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Hydropolitics in Hirmand/Helmand International River Basin

And

Application of

Integrated Water Resources Management

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Master's Thesis. 30 Credits. Advanced Level E
Integrated Water Resources Management Master's Program
Uppsala, Sweden 2009-2010

Hydropolitics in Hirmand/Helmand International River Basin And Application of Integrated Water Resources Management

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Credits: 30 hec
Level: Advanced
Course title: Master Thesis in Integrated Water Resource Management,
Course code: EX0658
Program/Education: (MSc in Integrated Water Resources Management)
Place of publication: Uppsala
Year of publication: 2009-2010
Online publication: http://stud.epsilon.slu.se

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Abstract

Water is the core of all developing activities. Given the introduction of the 'sustainable development' concept, water is being perceived as the centrality of all economic and social activities. Limited fresh water resources, the increasing rate of population growth and the hypothetical present and future impacts of climate change have led the concerned national authorities to rethink their previous conventional approaches to water resources. In this regard, new guidelines have been introduced within the Integrated Water Resources Management framework. These principles persuade the water sector planners and decision makers to be involved in an alternative ongoing management process along with considering the different involved components from natural and human systems interacting with each other.

On the other hand, water has a naturally erratic behaviour. It may cross the political borders; so two or more countries would share one common water resource. In these situations countries struggle to take advantage of the available water as much as they can, even by ignoring the rights of other stakeholders outside of the borders. New concerns such as 'national security' arise and conflicts may happen between the riparian countries. However, sharing one common resource can be an opportunity to bring the riparian countries to the negotiation tables and make them involve in cooperative processes. Hydropolitic, studies the conflicts and cooperation processes between the riparian countries in one international basin.

Through this research the case of Hirmand/Helmand River Basin that includes parts of Iran and Afghanistan is studied. Initially, attempts are made to provide information from several secondary sources about the general features of the basin. Then complementary actions such as field visit and interviews are carried out and the process of social learning is triggered in order to be able to better understanding of the given data and draw new facts from what people reflect on the current complex situation. After analysing the problematic situation, recommendations are made in the final part particularly in association with the IWRM principles and the exiting opportunities to promote cooperation between two countries and achieve an improved situation.

Acknowledgment

This research would not have been possible without the support and encouragement of Professor Ashok Swain, under whose guidance and supervision I chose this topic and carried out the thesis. All those who provided me with the opportunity to do the field visit and the respondents to the interviews are gratefully acknowledged. Last but not least, I wish to thank my family for their constant support and encourage in different stages of this work which have been abundantly helpful.

Acronyms

IWRM Integrated Water Resources Management

IRBM Integrated River Basin Management

Chapter One

1 Introduction

In this chapter a general overview of the current situation of water resources availability, existing connected issues and limitations and consequently the global challenge for tackling the problems over water resources issues is given. Then the need for new managerial skills is discussed.

1.1 Water scarcity and the global challenges[1]

While being through the documents and literature on water resources, one common point is highlighted beyond all of them: lots of efforts are made to draw world's attentions to this point: 'the world's population will face a 'water crisis' in near future'. Certainly the features will help to understand the situation more clearly:

Although three-fourths of the Earth's surface is covered by water, only 0.26 percent of the total global fresh water is available for human water consumption in fresh water lakes and rivers (Shiklomanov, 1993 cited in Swain, 2004) out of which 3750 km^3/year is withdrawn and total consumption is 2280 km^3/year (Shiklomanov, 1997).

Water resources are not distributed evenly. Due to the unequal distribution of water resources among the people of a society some have more control over water than others in a society. Most of the world population lives in tropical and arid areas. About 95 percent of global population growth is taking place in developing countries of Africa, Asia and Latin America (World Bank, 1992 cited in Swain, 2004). At the same time, Europe alone contains about half of the global per capita runoff while having temperate climate and much less population growth rate. Moreover, water has a variable behavior over time and space in quantity and quality.

In addition to these main natural aspects of water resources which human can not interfere to change it, there are other water related factors which are the direct or

[1] The features in this part have been mainly obtained from these different sources: Swain, A., 2004. *Managing water conflict: Asia, Africa and the Middle East*. Chap.1. London and New York: Routledge; Shiklomanov, I.A., 1997. World water resources and water use in the beginning of the 21st century. In: IWRA (International Water Resources Association),IXth World water congress: water resources outlook for the 21st century: conflicts and opportunities. Montreal, Quebec, Canada 1-6 September 1997. Collection Environment: Montreal; Global Water Partnership, TAC (Technical Advisory Committee): Agrawal, A. et al., 2000. Integrated water resources management. 2000. No. 4 Sweden: Global Water Partnership.

indirectly consequence of human activities. World population has been tripled during the last century. At the same time water withdrawals have increased by a factor about seven (GWP, 2000). 'Present estimates indicate that the global population is likely to be doubled between 1990 and 2100 and most of this increase will probably occur by the year 2025' (Swain, 2004). It is estimated that two-thirds of the world's population will experience medium to high water stress by 2025 (GWP, 2000). In other words,

In addition to the severe posed pressure on natural resources by the sober population growth factor, there are further issues interlinked with this issue. Not only people in the world are heavily dependent on fresh water resources, but also they need food to survive. Preparing food for this large number of people in the world has caused the agricultural sector's nearly 70% use of total water withdrawal and more than 90% of all consumptive use of water. As stated in GWP (2000), by 2025 food is required for another 2-3 billion people. This indicates the need for additional 15-20% of irrigation water and the global irrigated area will increase up to 330 million hectares[2] by 2025 (GWP, 2000 and Shiklomanov, 1997 respectively). The situation is worsened in water-short countries striving to provide national food security regardless of other possible solutions and the limitation they may face. Example, Egypt, which 50 percent of its food is being imported (Shemi, 1996 cited in Swain, 2004), with 936 cubic meters water per capita per year in 1995 and 607 cubic meters in 2025 according to the 'water barrier' concept (Malin Falkenmark, (n.d.) cited in Swain, 2004) belong in the 'water scarcity' category. At the same time Egypt struggles to expand its irrigated land area and water extraction from the Nile River for the agricultural sector to meet its rapid growing population needs regardless of its other interconnected upcoming issues. The disproportionate water use in agricultural sector is important in terms of quantity, but the water quality is also aggravated by agricultural and industrial sectors activities. Mismanagement in water allocation in agricultural sector along with misuse of fertilizers and pesticides in large scales especially in developing countries, and the polluted water which returns back to the fresh water bodies result in water contamination. The polluted water is a major threat to human health and of course, harmful to environment. Though currently the industrial sectors withdraw about 19 percent of water resources, this feature will be doubled by

[2] This feature was 254 million hectares by 1995(Ibid.).

2025 (Swain, 2004). In developing countries especially the lack of sewage and wastewater treatment services comes into account as another water polluting element.

Not all the fresh water is on the surface. The underground water resources support almost one-third of the world's population (Ibid.). People in the arid and semi-arid areas are more dependent on these underground resources for drinking and agricultural purposes. Groundwater overdraft has caused the fall of water tables by tens of meters in India, China, Middle East, etc.

On the other hand, the change in living standards and particularly urbanization, especially in developing countries at a faster rate[3], are aggravating the water demand and supply balance in the world. States struggle for their national multi-dimensional development which this process is generally along with a single-sector approach. In order to meet their increasing water demand, states try to expand their water-related plans with the help of development in technology like building big reservoir dams and designing vast irrigation networks. As Swain (2004) writes, by 1949 there were nearly 5000 dams in the world and mainly in industrialized countries. By the end of the century there were over 45000 large dams in more than 140 countries. No human activity is without consequences. Regarding these large scale water schemes there are obviously adverse impacts both on social groups and the environment. In a dam building process for example, the displaced people who need places to be relocated can be a potential conflict source. Change in area's ecology patterns which occurs due to the river path and flow alteration negatively affects the area's environment.

