005). The research literature recognizes leadership and social capital as important elements in community organization but there is tension between the two concepts when the concept of power is introduced (Gray, 2005). Gray (1992) states that local political structures and ideologies determine the content of local politics, as some interest groups are empowered while others are not. Rural community studies have shown that, even where local people strongly believe their community to be united and cohesive, social marginalisation and exclusion occur (Gray, 1992). Power and relationships are at the core of development and leadership programmes (Gray, 2005; Chambers, 2005). The various applications of decentralisation and participatory approaches in development interventions involve and induce shifts in power (Nelson & Wright, 1995; Boelens, 2003; Abraham & Platteau, 2004; Chambers, 2005). This realization brought about the currently well-known “paradox of participation”; how can external agents such as NGOs and international

organizations “empower” people at the grass-roots whilst having disproportionate economical and political power over them? Further, a rush for participatory development risks empowering local elites where the state is inefficient, corrupt and civil society weak (Abraham & Platteau, 2004).

As a central topic in social sciences since the 1960s (Nelson & Wright, 1995), power and how to analyse it, remains an inconclusive question. Power is often looked at as a commodity, something that is gained, lost or increased. In fact, as Chambers (2005) explains, power relationships can be a win-win situation whereby “uppers” with power over “lowers” can use that power to turn it into “power-to-empower” (See Figure 4). There is now general consensus that power refers to a relation between people, not necessarily something that people “have” (Nelson & Wright, 1995). The most commonly used type is “power over” which means a party controlling another party (Nelson & Wright, 1995). The other type is “power to” divided in “power with” and “power within” whereby power to is the *unique potential of every person to shape his or her life and the world* (VeneKlasen and Miller, 2002 as quoted in Chambers, 2005).

The “uppers” refer to those with power over, most of them are found in the higher enabling environment and few at community level. Their power is based on various dimensions; financial capacity, educational background, language, weapons, social network and connections, wealth and so on. The “lowers” refer to those who do not possess power over others because of the gap that exists between the uppers and lowers in terms of access to the various dimensions that determine the power bases of the uppers. The lowers are mostly found at community level. Within the group of lowers, similar power relations can be distinguished; power with is gained through collaboration, solidarity and collective action whilst power within refers to the sense of self-worth, identity and confidence (Chambers, 2005). Access to water often provides uppers with a power to exclude others. This is where most tail-ender problems stem from in irrigation. Water is political and power struggles and competition for the resource are most poignant in water scarce regions of the world.

2.2.3 Leadership and governance for community-based natural resource management

The 2006 UNDP Human Development Report stresses that the global water crisis is a crisis of governance. Inequality of access and distribution of water leads to local water scarcity and conflicts induced by a competition for the resource. This calls for a greater focus on

governance in finding solutions for the water crisis. There is a general agreement that improved water management can be achieved by improving the government processes relating to decisions on water and distribution (Moriarty *et al.*, 2007). Decentralised systems and empowerment of water users in decisionmaking is seen as the solution for many of the water problems in the Middle East (Moriarty *et al.*, 2007). Users taking responsibility for their actions and being held accountable for their decisions is seen as enhancing democratic processes and empowerment at groundlevel. Governance is crucial in this respect. Moriarty *et al.* (2007) describe water governance as the set of systems that control decisionmaking on who gets what water, when and how.

Collaborative governance of resources and community-based management is thus globally accepted as the way forward in sustainable development supported by influential international institutions such as the World Bank, WWF and IUCN. But making it work is clearly not as simple as is implied by its advocates, moreover because little is known about how decisionmaking at community level is influenced by the wide variety of internal and external factors (Leach *et al.*, 1999; Pero, 2005). Governance comes in many different forms and shapes and is related to various different styles of leadership.

The basis of leadership is different for various locations, cultures and countries. Leaders are recruited, chosen or appointed on the basis of their birth right, kinship, reputation, credibility, track record, capacity to lead and convince people, educational background, family history, symbolic capital and many other reasons related to culture, religion and politics. Leaders are respected and powerful on the basis of the justification by the local norms. Human institutions help in building and maintaining leaders and leadership and these institutions are subject to political, religious and cultural change and societal transformation. For example in Syria Bedouin shaykhs were powerful leaders until 1958 on the basis of their kinship and tribal history, culture, political climate, respect of their subjects, landownership and the various networks they had established with government and religious institutions. The moment the new government started to implement political changes based on an ideology of socialism and initiated a landreform, the basis for leadership and power diminished dramatically for Syria's Bedouin shaykhs. The landreform of course was a deliberate attempt of the Syrian government to break the Bedouin tribe's power bases as they were seen as a threat to stability.