1.2 Need for more efficient managerial skills

Water has no substitute. Limited water resources for the growing number of people in the world and uneven water distribution in addition to the impacts of climate change have created an uncertain situation. All these issues are leading the state governments to consider the situation as being critical in terms of access to fresh water resources. But water scarcity is one side. Misuse of water and mismanagement are on the other side. In other words, shortcomings in managing natural resources in general and water resources in particular, have aggravated the situation and multiplied the pressure on this vital resource. As Gourbesville (2008) claims, '[W]ater has conventionally been managed

[3] with a rate of 3.6 percent (Swain, 2004)

within administrative rather than natural boundaries, in a fragmented rather than holistic manner, and in a technocratic rather than participatory way.' Nevertheless, recent appreciation of the future 'water crisis' has led the governments to rethink their approaches. There is a universal call for gaining new managerial skills in this field. Governments now do realize that more efforts have to be made on planning and policy making:

'As the global economy grows, so will its thirst. This is not an issue of rich or poor, north or south. All regions are experiencing the problem of water stress. There is still enough water for all of us - but only so long as we keep it clean, use it more wisely and share it fairly. Governments must engage and lead, and the private sector also has a role to play in this effort.' (Ban Ki-Moon, the secretary general of the United Nations[4])

Water is the core of all developing activities. Given the introduction of the 'sustainable development' concept, water is being perceived as the centrality of all economic and social activities. Perhaps these could be the motivation for world business leaders at the World Economic Forum Annual Meeting in 2008 in which they set out a call to Action on Water[5]. During the twentieth century, water policies relied mainly on massive water infrastructure construction. From the water planners' perspective developing huge water schemes has been the answer to the increasing demands. The water related plans has been more supply-oriented rather than controlling demands. Gleick (2003), names it as the 'hard path approach' which beside its benefits, it has had several negative impacts on societies and environment. He later discusses that the main unresolved water problem is 'the continued failure to meet basic human needs for water'. However, the fact is that the actual real need for water can differ much more from the amount that people demand is overlooked. In current situation, the features indicate less water available for future population and the world leaders are becoming concerned about this fact and the climate change issue, its negative impacts and the future uncertainties. The multidimensional

[4] World Economic Forum Water Initiative, preface of Draft for Discussion at the world Economic Forum Annual meeting , Davos, Switzerland, January 2009. Available at: http://www.weforum.org/en/initiatives/water/index.htm (Accessed : 7 March 2009)
[5] Ibid.

aspect of water persuades those involved in water management sectors to devise other ways of tackling the problematic situation.

Given the current situation, this research aims at focusing on the case of Hirmand/Helmand International River Basin and study of the interwoven issues around the shared river water.

Chapter Two

2 Research design

The past, present and future possible conflicts in transboundary river basins has called the engaged water planners and authorities into rethinking their approaches to devise new ways leading to multilateral cooperation for improvement. More efforts are made towards the shared rivers to achieve mutual cooperation. According to the World Water Day official website (http://www.unwater.org/worldwaterday/flashindex.htm) on 22nd March 2009, attentions are called into the waters that cross borders and link us together. 'Whether we live in upstream or downstream, we are all in the same boat'. This research will concentrate on the case of Hirmand/Helmand International River Basin located within Iran and Afghanistan territories. The selection of this specific topic has been mainly due to the lack of existing studies on the hydropolitics of the basin. Although some researches have been previously undertaken in this area, but one that intends to consider two countries in one framework comprehensively is still missing. The lower part of the basin in the Iranian side is facing several issues resulting from water scarcity mainly attributed to the Afghans activities in the upstream and other relevant interstate issues which is discussed in the next sections. In fact, because of the harsh climatic condition especially in the lower parts, this area is hugely dependent on Hirmand/Helmand water. Hence, by this research efforts have been made to come up with some recommendations to improve the undesired current situation in the end after discussing the current issues in the situation.

2.1 Aims of the research

The study will follow two main purposes:

2.1.1 Study of hydropolitics of the Hirmand/Helmand International Basin

After gathering some general information about the basin, the degree of cooperation between Iran and Afghanistan over the shared river water will be investigated. Then, the consequences of the cooperation/lack of cooperation between two countries on the basin-wide current interconnected issues will be discussed.

2.1.2 Application of IWRM principles in the Hirmand/Helmand International River Basin and recommendations

Taking into account the current issues in the basin, the implications of IWRM principles will be studied to see how this approach can provide an enabling environment to improve the situation. Further recommendations are given as another part of this research.

The overall exalted (and ideal) purpose of this research is to trigger an on-going process with motivating those engaged in this area at different levels to build a basin-wide comprehensive and cooperative framework for taking further actions to reach a long-lasting solution beside all the hindering factors.

2.2 Scope of the research and limitations

Although the research is supposed to consider the whole basin as one study unit to systemically investigate the current situation in both riparian countries, but several major constraints prevents the researcher to pursue this manner. The security issue in the region and the instable political condition in the Afghan side as the major limitation do not let the process to follow the appropriate path and presence in the Afghanistan and investigate the whole basin thoroughly. On the other hand, since Iran has borders with Afghanistan and Pakistan and these two countries are facing political and social unrest, the situation in Iranian border towns is also affected and insecure. Hence, the parts of the study to be undertaken at the local level and field visit have to be limited. In addition, due to the insecurity issues in the area, clearly the woman researcher is able to do field work by being accompanied by a 'man' rather than being alone, according to recommendations from those familiar with the situation. Moreover, being a woman in Iranian rural areas creates some obstacles over the research process. Especially in the local area some people may have negative attitudes toward a woman asking them questions which refers back to their religious and cultural believes. Also Iranian authorities in important governmental positions are not so willing to attend the interviews to avoid further probable disturbances. Given these facts, the research could not be conducted in a fully participatory manner as a desired way of doing these types of research. However, attempts have been made to carry out the research by including as many local and non-local people as possible through a short field visit rather than limiting the research to a desk study.

Time is another constraining factor. As the research has to be prepared within almost 5 months, the scope of the research has to be limited.

Lack of enough information from Afghanistan side is considered to be another limiting factor. Although more concrete data and contacting Afghan informants seems necessary but unfortunately both will be missing during the research as mentioned earlier in this part. The available data from internet will be used in the research for the Afghanistan side.

2.3 Approaches adopted

2.3.1 Methodology

Wilson & Morren (1990) define problematic situation: '[A] set of circumstances comprised of people (as individuals and in groups); a historical context that bears on the present; key human activities; themes of concern and opportunity; decision-making structures and processes; physical and biological environmental factors; a political, economic, and social context….'. The international river basin of Hirmand/Helmand between Iran and Afghanistan is typical example in the central part of Asia indicating a typical example of such a problematic situation. Ecosystem and natural resources are interconnected with a variety of human activities within the basin and eventually are in interaction with each other. River basins, where nature and society interface, are recognized as messy and dynamic situations or 'complex systems' where the components and their interactions are changing and can never be completely pinned down, in contrast to the complicated systems where cause and effect can be separated (Snowden, 2002 cited in Steyaert et al., 2007). As within this context the situation is changing during time, surprises may take place and we would confront uncertainties. Due to the interdependency of the components, their varying needs and interests on the common resource (here Hirmand/Helmand River water), social dilemmas exist and conflicts of interests may happen.

As international river basins are about 'sharing' of a vital irreplaceable natural resource between two or more states with quite different backgrounds, interests and perspectives; consequently conflicts and tensions are at larger scales. New concepts such as 'national security' are brought into the discussions and each riparian country seeks ways to deal with its own prioritized demands. Hence, in such condition (in which issues are at higher

levels) and due to the failure of previous traditional approaches to efficiently cope with such situations, new approaches are needed for gaining different and more powerful means. As Steyaert and Jiggins (2007) state, growing awareness of the current situation along with existing limitations has led to ‘a new societal agenda for research that has been incorporated in major policy frameworks’ (Ibid.). They later claim that in this way, the co-creation of knowledge and understanding will be developed. In addition they offer other tools (engineering and scientific ones) need to be sophisticated in the process of dialogue.