Pero (2005) describes how the leadership dimension forms an essential and overarching element in a conceptual framework to identify various factors that underpin the success and failure of community-based natural resource management group functioning and decisionmaking

(Pero, 2005). The CIVILS framework combines decision theory viewpoints from management, organizational, behavioural, political, psychological, social and economic disciplines (Pero, 2005). It combines the following six framework dimensions: Cultural, Interpersonal, Values, Institutional credibility, Leadership and Social identification. The leadership dimension draws on various leadership theories; environmental leadership, ecocentric leadership, transformational leadership and prosocial leadership.

2.2.4 The relationship between collective action and water scarcity

Naff (1994) describes six basic causes for growing water scarcity; climate variations (drought), degradation of quality by human activity, depletion of a source, out-of-basin diversion, redistribution for other uses, consumption. There is no consensus in literature about whether scarcity leads to cooperation or conflict; the effects of scarcity are as multidimensional and complex as its causes (Naff, 1994). In 1988, Robert Wade studied the correlation of the level of collaboration between farmers and the availability of irrigation water. If water is in abundance, collective action is not necessary, if it is relatively scarce, organizations will be formed to induce collective action and in case of extreme scarcity, conflicts emerge and the social organization breaks down. The traditional solutions to water shortage in the Middle East are engineered storage dams and to move water from surplus to deficit regions by canals and networks (Allan, 2002). This links with the idea that water - contrary to some other resources – forces people to work together (Musch, 2001).

Soussan (1998) differs somewhat with Musch and claims scarcity *in general* leads to conflicts between different types of users not only in extreme cases of scarcity. Both agree that scarcity is a multi-dimensional concept. It is dynamic and finds expressions across the range of uses of water resources (Soussan, 1998). Soussan then describes four issues at the core of water livelihoods challenges:

- *Understanding of scarcity-based conflicts and the institutional processes through which they are expressed and can be mitigated, is crucial to actions to address the water needs of the poor*
- *These issues can be neither understood nor addressed at a purely local level. They are found at all levels, ranging from riparian disputes to neighbours fighting over locations of wells*
- *The nature of scarcity and the conflict which it generates is inherently dynamic, reflecting patterns of change to the resource base, the needs for and uses of these resources and the social,*

economic and institutional context at local and wider levels which condition these patterns of exploitation

- *Where water stress exists, people respond to scarcity. These responses can fundamentally change the nature of water resources/livelihoods relationships and are central to defining indicators of and strategies to mediate water-stress*

(source: Soussan, 1998)

Schouten & Moriarty (2003) state that overall management of water resources is not usually seen as a legitimate area for community water management, which appears to be an important and dangerous hiatus in the water supply and sanitation sector considering the global problem of water scarcity. Indeed in many irrigation studies, even if concerned with pumps²⁵, the focus lies mainly on the allocation, distribution and efficiency of single-use and overall management of *surface* water and not on *groundwater* resource management. The main distinction between groundwater and surface-water based irrigation is of course in the resource itself; groundwater is subject to regeneration or is finite (in case of fossil aquifers) and at risk of depletion. One can ask if surface-water irrigation systems based on rivers and rainfall run-off are indeed similar common pool resources (Bardhan & Dayton-Johnson, 2002). In the case of groundwater, the common pool is comparable with pastures, forests and fish and competition for the resource with other users is much more salient.

The aspect of competition for groundwater resources, as described by Schouten & Moriarty (2003), is of relevance to qanat systems especially where diesel operated pumps withdraw groundwater from the same aquifer. While qanat tunnels are based on gravity, pumps use mechanized force to draw water to the surface, making them potentially environmentally unsustainable methods of groundwater use if not properly managed. The presence of pumps could thus negatively influence the discharge of qanat water. This could result in conflicts between different water users; qanat users and pump owners.

“The pumping of groundwater causes the water table around the well to sink and forms a cone-shaped hollow called a cone of depression.

²⁵ *For example “Women and water pumps in Bangladesh” by Koppen & Mahmud was published in 1996 to study the impact of participation in irrigation groups on women’s status. The title suggests that community groundwater management could be part of the study. The main focus however is not on supply but on demand and community management of surface water; abundance is assumed.*

The more water is extracted from an aquifer, the deeper the cone of depression extends and the deeper a well must go to continue providing water. Groundwater mining is the withdrawal of groundwater at a rate that exceeds its replenishment and ultimately leads to depletion of the resource.”

(Source: Hunt, 2004).

The history of qanat technology as an adaptation to non-equilibrium systems, shows that water scarcity can enhance positive collective action. Similarly, the earlier described pastoralist response to non-equilibrium ecosystems (*cf.* Leonard & Crawford, 2002) does not necessarily lead to conflict but promotes growth (Adano & Witsenburg, 2004). In McCay's view, scarcity of a common resource does cause conflict but it may also stimulate people to create effective ways to cope with the (potential) conflict thus “traditional conservation or adaptation” is in fact “traditional conflict management” (McCay, 2002). Whatever the cause, there is a need to find out in which particular situation scarcity leads to perpetual conflict, and in which situation scarcity leads to cooperation. In the past, the building and maintenance of qanats was obviously done in multiple environments that enabled collective action and management of conflicts. The local societal structure provided that.

Soussan stressed that institutional reform approaches promoted by New Institutionalism such as introducing Water Users Associations (WUAs) have consistently failed; more effectively development interventions should be built upon historical evidence and context, existing local structures, formal and informal, and to integrate water management issues into the wider fabric of local-level social and economic relationships (Soussan, 1998). Van Vuren (2005) highlights that in some places like Turkey, Colombia and Mexico, WUAs were more successfully introduced (India, Pakistan and Phillipines). His research on water scarcity and farmer participation in Morocco, concludes that farmers do not want to cooperate and real participatory irrigation management (PIM) did not follow the theoretical assumption that water scarcity stimulates irrigation reform (Van Vuren, 2005). But qanats, or foggaras as they are called in Morocco, have historically been widespread in this country, indicating an informal and traditional will to cooperate in times of water scarcity. Similarly, in their situational analysis of the Abshar Irrigation System in Iran, Hoogesteger and Vincent (2006) highlight that due to the emphasis on performance indicators of institutionalized participation in the New Institutional approach, many did not notice that informal participation was already taking place at tertiary level.

Uphoff (1996) states that conclusions and evaluations depend on which frame of reference is employed or assumed. It is therefore necessary to be conscious of and explicit about one's frame of reference even with regard to facts (Uphoff, 1996). In her critical view on New Institutionalism and rational choice, McCay calls for more social, political and ecological context from a postmodern anthropological perspective: "*a more cultural and historical approach in human ecology sees "commons" questions as ones about competition and collaboration among social entities; the embeddedness of individual and social action; and the historical, political, sociocultural, and ecological specificity of human-environment interactions and institutions*" (McCay, 2002). She also stresses the importance of postmodern "framing" and social construction for collective action: our representations of the natural and social worlds are shaped by social facts and cultural preconceptions and only if people *perceived* an environmental problem as serious and "solvable" they *could* act (McCay, 2002). This calls for more empirical study on "perception", "situation" and "context" and the actual local level processes.

2.2.5 Analysing the orientation-to-action of individual actors

Collective action as "*a process of individuals acting together to reach a common end*" does not take place in a vacuum and the enabling environment is defined here as the "*complex of multiple environments in which the collective action takes place*". These concern the aforementioned social, cultural, biological and physical environments in a human ecosystem. The qanat user's community is defined as "*the group of people that are benefiting directly (as right holders) or indirectly (by being related to right holders) from the supply of water that the qanat provides*". McCay (2002) warns that the term "community" is meaningless without further specification, clearly situating the peoples in their environments, histories, cultures and network of wealth and power. Further, the group executing the collective action, even if small, consists of many different types of individual actors, each with their own "framing", desires and goals in mind. She argues for a more actor-focused ecology (McCay, 2002). A basic research question in political ecology looks at who play a role in resource extraction and maintenance (Dietz, 1996). Dietz (1996) stresses that studies of political environmental geography should therefore "map" the various local and external agents and individuals involved with the collective action.

So what does New Institutionalism say about different types of individuals and agents? The world consists of multiple types of individuals, some more willing than others to initiate reciprocity to

achieve the benefits of collective action (Ostrom, 2000). Ostrom describes “rational egoists” and “conditional cooperators” within a group. *Rational egoists* are mainly interested in their own immediate financial pay-off, and are only willing to contribute to collective action when they are convinced it will not harm their perceived share of the benefit. *Conditional cooperators* are individuals who are willing to initiate cooperative action when they estimate others will reciprocate and repeat these actions as long as a sufficient proportion of the others involved reciprocate (Ostrom, 2000). It is suspected that in Syrian society “rational egoists” will not cooperate if they *perceive* an increase of power of other “conditional cooperators”, therefore the diminishing of their own social power.