‘Problem solving is essentially a learning process….One must engage in a learning process in order to improve the situation’ (Ibid.). Indeed, social learning happens within the soft systems thinking approach: its purpose is to understand others views and values and to learn about different existing perspectives and reach a mutually acceptable overview of the issues they are involved in. Such learning processes aims at creation of enabling environment for those considered as ‘stakeholders’ and also ‘policy makers’ in the problem area to discuss about their views and perspectives.

Combining methods -on purpose- would offer a broader range of opportunities for learning, analysis and acting within complex systems in different ways. Consequently, within this research some methods are grounded in soft systems methodology. Soft systems thinking is an approach to inquiry into the complex situations beside other approaches such as basic knowledge and applied science (Wilson & Morren, 1990). Through this approach, interactions between interlinked components of the systems and the impact of each on another are taken into account, since systems thinking implies a holistic approach rather than an exclusive one. Such complex situation in which nature and human societies are interacting thorough time and this will never stop as long as they both exist. Therefore, the desired outcome in the end of the process is usually an ‘improved situation’ rather offering ultimate changes. A proper research on Soft Systems Methodology embraces 7 steps which have to be indirect contact with the stakeholders. But since almost 90 per cent of the basin is laid within Afghanistan territory, it was not possible to attend physically there and create the mutual learning environment due to lack of facilities and security issues. Therefore, only some ideas and methods are obtained from this approach to organize the research in order to its better understanding.

In other words, this research will be done by blending different tools and through a combined methodology rather than following one specific one. In this way, it has been attempted to provide answer for these two questions 'What is happening' and later, 'What does all this mean?'. Below is the explanation of what consists in this research methodology.

– **Secondary sources**

An overall picture of the Hirmand/Helmand River Basin and some main existing issues will be highlighted with the help of available reports and articles obtained from different internet websites mainly for the Afghan side of the basin. For the Iranian side ample reports and information were available from the engineering firms working in this area and other internet sources and books. Facts and figures and other quantified information are found through these sources.

– **Complementary actions**

After collecting information from the documentary sources (books, articles, reports), within this part, emphasis is more on starting a 'social learning' process by closely discuss with informants and going to the area to observe the realities in the situation. Some informants will be available in Tehran who have been working on the socio-political aspects of the basin. Another part is the conversational realities which will be outlined later in this study, gathered from interviews by the local people during the field visit and bolding the phrases they expressed. Thus, interviews are the main tool used for obtaining information and understanding local stakeholders' different perspectives. Their views and suggestions are written down and after each interview a rich picture is drawn. Later all the rich pictures are combined to indicate clearly what is going on in the whole basin. This will help the study to be done in a more organized way. After analyzing the problematic situation, categorizing the issues and making claims based on the existing issues the recommendation section comes next which is drawn mainly from the ideas of different relevant people and secondary sources.

2.4 Definitions

According to the present research title two main concepts will be brought and therefore, will be discussed in this part to have a clear definition of them.

2.4.1 Integrated Water Resources Management

Dams and water distribution systems will not be a lasting solution if sufficient water is not available. Instead of designing master plans to develop the remaining free water resources to overcome the increasing gap between supply and demand, more attempts are needed to change the way water is used. Water resources consumption patterns should be revised. The other dimensions of this natural resource should be taken into account. The most important part is the existing societies as the 'stakeholders'. Policy makers should realize that everybody has a voice and interest. What is required is a "soft path" approach (Ibid.). For a long term solution, a holistic approach has to be implemented. The conventional ways of facing water resources has been mainly in a single-sector and fragmented manner. 'Integrated Water Resources Management' seeks new ways in order to bring improvements (if not say changes) to this complicated situation. The box indicates IWRM definition:

> IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic social and welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP, 2000).

There are different and several principles and guidelines relevant to IWRM and each have their areas of appropriate application of which the Dublin principles are a particularly useful set. The Dublin principles have found universal support amongst the international communities and are of those guiding and supporting principles (GWP, 2000). The box contains are the four Dublin principles:

I. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
II. Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
III. Women play a central part in the provision, management and safeguarding of water.
IV. Water has an economic value in all its competing uses and should be recognized as an economic good.

From the Dublin principles the main characteristics of IWRM can be obtained:

- According to the first principle water is a limited source and influenced by human activities in multiple aspects. A **holistic approach** is required to understand and analysis all the interactions and interdependencies between this natural resource and the human activity system.
- It is clearly stated that water management requires a **participatory approach**. Water is a subject in which everyone is a stakeholder (GWP, 2000). IWRM entails all stakeholders' engagement. Participation should be at a proper level, whether it is local, regional, national, or international depending on the context. All the users in a basin, whether in upstream or downstream, should be taken into account. IWRM aims at bring all to a table to negotiate their different perspectives and create balance between a top-down and a bottom-top approach. Therefore, a participatory approach is the only means for achieving long-lasting consensus and common agreements. However it will not always be achieved since some other mechanisms might be needed (Ibid.).
- In different regions of the world due to various reasons women's role has been neglected in water resources management. The social and cultural backgrounds of several countries traditionally do not allow women to participate in decision making processes. From the political perspective, in some countries gender discrimination exists and is emphasized legally that can affect the involvement of women in management processes. One

principle being allotted exclusively to women and their role in the Dublin principles highlights its significance in IWRM. More efforts should be made to find out ways of **women involvement** in this process.

- In many parts of the world water is still perceived as a 'free good' and costs almost nothing for the end users. This can be considered as one of the main reasons of low water use efficiency in different sectors. Regarding the crucial importance of water for lives and its scarcity, this resource's **economic value** should be appreciated. Of course, consideration of the condition of low income levels of the society should be taken into account.

IWRM can be seen as an adaptive term of management: learning by doing. Water management process is dealing with resources that are dynamic and in which interactions always exist. During application of IWRM principles in practice, new experiences are gained that brings improvements and causes progress. Hence, these principle and other guidelines cannot perceived as static, they clearly have to continuously be updated. Hence, integrated water resources management is an evolving process.

Human uses, sometimes overuses and contaminates the natural resources. Ultimately, in the management of natural resources consideration of human interaction with natural resources should not fail to be taken into account. '… [I]ntegration can be considered under two categories: the natural system and the human system….Integration has to occur both within and between these categories' (GWP, 2000). The old patterns of water resources management are not able to provide a solution to this uncertain situation. If the water planners accept that water resources are under pressure owing to a variety of different factors and at the top of the human activities, they realize that the fragmented approach is not the proper answer. 'Integrated approach' is challenging the policy makers to engage all the components interlinked with one another. However, the increasing concerns over limitation on water resources cannot merely stay in theoretical terms. Action has to be taken before it is too late.

2.4.1.1 Management at basin level

In order to build up a long-term and sustainable solution, appropriate identification of the borders of the problematic situation is necessary. In fact, the river basin is the proper unit

in which IWRM principles should be implemented. An integrated river basin management approach includes various interdependent components and a number of different stakeholders with diverse interests over one common natural resource (water). The river system embraces all these parts as a whole and as a joint unit. The policy makers and water planners should be aware of this inclusive concept.

Although a basin based approach is required in integrated management, but as Molle (2007) states, by no means socio-environmental processes are spatially bounded. He also argues that causes of water related problems (e.g. land use changes, erosion, loss of biodiversity, etc.) can be at national or global levels. Therefore, their solutions may indeed lie outside river basin boundaries. This is observable in international basins in which different institutions and actors exist out of the borders having the capability of influencing management processes. Hence, a holistic approach should contemplate other factors that may exist out of the basin borders anyway. This again emphasizes on the context-specified character of IWRM.

2.4.2 Hydropolitics

Water is the most politicized natural resource (Elhance, 2000). At some points, it is compared to another strategic natural resource: oil. The difference is that without water no one can live more than few days.