Thus, the actor’s *perception* can be of negative influence on collective action and consequently create conflict between rational egoists and conditional cooperators. Conflict creates *mediators* and we have not found this category in Ostrom’s analysis. *Mediators* are in principle altruistic and mainly interested in the creation of a safe environment without conflict. If this means the prevention of collective action, they are willing to sacrifice prospected interest for the sake of well being. Being human, these *mediators* find themselves continuously in a conflict of interests but could function as the glue that keeps the community together.

The problem with the New Institutional approach to types of actors is the structural essentialism of types and categories. Uphoff (1996) identifies two ways of analysing influences on behaviour; a *structural approach* with an emphasis on a typical or modal person in a specific context focused on roles and a *cognitive approach* explaining behaviour of a particular person in terms of ideas, values and expectations (Uphoff, 1996). Through empirical complex systems analysis many more types of actors and multiple causes of behaviour in different situations can be identified. Further, based on a probabilistic, chaotic and complex world, expectations and perceptions are major influences on human behaviour and create self-fulfilling prophecies²⁶ (Uphoff, 1996).

The user community of qanats consists of individuals, each of them with expectations and perceptions embedded in their own frame of reference based on experience, history and multiple environments. They have their own reasons to cooperate or not to cooperate in the collective action to clean and maintain the qanat. This willingness can change over time and depends on the context of the situation. The spatio-temporal configuration of main actors in a collective action will form an analytical

²⁶ *The fundamental “Thomas theorem” in sociology refers to the role of perception in human behaviour and states “if men define situations as real, they are real in their consequences.” (Coleman, 1990)*

(at individual level) and exogenous (at regional level) dimensions of collective action can be analysed.

The terms endogenous and exogenous are preferred because the qanat is considered as a continuously transforming complex human ecosystem. In biology, the term endogenous is used for something, which grows from within and in psychology, endogenous behaviour is spontaneously generated from an individual's internal state. Exogenous phenomena occur and grow from without. The terms implicate change and transformation.

2.3 The importance of information flows in human ecosystems and collective action

As well as being central to social relations and culture, communication is a crucial aspect to the question how people respond to environmental problems and risk (McCay, 2002). What sets human ecosystems apart from the conventional view on ecosystems is the emphasis on the importance of the role of information and communication (Casagrande, 1999; Pavao-Zuckerman, 2000; Stepp *et al.*, 2003). Although an important part of the participatory research literature is concerned with how researchers and the “grassroots” communicate (Martin & Sherington, 1997), conceptualizing communication, information flows and their impacts are relatively neglected subjects in the literature on collective action. Within ecology or the cognitive sciences no major attempts have been made to develop a more comprehensive model other than based on the linear mathematics of the Shannon-Weaver model in 1949 (Casagrande, 1999). However, communication science and ethno-communication studies have spent considerable amount of energy in developing a variety of conceptualizations of communication as a complex process. A further explanation is necessary on the subject.

2.3.1 Communication and the cultural dimension

The mathematical communication model of Shannon-Weaver (Weaver, 1949) did not satisfactorily represent the complexities of communication as a process. Communication was presented as a one-way linear process between sender, receiver and a medium in between. In reality, the process is much more reciprocal and complex than that. Boeren (1994) describes the difficulties of approaches of communication once the cultural dimension is taken into account. In his model, a communication process is made up of the following aspects;

- 1) *Source: a person or object/entity that conveys an idea*
- 2) *Receiver: a person for whom the message is intended*

- 3) *Content: the idea that is being communicated*
 - 4) *Coding: linking an idea to an information carrier*
 - 5) *Decoding: interpreting an information carrier*
 - 6) *Objective: the intended effect to be achieved*
 - 7) *Medium: the type of carrier used to convey the idea*
 - 8) *Format: the way in which the idea is presented*
 - 9) *Context: the non-physical environment of communication*
 - 10) *Location: the physical environment of communication*
 - 11) *Time: the moment at which communication takes place*
 - 12) *Duration: the length of the communication event*
- (source: Boeren, 1994)*

He speaks about potential noise that can hamper communication between people and is embedded in each of the twelve aspects. The noise often originates from a clash of frames of reference of both sender and receiver. Inherent to communication are different points of view towards concepts, reality, norms and values, in other words the different frames of reference between sender and receiver. When individuals, having their own opinion, have completely different views on how collective action should take place and who should be the beneficiaries, the communication between them is scrambled and can lead to conflict situations. Analysis of communication processes in human ecosystems and collective action can give clues to the success or failure of participatory approaches. Specifically concerning the manner in which perception influences human behaviour.