Water does not follow any pattern while flowing. It does not obey the geographical borders. Today there are 263 shared rivers crossing the borders of two or more countries. International basins cover 45.3 percent of Earth's land surface (Wolf et al., 2005). While governments are concerned about the widening gap between water demand and supply within their countries, more than 40 percent of world population is dependent on international rivers and about two-thirds of these people live in developing countries (Swain, 2004).

Existing concerns about scarce water resources and the competition over this limited vital natural resource generates unease and conflicts among states which have led to the prediction of water wars in future. In 1995, the World Bank then vice president Ismail Serageldin claimed that “the wars of the next century will be about water.” (Wolf et al., 2005). Swatuk and Motsholapheko (2008) write that the stream of media reports concerning about events which some or all of them are linked to global warming and

climate change, have seeped into popular consciousness so that 'water wares' are considered real possibilities. Although discussions about possibility of water wars still exist, but the fact is that there is no clear evident on this. As Swain (2004) writes water scarcity has caused a few minor 'skirmishes' but no war has yet been erupted and shared rivers have not been the sole and immediate reason for wars among riparian countries. It seems that countries try to avert wars over water resources though in different cases it has been close to start. This can be attributed to different factors preventing countries of fighting wars including need for enough time, costs, fear of the invader for penalties from the international communities, etc.

On the other hand, countries have seemingly tried to bring a resolution to the existing water induced conflicts. As Elhance (2000) claims, there are more than 300 treaties dealing with the shared water resources issues and over 3000 treaties with provisions relating to water although cooperative and integrated development and management of the water resources in shared basins is still extremely rare (Elhance, 2000).

The concept of 'hydropolitics' has arisen due to the water inducing conflict and cooperation:

> 'Hydropolitics is a systematic study of the nature and conduct of conflict and cooperation between states over water resources that transcend international borders' (Elhance, 2000)

Hydropolitics is context-specified. Each shared basin has its own specifications. The difference of international basins can be seen through each riparian countries historical background, geographic characteristics, social and cultural behaviors, political and economic condition, etc. In addition, not all the states sharing a river basin have the same capabilities. The states dependency over water can differ from each other like 'Nile with [ten] riparian parties on it of whom only Egypt is totally dependant on it' (Haddadin, 2002). In study of the hydropolitics of each international basin all of these factors together and the existing multi-faceted feature of each common river basin should be taken into account. As Elhance (2000) states, '[T]his makes hydropolitics a multidisciplinary and complex subject of study'. He also later discusses the impediments that may hinder the cooperation process between the riparian countries which may be in different aspects: political, technical, economic, etc.

Given all these facts, ultimately a clear understanding of the hydropolitical aspects (conflict and cooperation) within the international basins and the background behind it is necessary before initiation of an integrated basin-wide management.

2.5 Integrated water resources management in international river basins[6]

The international river basins bring different challenges to the water sector managers. As mentioned before, water is the most politicized natural resource. In shared basins different states (whether they are in the upstream or downstream) with various interests are involved. The institutional settings, ranging from agreements between countries and the national legislations to the local councils and informal group of stakeholders, exist not only within the basin or sub-basin area, but also include the national and international levels. Agreements and conventions are negotiated and ratified at international level; policies are formulated at national level and implemented at basin and sub-basin level. Given these facts, the IWRM principles emphasize on coordinated actions between different sectors at different levels. Therefore, involvement of policy makers from all riparian states is inevitable. In the initial steps and according to the holistic attitude of the IWRM policies, the management process will be effective only if the highest related political level officials are involved. To pave the way for the improved situation the key players from the high level authorities from both sides have to be convinced about the benefits of cooperation to strengthen their will for taking further mutual actions to trigger the continuous cooperation process.

However, IWRM principles can be implemented while an enabling environment is created by supporting laws and legislations which are required to be developed at national and interstate level. Both sides have to be concerned about the financial sources to guarantee the process to be continued. To achieve these, institutional arrangements have to be established at national and interstate level. Basin organizations have to be set up at basin and sub-basin(local) level by including the key stakeholders for the implementation process. Management mechanisms and support have to be provided by the authorities for the water management sectors from both riparian countries. As Swain (2004) states, understanding of the problem is necessary for the negotiators to find lasting solutions and for the conflict management. Hence, providing sufficient relevant

[6] GWP (2009)

information about the complex issues from diverse disciplines existing in the basin is necessary from the upstream and downstream countries to each other.

2.5.1 Why is it difficult to achieve?

Bearing in mind the existing interconnectedness within the international river basins, engagement of upstream/downstream parties calls for strong will of authorities, proper managerial skills and enough institutional capacities. The holistic attitude of IWRM/IRBM entails consideration of all factors and participation of policy makers and others who have an interest in the decision-making processes. This can be seen as the main challenge on the way of its achievement in reality. Fragmented, uncoordinated and weak-functioning institutional structures along with the lack of relevant knowledge and skillful human resources impede the process and bring lots of hurdles still to be dealt with. Opposition by authorities to the new ideas which may seem challenging to them can occur.. Such factors are more noticeable in scarce-water developing countries in arid and semi arid areas. These countries' inefficient governments and unstable political situation are of the strong grounds for negligence of the actual need for alteration in their institutional structure and reform of their current approaches. While the countries failing within their own water management sectors; building institutional capacities to bilaterally share information, negotiate and consequently cooperation over the rivers shared by their neighbors as the necessary part of IRBM sounds far-fetched.

No country will miss any opportunity to take advantage of its water resources even if it is shared either with the downstream country or the upstream one. The situation is worse in populated water scarce countries located in arid areas which lead them to seek a water secure condition by using these waters at the shortest time and the highest quantity. As Turton (1999) states, '[developing] states are typically locked into a conflictual set of hydropolitical dynamics aimed at getting accessed to ever dwindling water supplies'. Meanwhile less attention is paid to the adversely affected people who are dependent to the shared water outside the borders of the country. Because of the existing rivalry between the several countries sharing river(s) with each other, their relation is very prone to be influenced by tension and conflict. 'From the Middle East to New Mexico, the problems remain the same' Wolf et al. (2005) claim this after referring to interconnections in a watershed and consequently the complications of water resources

management, and more possibly when the international boundaries are added to the system. 'Today the downstream neighbor's complaint about the upstream riparian is echoed by Syria about Turkey, Pakistan about India, and Egypt about Ethiopia' (Ibid.).

The stronger country(s) in the basin can take control over the shared river even if located in the downstream without considering other riparian countries in different ways like huge water infrastructures construction usually in upstream, unfair treaties which can be signed with the support of another powerful third party, military threats, etc. As Zeitoun and Warner (2006) discuss, Israel, Egypt and Turkey have established situations of dominant hegemony over the Jordan, Nile, and Tigris and Euphrates river basins respectively. The 'hydro-hegemony' concept can clearly be observed in the Nile shared river basin while there are two other major riparian countries (Ethiopia and Sudan). 'Egypt has always used the threat of war to stop the water development plans of the Nile upstream countries' (Swain, 2004).

Because of the competition between states over shared waters, the concerns over access to enough fresh water resources can be due to country's struggle for national security. Sufficient water resources for one country, means developments in agricultural sector, enough food, economic growth and public welfare. Elhance (2000) states that water security is becoming a core national security concern especially in arid and semi-arid regions. Uncertainty resulting from the climate change (like current longer drought periods in some parts of the world) aggravates the situation. In countries with more limitations on available water resources along with population growth and arid climate the competition may lead to more serious conflicts over water allocation agreements.