Patterns of thought are culturally determined and Western modes of reasoning and communicating are characterized by abstraction and claims to universality, while other cultural systems tend to be more associative and particular (Boeren, 1994). Different models of communication influenced by cultural dimensions can be distinguished. Warren Feek and Chris Morris (2003) describe two models in their case about internet radio in Sri Lanka; the Aristotelian and the Buddhist Model. Following seven characteristics, we have added the “Arabic” model. Based on that approach three different cultural models in communication are introduced in Table 1.

	Aristotelian	Buddhist	Arabic
1	Emphasis on communicator	Emphasis on receiver	Emphasis on communicator
2	Influencing is central	Understanding is central	Influencing is central
3	Focus on control	Focus on choice	Focus on control

4	Emphasis is on outward processes towards the world or audience	Emphasis on both outward and inward processes – the message and how the receiver perceives and interprets the message	Emphasis on inward and outward processes – the message and how the receiver perceives and interprets the message
5	The relationship between communicator and the receiver of information is asymmetrical - the communicator controls the message	The relationship between communicator and the receiver of information is symmetrical - the communicator's message is as important as the receivers' understanding	The relationship between communicator and the receiver of information is asymmetrical - the communicator controls the message
6	Stresses intellect and rational action, reputation, relationship between men and society	Stresses empathy and understanding, respect, relationship between men and the holistic world	Stresses power and alliance, honour, shame, one-on-one human relationship
7	Public and direct	Personal and indirect	Personal and indirect

Table 1 - Models of communication adapted from Feek & Morris (2003)

The Buddhist model is based on dialogue and a two-way communication process. As a model this type seems to be promoted through participatory approaches following the clarion call of devolution and empowerment of communities. Surprisingly, both the Aristotelian and Arabic models are mainly one-way communication models and very much alike. The main differences between the two models are in point 6 and 7. The Aristotelian model emphasizes the importance of intellect and rationality whilst the Arabic model is focused on power and honour (“*sharaf*”). The inter-human relationships are determining ways of communication. Honour and loyalty are considered crucial and the indirect communication protects the communicator of losing his or her honour and of his/her family. The Aristotelian model is more direct, transparent almost where the communicator is aware of the public importance of the message. Participatory development practitioners aim to follow the Buddhist model. According to the model above, this could potentially lead to conflict with the Arabic approach to communication.

2.3.2 The role of communication in participation

In action research various external actors, third parties or ‘outsiders’ are involved in the development and execution of collective action, such as a team of researchers with their assistants, government officials, and donors. They all communicate with each other. The interdisciplinary team needs to be open-minded and learn to accept cultural differences even if they seem to contradict each other. The crucial

aspect of the success of action research lies in the communication between the research team and the community.

One of the most important aspects of initiating collective action is communication. People communicate to bring about change, development and to manage natural resources. Therefore communication is vital for any activity in which the participation of local people is envisaged (Borrini, 2000). Communication occurs when people have something in common, in this case the *qanat* cleaning. However, there is no general model for a participatory communication process or approach.

Strictly speaking, there is no communication without mutual understanding (Boeren, 1994). Boeren describes a two-way communication model between sender and receiver, in this model the coding and decoding of messages takes place in a cultural environment, being aware of each other's coding systems, enhances mutual understanding. A basic understanding of the local language (in this case Colloquial Arabic) and respect for the local customs are therefore essential for development researchers to conduct their work. A research assistant or translator could facilitate further detailed conversations between scientists and community members if needed. However, the research assistant could at the same time create a bias between the researcher and the community member.

Good communication is based on listening rather than talking. Communication skills are based on dialogue not on "presentation of ideas". Werner (1993) discusses important "don'ts" in effective communication for a dialogue with farmers in participatory projects;

- *Don't get impatient or interrupt the farmer*
- *Don't contradict the farmer*
- *Don't show disapproval of the farmer's statements, even if you disagree*
- *Don't express judgements about the correctness or incorrectness of what the farmer says*
- *Don't give the farmer advice*
- *Don't convey either verbally or non-verbally that you are bored by what the farmer is saying, even if he wanders away from topics of your research*

(source: Werner, 1993)

Skills for communication with farmers include; active listening skills, body language, probing, open and balanced questions. In my opinion, Werner tends to treat farmers in a motherly sometimes even patronising way, as people who need to be probed and helped to express freely what they think. In his description of ideal communication, Werner

tries to eliminate biases. In action research, all actors, including researchers, their assistants, government officials, institutes, donors and other outsiders are cognitive and emotional human beings that react either verbally or non-verbally to other human beings who are influenced by their own frames of reference and perception. Werner's trust in the researchers' ability to be an angel and farmers to become active participants in questioning sounds a bit naive. Poor farmers may often have other things on their mind than yet another development practitioner visiting them and trying to take an interest in the way they live their life and make their choices (Abraham & Platteau, 2004; Chambers, 2005). Farmers need to make a living, and when an "outsider" arrives in their village with a four-wheel drive and a research assistant, the message is often unwillingly perceived as "an outsider who thinks to help us by asking questions and not giving anything back" or "maybe these people are going to give us money!". Even without these transport devices, the very fact that researchers are from outside the community and actually earn their living with this type of work already creates an awkward bias. It is up to the researcher to deal with this image and local perception but he/she can never eliminate it, just like anthropologists cannot "go native" or make themselves an invisible fly on the wall.

In studying collective action all actors, including external agents, need to be evaluated in terms of individual frames of references. Analysing communication between the actors in collective action is therefore crucial in identifying why people cooperate or not. Communication theory also has consequences for the methodology of field research; firstly, a development researcher needs to be aware of the hidden and unwilling 'messages' the fieldwork team might send. Secondly, in the communities studied, the mere presence of an outsider representing international organizations, NGOs or academic institutes influences the process of collective action and needs to be taken into account.

2.3.3 Community-feedback and reflection of observation; using Participatory Video (PV)

A way to try to avoid falling too much in the trap of Werner's communication "don'ts" in participatory social research is the use of audiovisual recording devices like video during interviews or participant observation. It forces the development researcher to listen, not to interrupt and not to filter his/her own opinion. The use of video also provides the "professional" researchers with means to communicate research results to a wider group of people than his/her fellow "professionals". Therefore in this section; a short word on the use of audio-visuals in listening,

dialogue, qualitative data collection and documentation, community feedback and an overview of different styles of filming.

By writing this study I am ultimately walking into the same trap as Chambers' famous prison of "conventional professionalism", where studies are published in journals, books and on the internet, hovering distantly above the reality of poverty and rural communities (Chambers, 1983, 1998). This study also uses audio visuals as means of publicizing and feeding back research results to the communities on the ground. Used as a medium it is a powerful tool to facilitate a dialogue with local communities and less literate people. Shifts in communication for development reflect the emergence of the participatory paradigm for up-scaling community based natural resource management research results,

"Communication is no longer seen as simply a top down, mechanism for the transfer of information, but as an iterative, interactive, multi-directional process involving a wide range of stakeholders. It is recognised that the users of the products that research delivers have differing needs and perspectives, and that they are generators and transformers, as well as users of information"

(source: DFID, 2002)

The use of participatory video (PV) for a bottom-up communication in development research is envisaged to enhance collective action. With video, the opinions, image and voice of the communities can be literally transported all over the globe. In the first book published on PV for development, White (2003) states that while video is a tool, it becomes more than a tool when used within developmental conceptual frameworks such as self-concept, reflective listening, dialogue, conflict management, or consensus building. She continues to say that the power of video to transform behaviours is not yet fully explored nor are informed links made between theory and practice (White, 2003). Participatory video is thus a relatively new and unexplored terrain with high potential for development and social change. White describes that one of the first instances for social change was developed in the late 1960s and 1970s, using video as a tool for social dialogue, as a problem solving mechanism leading to collective action, for empowerment and decision making. Case-studies in India and Latin-America show that the use of video is a very effective tool for the development and transformation of disadvantaged individuals and communities (Barbash & Taylor, 1997; White, 2003). The most recent handbook on PV (Lunch & Lunch, 2006) illustrates that there are already many applications of PV, specifically as a tool for action research. Currently a new debate is emerging whereby it is considered that

development organisations should provide a standard budget line on communication and participatory video for their development projects²⁷.

An interesting case where video was used in community water management in the supply and sanitation sector is the participatory action research that has been done by IRC international water and sanitation centre with the PV work of Ton Schouten (White, 2003). An extensive six-country training programme called MANAGE, is an effort to increase competencies of development facilitators to create an “enabling environment” in communities to support and sustain their own water supply management (White, 2003). Seven videos are produced during the project intended to show the complexities and heterogeneity of community water management. The videos are produced by local filmmakers from the six partner countries; lessons learned from the project is that there are many different ways of looking and which one is chosen depends on the goal of the video. In this project, the goal of using video is to document the community based actions and record case studies of main stakeholders of the qanat system. An additional feature is probing feedback from communities on the recordings that could stimulate action and give an insight into the self-reflection of stakeholders.