Many of developing countries that are located in arid and semi-arid areas of the world may experience more tensions over water scarcity, and among them those dependent on shared waters may be confronted with more conflicts the intense competition in these cases. In situations like these, the weaker riparian countries will face limitations to participate in long-term cooperative activities if they would have less available technical capability, management knowledge and expertise and financial resources. While talking about the developing countries and their lack of financial resources (of which some may be in poverty condition), the existing water resources can be perceived as the only economic asset that they have to use at least to develop their agricultural activities in order to grow food. Another key issue is that each country perceives the natural resources

within her territory as its own resources. The priority is with the country's people and the developing activities within the country. While the country is concerned about her lack of available water resources, will be reluctant to step in the negotiations for cooperation and sharing this key natural resource. In this case the country can hinder the process in different ways like preventing reliable information dissemination, etc. Countries with more tendency of using the common water resources unilaterally may refuse to share the proper data on the amount of rainfalls and river discharge in the upstream. Usually this is the upstream country which takes the control over the shared resource. The downstream country is more willing to make the process of cooperation start. Though in some basins like Nile, in which Egypt in downstream of the basin acts more unilaterally. However, Elhnace (2000) writes about the fear of the country ' of becoming dependent on others for an essential resource' considering the future uncertainties. The fact is that those riparian countries unwilling to participate in the cooperation process over their common water resources will however be in a lose-lose game. Implications of the desire of countries to expand their global economic activities in a faster rate, has persuaded the states authorities to realize the importance of water as the center of all developing and economic activities and consequently be engaged in providing solutions in favor of all parties sharing a common water resource. Unilaterally use of common waters will bring several negative impacts. Threatening the complainant country by war and militant activities (hydropolitical belligerence) or by massive water infrastructure construction to divert water or impound it, none will provide the answer to the complex and interlinked issues in international basins in the long run.

On the other hand, since the shared waters issues mainly lay in the political category and may affect the relationship between the riparian countries, the authorities may neglect the important role of ‘water’ for the local level stakeholders to prevent deterioration of the political relationship between the countries**.**

2.5.2 Also grounds for hope

However, as mentioned previously, states have attempted to find solutions to avoid violence. Wolf et al. (2005), according to the analysis of the study done by researchers at Oregon State University, conclude that '… [T]here are more examples of cooperation than of conflict.' Later it is discussed that '…international water disputes do get resolved,

even among enemies…' The number of treaties over shared waters is the evidence that governments make more efforts to find solutions for the situation rather than break out fights over water resources. The attempts of the third parties and international bodies to bring the riparian countries to negotiate the issues over their common water resources can be perceived as the desire of the parties to cooperate. Though in actuality, riparian countries do not fully cooperate and abide by the existing agreements, but as Elhance (2000) claims, there are enough reasons for hope that water conflicts can be resolved and cooperation fostered with effective international engagement in mediation and negotiation efforts. In shared basins, the riparian countries, whether in upstream or downstream, are now aware that the long term solution will not be achieved by their individual activities. IWRM by its holistic attitude toward present interlinked issues intends to improve the current messy situation. Hopefully, the IWRM principles will help states to devise plans in a more holistic, participatory and cooperative manner.

The fact is that common water resources can lead to tensions among states while at the same time can be the reason to bring parties together for cooperation.

Chapter Three

3 The case of Hirmand/Helmand International River Basin

Since the Hirmand/Helmand River Basin is shared between two countries, a brief general overview of both countries is provided before going through the case.

3.1 Iran-Afghanistan: a general overview of the situation in each country

– **Water resources in Iran**

Iran is a Middle Eastern country with the total area of 1,648,000 km^2 and nearly 70 million population[7]. Population projection indicates that Iran will have around 100 million people by 2022. Iran's climate is arid to semi-arid in Eastern and Central parts, and along the Caspian coast in northern part has the subtropical climate. Almost that 85% of the country is under the arid and semi-arid to extreme arid climatic condition. The country is suffering from the limited available water resources and uneven distribution of this natural resource:

- Iran has one third of the global average rainfalls which is about 250 mm per year and 0.3 percent of world's fresh water resources while almost one percent of world's population lives in Iran.
- Iran uses nearly 74 percent of its renewable fresh water resources
- Iran is in the list of countries within 'water scarcity' category by 2025 (Swain, 2004). It is indicated that the water per capita in 1995 has been a bit more than 1700 cubic meters per year while this amount will decrease to 916 cubic meters by 2025.
- About 93 percent of water resources is used in agricultural. The water efficiency in this sector is around 30 to 37 percent. 6 percent is used in domestic sector and 1 percent in industrial sector.

[7] Iran GDP is estimated at 270,937 millions of US dollars in 2007 (World Development Indicators database, World Bank. Available at: http://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf (Accessed 28th Feb 2009). GNI per capita for Iran has been 2,600 US dollars in 2005 which belongs in the lower middle income category according to World Development Indicators database, World Bank. Available at: (http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf (Accessed 28th Feb 2009).

- There are not sufficient wastewater treatment facilities in Iran. Only 24 percent of Iranians in urban areas are under the coverage of sewage collection and treatment facilities.

– **Water resources management in Iran**[8]

By the year 1960, Iran was following the traditional ways of water distribution, e.g. Qanats[9], springs, river diversion by dug traditional canals, etc. From 1960 and after nationalization of water resources in Iran, water harnessing projects started by construction of reservoir and diversion dams and government was at the top of all these schemes. Stakeholders and private sectors were not participating at any stage of planning, studying, implementation and operation. There has been a non-holistic approach in designing the water projects. The National Water Plan studies started in the mid-1970s within a comprehensive framework, but neither these studies nor the studies came up later (which were more like a 'Master Plan' rather than an IWRM framework) were practically applied in the decision making processes. After the introduction of 'IWRM' in the world as a new approach, Iranian academia have taken advantage of the introduced concepts and new efforts have been made to bring them into different academic and administrative societies. The application of IWRM concepts is still limited to some interior river basins and is considered as a device for decision makers in water allocation debates.

However currently in water sector, the major trend in water resources management is still toward unsustainably water infrastructure construction to guarantee that water supply is in line with population demand. The outcome of the water infrastructure development schemes, have not been acceptable. Many interlinked issues have come up as consequences of these unsustainable activities. As a clear example, there are water harnessing structures for more than 40 years, while still their water delivery and distribution networks have not yet been completed. Overexploitation of underground

[8] This part is written in association with those involved and specialized in water resources management sector in Iran. In this regard, two people were interviewed: Dr. Rahim Ettehad, the then senior expert of Planning and Budget Organization of I. R. of Iran with more than 40 years of experience in water resources planning and management sector and Dr. Shahab Araghinejad, assistant professor in School of Soil and Water Engineering, University of Tehran.

[9] The Qanat system consists of underground channels that convey water from aquifers in highlands to the surface at lower levels by gravity. (available: http://users.bart.nl/~leenders/txt/qanats.html (1st Feb 2009)) The word 'Qanat' is Arabic, but the system is famous from Iran. In Persian it is called Kareez.

water resources leading to fall of water table and change in its quality, soil erosion and huge amount of sedimentation in dam reservoirs, indicate lack of proper water resources management. Low efficiency in agricultural sector as the outcomes of water resources plans and projects and existing imbalance between costs and benefits is complicating the situation. There is no clear-cut between tasks of different sectors and organizations and this leads to uncoordinated intricate interactions between them. Instability in the administrative structures can be perceived as a major issue. Authorities at the administrative levels may change even after a very short period of working.

It is expected that IWRM will provide an answer to the complications resulting from unsustainable water related developing activities and the consequent undesired situation, though in reality this has not been proved so far.

Although the situation is not still satisfactory, but IWRM has brought already some changes:

- New concepts (coming from international literature) are currently prevailed in professional dialogues and upper administrative levels of decision making.
- Currently, the governmental client, and those involved in water resources development projects, put more emphasize on the necessity of consideration of IWRM.
- Simulation and optimization modeling of physical resources are the main feature of IWRM in Iran. However, in these studies, the socio-political aspect is not considered in the analysis processes.

The main obstacles in the present situation which are preventing the process from progressing can be mentioned as below:

- Governmental inefficient management of water resources for several years. Structural approach has been dominant in water resources processes. This approach is still prevalent.
- Still there is no proper and adequate understanding of IWRM notion in the relevant communities. It is a hasty IWRM! The authorities are trying to adopt and apply the IWRM concepts too fast, before understanding all the connected predecessors and prerequisite
- There is lack of attention to the previous experiences and analysis of consequences of former existing approaches. This is somehow related to the authorities' hasty actions.

– **Water resources and management issues in Afghanistan**[10]

Afghanistan is a landlocked country with limited water resources. The current population of Afghanistan is estimated at about 20 million of which 85 percent live in rural areas[11]. Afghanistan has an arid and semi-arid climate with precipitation from 75 mm in the plain to 1170 mm in highlands. The rivers in Afghanistan represent 80 percent of surface water resources of the country. Afghanistan is one of the countries with the lowest access to safe drinking water. The annual water consumed for drinking purposes is around 1.5 percent of the country's total water consumption. Agriculture sector is the major water user from surface and underground sources. Moreover water use efficiency rate is nearly 25 percent. As Afghanistan is experiencing a long spell of violent conflicts no major industrial plants is in operation, therefore only 0.5 percent of total fresh water is used in industrial sector.

Different issues are adversely affecting the natural resources in this country. Non sustainable resource use, poor management systems are the existing issues in the present situation. Natural resources, due to a combination of war, civil conflict, over exploitation and imposed neglect, is suffering depredation for almost 25 years. Damaged infrastructure and degraded natural resources are the legacy of these factors. Moreover, the recent drought periods have imposed more pressure on natural resources and worsened degradation. Though the NGOs and different UN agencies have worked during the period and the process still goes on in the post-war period, but in general, this sector remains poorly performing, with the country's highly dependent on food aid (Anon., 2002)[12]. In addition, as Alim (2006) argues water management in Afghanistan is facing challenges such as pollution of surface and underground water bodies, deforestation and drought periods which generates/intensifies flood, uncontrolled groundwater exploitation, etc. As he states, these are consequences of 'weak institutional infrastructure'. Within the country the River Basin Management approach has been launched and initiated by Afghanistan's Ministry of Irrigation, Water Resources and Environment. Under this

[10] (Alim, 2006; Aini, n. d.)

[11] According to the World Development Indicators database (World Bank), Afghanistan's GDP is 11,627 millions of US dollars in 2007. Its GNI also fits into the low income category of World Bank in 2005 which is less than 875 US dollars per capita. (Available athttp://siteresources.worldbank.org/DATASTATISTICS/Resources/GDP.pdf and http://siteresources.worldbank.org/DATASTATISTICS/Resources/GNIPC.pdf , Accessed 28th Feb. 2009)

[12] Available http://www.adb.org/documents/others/cna_afg/agriculture/cna_afg_agri.pdf (Accessed 20th February 2009)

program the country is divided into five major river basins, of which Helmand Basin with 40 percent of area coverage and 11 percent of water flow is the largest one.

– **Transboundary Rivers in Iran and Afghanistan**

The total renewable water resource in Iran is estimated at 137.5 km^3/ year. Iran receives around 9 km^3/ year of surface water through the rivers flowing from outside the borders. On the other hand, the outflow from Iranian borders to the neighboring countries is almost 10 km^3/ year. Iran has Boundary Rivers with its seven neighbors which are around 22 per cent of the total border lines (Chavoshian, Takeuchi, Funada, 2005?).

In Afghanistan, among the eight principal river basins, only one is entirely in Afghan territory and some small rivers in the north and northwest and some others in the Amu Darya deserts. The rest of the substantial perennial rivers are shared with neighboring countries. Only on the Hirmand/Helmand River, a water sharing agreement exists (Anon., 2002). 47 percent of the surface water in Afghanistan flows to the neighboring countries (Alim, 2006).

3.2 The Hirmand/Helmand River Basin

The Hirmand/Helmand River Delta is in the end of the closed Hirmand/Helmand basin in Iran (figure 1) and is also called Sistan Basin or Sistan Inland Delta. This is a part of the Hirmand/Helmand River Basin which largely is located in Afghanistan. The water in the basin flows from the Hindu Kush Mountains and the total length of the river from head to mouth is 1050 km. Hirmand/Helmand River is the only perennial desert stream between Indus and Euphrates-Tigris Rivers (Whitney, 2006). The main characteristic of this river is its significant fluctuations during the year. According to Alim (2006) the settled population in Hirmand/Helmand Basin located in Afghanistan is 5,881,571. About 400,000 in 2005 lived in Sistan Delta (Beek & Meijer, 2006). When enough water is available three Hamun[13] lakes will be formed: Hamun-e-Puzak (mainly located in Afghanistan), Hamun-e-Saberi (59 percent is located in Iran), and Hamun-e-Hirmand (located in Iran)[14]. These lakes are one of the main resources of area's fresh water and one of the most valuable aquatic ecosystems in Iran. They are registered in the Ramsar Conventions on wetlands (http://www.ramsar.org/).

[13] Hamun in Persian means a large flat area, plain.
[14] These lakes receive their water from Hirmand/Helmand and some other smaller river flows.

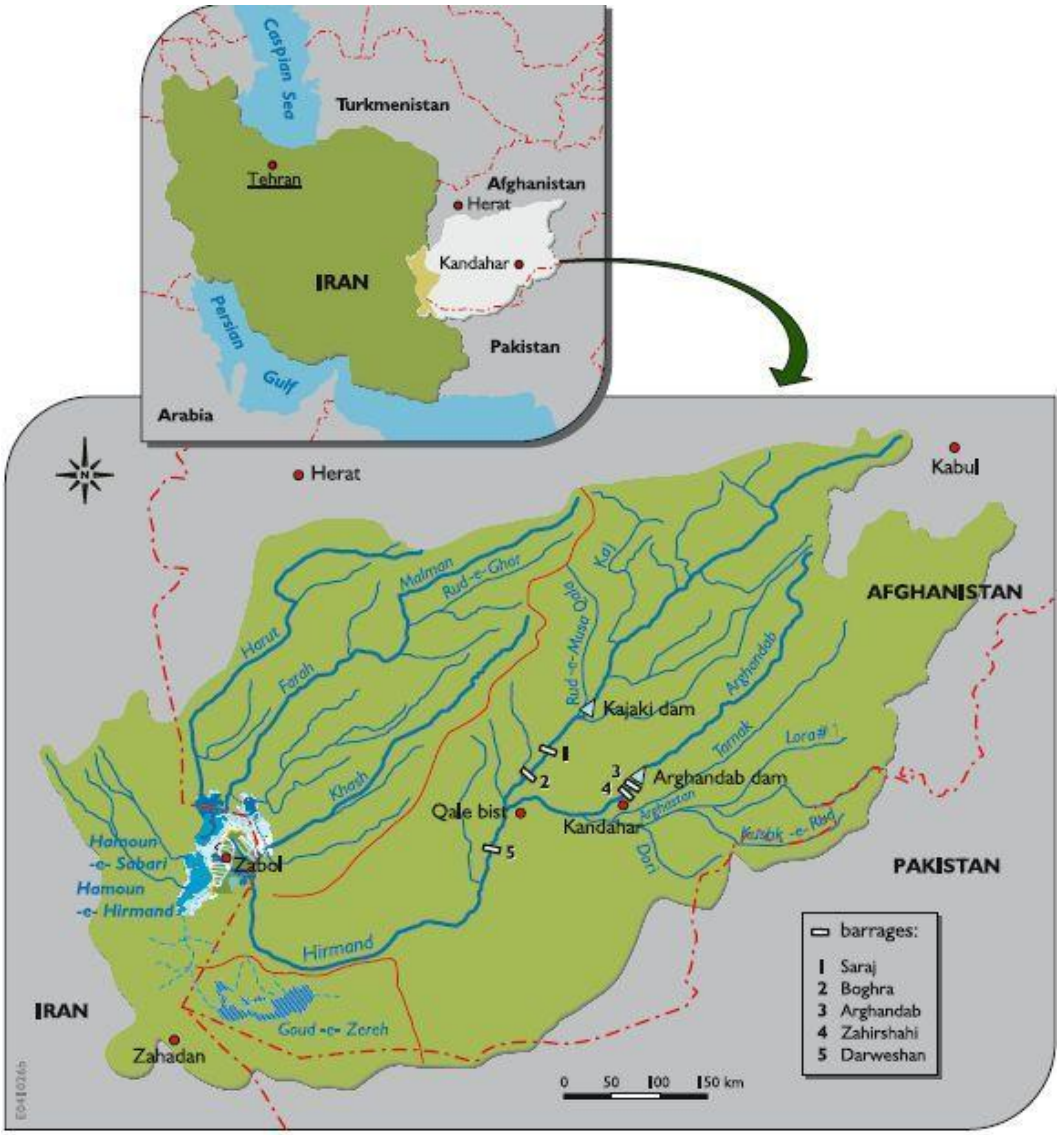

Figure 1: Hirmand/Helmand River Basin

(Sources: Beek et al. (2008))