A similar follow up to the MANAGE project is the EMPOWERS²⁸ project implemented between 2003 and 2007 with collaboration of IRC. In this project three local filmmakers produced country films. The EMPOWERS project aims to enable water users and the community to gain a decisionmaking role in water supply and sanitation services in Jordan, Palestine and Egypt. The project is based on the CBNRM principle of empowerment and participation of the disadvantaged and excluded. It tries to reduce the gap between the service providers and the end users of water supply systems. The films were produced by professional outsiders with the brief of being critical and impartial towards the project implementation. The films had a catalysing effect, specifically when they were premiered to officials and general public. The Jordan country film for example, created a tense but constructive discussion between service providers, government officials, end-users and project team members. The country films form part of the Process Documentation (PD) output of the EMPOWERS project and can be used for advocacy, training and evaluation.

²⁷ *The Drum Beat - Issue 256 - Video for Development Communication, July 5, 2004 comments by Elizabeth Wickett The Communication Initiative*
<http://www.comminit.com>

²⁸ www.empowers.info

Another good example of the use of PV in the Arab world is the Arab Women Speak Out (AWSO) project of the John's Hopkins University. More than 60.000 Arab women have participated in this project on women's empowerment since it started in 1999. The project revolves around the use of ten compelling 20-minute video portrayals of Arab women from Egypt, Lebanon, Palestine, Tunisia and Yemen. The primary purpose of the project is to share these individual stories with other women throughout the Arab region, as well as with development workers, community leaders, policy makers and donors (Underwood & Jabre, 2003). Qualitative and quantitative assessment of the project showed the powerful contribution that video can give to participatory development. Underwood & Jabre (2003) conclude that visual images are vital for the initiation of public discourse on gender constructs, which must be introduced in a culturally sensitive manner.

2.3.4 Important lessons from visual anthropology for the application of video

Contrary to the late entry of video in the development sector, visual anthropology as a discipline has been around for much longer. In fact, using film and video for data collection in social science originated with the invention of film at the beginning of the 20th century. The earliest films consisted of observations of walking people and were used to interpret the various walks. Psychology, animal behaviour sciences and other humanities have used film as methodological tools. The advantage of using audio-visuals is that the amount of information recorded and stored at the moment of observation is at least three times more than that of any notepad or sound-recorder. Visual anthropology really started with the film "Nanook of the North" made by Robert Flaherty in 1922 where an Inuit family is observed in their livelihood and their way of making a living (Grimshaw, 2001; Barbash, 1997; Heider, 1976). The use of film as observation tool soon turned out to be indispensable at various expeditions to record all kinds of forgotten rituals, document cultural phenomena and compile collections of cultural events that otherwise might have been lost forever.

Since "Nanook of the North", the discipline of visual anthropology has emerged parallel to the mainstream feature film and documentary industry. After the introduction of synchronous sound in the 1960s, it became easier for anthropologists to take a camera with them on expedition (Barbash, 1997). Various different approaches to the use of film in social science have since emerged. After the Second World War, the French, German, English, Australian and American schools have each developed their own distinctive anthropological cinema. Grimshaw (2001)

distinguishes between the French School of Jean Rouch, the Australian cinema of David and Judith MacDougall and the British *Disappearing World* anthropological television of Melissa Llewelyn-Davies as leading figures in the project of anthropological cinema over the last two decades (Grimshaw, 2001). It would be outside the scope of this study to describe the characteristic of each school; however some general features of the differences between them will be described.

The differences are mainly noticeable in the concepts of editing and application/use of film within the anthropological discipline. The French Cinema Verité as developed by Jean Rouch, is an exceptional use of film where the post-modern thought of authenticity, reflection and dialogue is exploited (Barbash & Taylor, 1997). The researcher/filmmaker has an active part in the process and as such noticeable in the film. By using the camera as an investigative tool recording the reality of all research participants, his films try to give an account or document of the real world around us revealed by the dialogue established between the filmmaker (ethnographer), the camera and the filmed (Heider, 1976). His way of editing was unconventional and the content rather than the format of the film is important, albeit that the Rouch style of editing soon became a style in its own right. The style contains long shots, filmed in a frame that is able to catch the moment in the “cinematic trance” of the filmmaker (Barbash & Taylor, 1997). Jump-cuts are not uncommon and incorporated in the final edit. The result is an almost surreal account of a real event. Impressionistic styles also emerged, where the use of music, sound and images formed the interpretation of other cultures by the filmmaker, less of an observational account and more of an emotional journey through other cultures.