'….Hamuns remain the only free-standing bodies of relatively fresh water in Southwest Asia that are not artificially created or located in mountainous terrain.' (Whitney, 2006). The main feature of these lakes is that their water is fresh, though they are located in the end of a closed basin. In addition, Sistan Basin has two other geographical sub-unites in addition to these Hamun lakes (UNEP, 2006: 5): (i) the upper plain of the inland Delta of the Hirmand/Helmand river, which is mostly used for agriculture; and (ii) a hypersaline lake (Gowd-e-Zareh) in the lowest part of the basin and in the lower part of the Hamun lakes. This saline lake is the deepest depression of the basin and collects the overflow of

the wetlands (Hamuns) and also of Hirmand/Helmand River's in case of extreme floods. The basin does not have an outlet to sea. Water is lost just by intensive evaporation. Figure 2 indicates the Hamuns and Lake Gowd-e-Zareh.

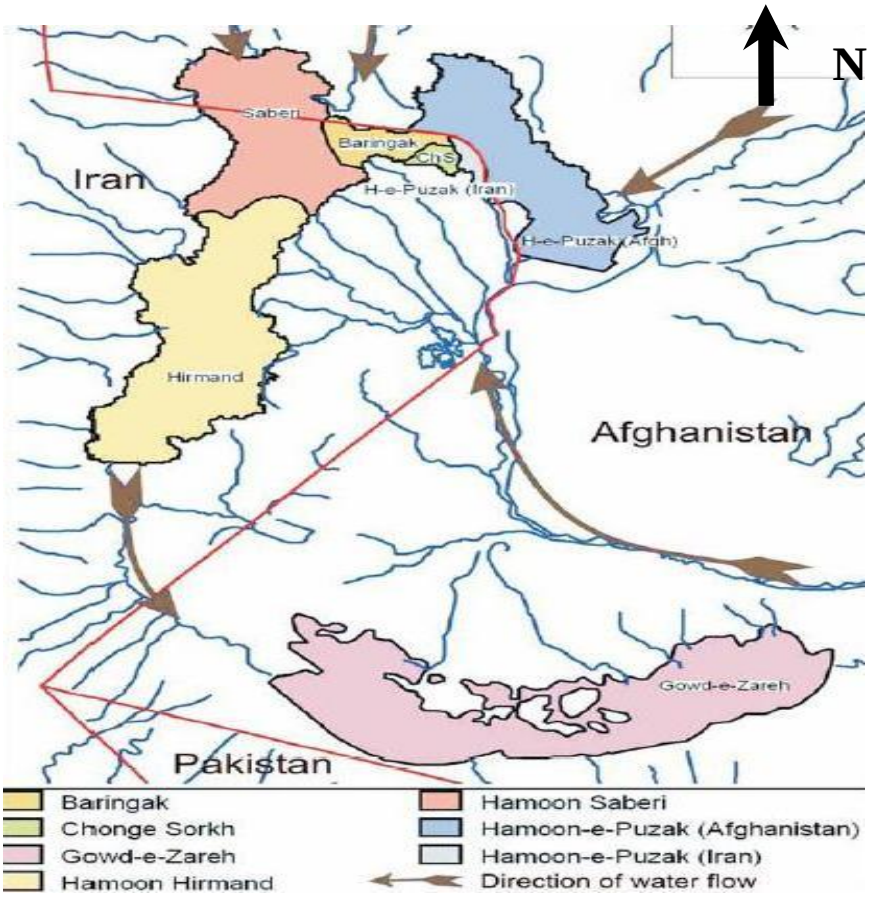

Figure 2: Location of Hamuns and direction of water flow
(sources: UNEP, 2006)

According to the UNEP report on the history of environmental change in the Sistan Basin in May 2006, 89 percent of the basin is within Afghanistan and 9 percent is located in Iran. Only 2 percent of the basin is in Pakistan. In Hirmand/Helmand Basin there are other contributing rivers other than Hirmand/Helmand River. This river at its reach to Iran bifurcates into Sistan and Common Parian Rivers. These two enter Hamun-e-Hirmand and Hamun-e-Puzak. Common Parian River forms the border between Iran and Afghanistan. There are other small rivers with temporary flow which in the table are mentioned as Hirmand West and Common Parian. Arghandab River which is the major

tributary of Hirmand/Helmand is in the Lower Hirmand/Helmand category. More detailed information is indicated in the table 1.

Table 1: Size of the Hamuns and catchments

(source: UNEP, 2006)

Country	Afghanistan		Iran		Pakistan	
Units	km²	%	km²	%	km²	%
Hamoons						
Baringak			208	100%		
Chonge Sorkh			62	100%		
Hamoon Hirmand			1842	100%		
Hamoon Saberi	479	41%	682	59%		
Hamoon-e-Puzak (Afghanistan)	1154	100%				
Hamoon-e-Puzak(Iran)			60	100%		
Catchments						
Adrashkan	21068	77%	6418	23%		
Arghandab	71958	93%			5350	7%
Common Parian right bank	1904	100%				
Farah	39945	100%	9	0%		
Hirmand West	642	4%	13747	96%		
Khash	24487	100%				
Lower Helmand	36307	99%			418	1%
Sistan Irrigated			2474	100%		
Upper Helmand	59918	100%				
Total	257860	89%	25502	9%	5768	2%

3.2.1 Climate

Sistan was often described by explorers and natural scientists as one of the most desolate deserts on Earth. Whitney (2006) refers to Sir Fredric Goldsmith's (1876) visit to the Helmand Delta region which describes it as being the 'most odious' place on the face of the Earth'. The climate of the basin is extremely arid except at the edges of the basin where are arid (Ibid.). The area suffers from major consecutive droughts and floods**.**

- **Droughts in Sistan area and hypothetical climate change impacts**

Unlike floods, drought has no immediate major impact. Therefore, it draws human's attention much later in order to take an action to cope its multifaceted adverse effects. One of the major characteristics of this area is its exposure to unpredictable prolonged dry periods. The recent drought period in 1998-2005 has created major conditions of famine in the area. The Hamuns Lakes have run almost completely dry over the recent drought period starting from 1998. Figure 3 indicates the extent of degradation within this period. To see this as a result of climate change or not is out of this research's purpose and it should be investigated in another research proposal. However, according to the

studies every 15 years droughts and each 30 years a critical drought period happens. Especially the recent major drought was one of the worst ones. Even in 2004 in which Iran has received good rainfall amounts, this province was still extremely dry (Jihad-e-Agriculture, 2005). In comparison to the previous years, within the drought period of 1998-2002, the average temperature has increased 1 °C, relative humidity decreased by 5 per cent and evaporation increased by 11 per cent while at the same time precipitation decreased by 56 per cent in the Sistan area (Ahmadi, 2005). Indeed, it is anticipated that in long term the probability of drought periods is higher than normal and wet periods (Haghighatjoo & Shahmohammadi. H, 2002).