Other styles that emerged are more conventional and observational, where the researcher/filmmaker is virtually absent and acts as a “fly on the wall”. The films of McDougall are an example of this. The result is long films based on wide shots of events happening in front of the camera. The fly-on-the-wall principle means that the camera should, to a certain extent, be unnoticeable to the critical reference group. Interviews are inserted to explain some of the observational shots (Barbash & Taylor, 1997). The British and American contribution to visual anthropology has been considerable. In essence, the British school and style has a more positivist approach of filming, less engaged than the French if you like, using film as a method to record a phenomenon, without much engagement of the filmmaker or establishing dialogue between researcher and critical reference group. The links between visual anthropologists and the mainstream television and film industry tends to be stronger in the UK and USA. The style of filming is therefore more accessible to a larger audience. The “*Disappearing World*” Series of Granada Television and

the work of Melissa Llewelyn-Davies presents an interesting case study in the emergence of anthropological television (Grimshaw, 2001). Her cycle of films about the Maasai people in Kenya is well-known and was regularly broadcast at the BBC during the eighties. Television is a difficult industry to deal with for academics and anthropological filmmakers can not always reconcile with the editorial changes their work undergoes when it is to be shown on television. But driven by a profound respect for her audience, and a desire to engage them, Llewelyn-Davies managed to innovate and exploit television's distinctive genres for the generation of new kinds of ethnographic understanding (Grimshaw, 2001).

Contrary to the work of Llewelyn-Davies, the Dutch school of Dirk Nijland has a pure methodological approach towards using film in anthropological research. The Leiden School of Visual Anthropology began with the film of Matjemosh made by Gerbrands in 1967 (Heider, 1976). This film records the activity of the woodcarver Matjemosh in Papua-New Guinea. Step by step in much detail, with the use of conventional close-ups, medium shots and establishing wide shots, the whole process of producing a wooden drum has been recorded. It is a thorough account of the whole process. Nijland has built on this approach and to his films about wedding rituals in Indonesia applies the same. The main contribution of Nijland is the integrated use of feedback in visual anthropology (Nijland, 1989). After observing the cultural phenomenon, and filming the event, the researcher/filmmaker edits the first draft and takes the edit back to the critical reference group for feedback sessions on the work in progress. This interaction between researcher and critical reference group, is participatory and establishes a dialogue that generates new insights into the cultural phenomenon.

This study will use the concept of feedback in the film recording of the collective action. The style of filming is based on the French and Dutch school with the ethnographer interacting but it is edited in the style of the British school. The multi-purpose of the video material in terms of academic analysis and footage for television in the style of Llewelyn-Davies, requires a flexible approach towards the final editing. Although feedback and reflection facilitated by video footage is a crucial element, the analysis of the actual visual dialogue is of less importance to the overall study. In this study video is used as methodological tool that facilitates observation, communication and reflection on the collective action rather than being the sole object of study.

The revolution that digital video has caused throughout the film industry is evident (Wessels, 2001). The process of filmmaking actually becomes an affordable exercise that can be done by a wider range of producers. Whether this is beneficial for the quality of the products remains to be seen but it makes visual research much more accessible, it

allows filmmakers to record the more intimate conversations they have with respondents and it is not so intrusive and heavy as bulky camera equipment. A well-known advantage of the video camera is that it is possible to immediately view back material using the small LCD screen. Doing a short feedback session with the respondents of the critical reference group on the spot actually has become common research practice. Even if the recording would not be sufficient for editing, this immediate feedback possibility strengthens the relationship and communication between the scientist and his/her respondent considerably. The self-reflective effect of immediate feedback should induce interesting discussions between and with key informants.

Audiovisual footage forms an integral part of the data collection and analysis for this study. In total 45 hours of film footage including interviews with key informants have been recorded over the course of the fieldwork for this research. Apart from using the extensive footage for feedback sessions with community members, review and analysis of social data, films were edited from the footage. In total 3 films were produced from the video footage:

- **“Little Waterfall”** (2003) (52 mins) anthropological film on the renovation in Shallalah Saghirah.
- **“Tunnel Vision”** (2003) (26 mins) short TV documentary for BBC World Earth Report Series “Changing Currents” following the story of Shallalah Saghirah.
- **“Reviving Qanats”** (2007) (30 mins) This scientific film is produced for the United Nations University on the Syrian qanat research project and gives an overview of the qanat renovations that took place at various qanat sites including Dmeir, Qarah and Shallalah Saghirah.

DVDs of the films are available. For more information please contact: info@sapiensproductions.com