These dry periods have been adversely affecting agricultural activities and productivity, livestock, fisheries and endangered birds, plants, etc. species. The windblown sands have aggravated the situation. Since there is almost no water in Hamun Lakes, sand banks can easily move to agricultural fields, settlements, roads, etc. Many other social and economic issues have come up afterwards since the lakes are the main source of locals' livelihood. In addition to dry periods, according to UNEP (2003) despite the continuous releases of water from the dams in upstream as a result of over-exploitations en rout, this amount fails to reach to the Sistan area.

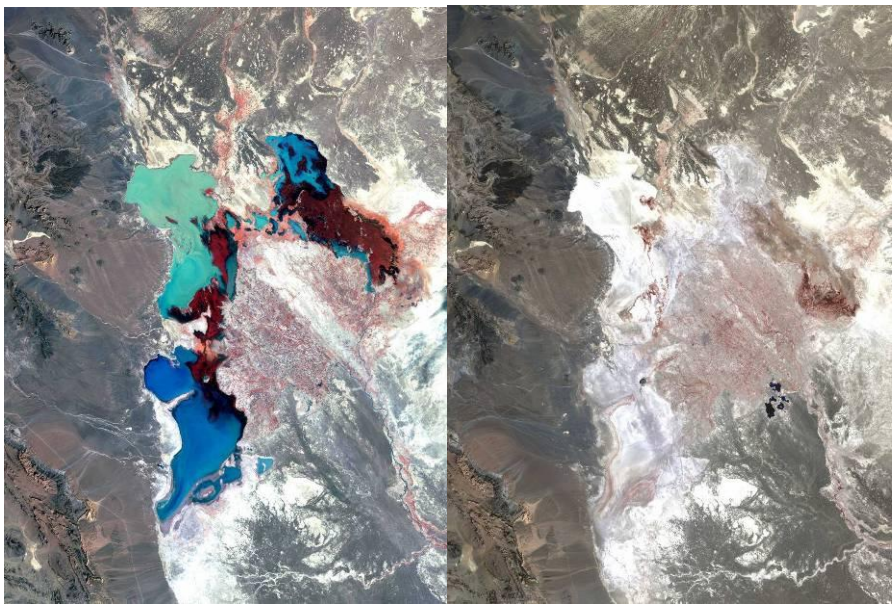

Figure 3: Hamuns.

In 1976 (left) Hamuns were still thriving. In 2001 (right) Hamuns were completely parched after the long drought periods.

(Available at http://earthobservatory.nasa.gov/Features/hamoun/Images/hamoun1976_highres.jpg and http://earthobservatory.nasa.gov/Features/hamoun/Images/hamoun2001_highres.jpg)

– **Precipitation, temperature and evaporation**

The annual average precipitation in the Upper Hirmand/Helmand River basin is estimated 350 mm while it reduces gradually in the lower parts of the basin. In Sistan Basin (the lower parts) this feature is about 55 mm which is one-fifth of the whole country's average rainfall. The weather temperature can exceed 50 º C in summer in Sistan Delta. The annual average temperature is about 21.8 º C. According to this, Sistan is classified as a very hot and dry region (Beek, Meijer, 2006).

Evaporation in the Iranian side is about 4800 mm per year which is two times greater than average annual evaporation of the country (Pars Consult engineering company, 2007). In the period of growing season of the summer crop from May to December the potential evapotranspiration in Sistan is about 700 mm higher than in the lower Arghandab, middle Hirmand region which have serious affects for the crop water requirement (Kwadijk & Diermanse, 2006).

– **Desert winds**

One of the main factors affecting the weather condition in the area is strong winds. The 'Wind of 120 Days' is the most notable and frequently described feature of the lower Hirmand/Helmand Basin (Whitney, 2006). Sistan is one of the windiest deserts in the world (Ibid.). These winds blow continuously in spring and summer (from May to September) and some days in winters. It is stronger in Sistan than the other parts of basin and has significant impacts on the landscape and the lives of local inhabitants. These winds cause a considerable increase of evaporation in Sistan. The strength and duration of these winds has increased after the recent drought periods. In some villages in this area people have left their homes due to the hard condition of living (Pars Consult engineering company, 2007). As a consequent of this phenomenon, high temperature in summers and surprising cold winters have adverse impacts on agricultural productivity in this area.

3.2.2 Water resources in Sistan Delta[15] and Afghanistan

– **Surface water**

The Hirmand/Helmand is the main source of water in this area. The available river water

[15]For the required information in this part has been mostly relied on Beek & Meijer (2006)

is at average between 5000 and 6000 MCM per year. Total annual discharge of the river is 9300 MCM stated by Alim (2006). As Whitney (2006) states, Hirmand/Helmand River has very low content of dissolved solids.

Water availability has decreased in recent years. In 2001, The Hirmand/Helmand River at the Afghan-Iran border ran dry, falling by 98 percent from its annual average, also precipitation in Sistan Basin dropped by 78 percent in the same year (Weier, 2002). This decrease is also attributed to river damming in the upstream and the expansion of agricultural activities. As mentioned earlier evaporation rate is also high.

– **Groundwater resources**

As Beek and Meijer (2006) state, various explorations have confirmed that there is no deep groundwater in the area, even not under the Hamun lakes. However, 10.57 percent of the water consumption in the Sistan area is from groundwater resources (Jamab Consulting Engineers, 2000).

3.2.3 Main water infrastructures in the basin

Dams: A number of multipurpose water projects have been implemented on this river in Afghanistan after the World War II, mainly with the financial (and technical) support of Americans, e.g. Helmand Valley Project (HVP) which was inspired by the Tennessee Valley Authority (TVA). It was the largest agricultural development project in the country. In the early 1950s Kajaki and Arghandab reservoir dams were built which are the two main hydraulic infrastructures in the Hirman/Helmand and Arghandab Rivers respectively. These two main dams were built by substantial aids from United States in Afghanistan on Hirmand/Helmand River, and the main goals of these projects were to provide hydroelectric power and increased agricultural productivity through irrigation and land reclamation (Whitney, 2006). Kajaki dam was built in 1953 in the Upper Hirmand/Helmand River in Afghanistan with the storage capacity of 1800 MCM and 70m high. The dam has some power to control the Hirmand/Helmand water (Ibid.). Because of the load of sedimentation in Kajaki Reservoir, development in the irrigated area and hypothetical climate change[16] issues could result in greater water-supply deficits

[16] According to Vining & Vecchia (2008) in some studies it has been predicted that by 2057 precipitation will decrease by about 10 percent and temperature will increase about 2 degrees Celsius could occur in central Afghanistan.

in future and consequently some improvements has been suggested to impound water to a higher elevation (Vining & Vecchia, 2008). This dam also has electricity generation capacity of 133 Mw. Arghandab dam was built in 1952 in Arghandab valley in Afghanistan and its storage capacity is about 480 MCM. This dam's main purpose is also providing water for irrigated areas.

However, it is important to notice that several negative impacts of the dams and other water distributions schemes in the lower Hirmand/Helmand Basin and the Delta can be observed. Less water flow to the downstream of the basin has resulted in shrinking Hamuns especially when there is no enough water during the dry periods. This also aggravates water quality. This also leads to erosion, since vegetation growth is not possible due to lack of water. As Whitney (2006) claims, '[S]istan was home to many historic civilizations; however, the Delta region was left out of the first Helmand Valley Project'. Again he states: '[T]hese negative environmental effects in the lower valley, along with waterlogging and salinization downstream from the dam, have not been calculated as indirect costs of the Helmand Valley Project'.

Chah Nimeh Reservoirs: these three natural reservoirs are located in the Iranian side exactly when the Hirmand/Helmand River reaches to Iran and bifurcates into two the Sistan and Common Parian Rivers. These reservoirs are mainly used for drinking purposes in cities of Zabol and Zahedan and their surrounding areas. During dry years some water can be released to supply the irrigation areas (Beek & Meijer, 2006). They receive water from Sistan River. A feeder canal links the Sistan River to the reservoirs. A fourth well is under construction biggest than these three (UNEP, 2006).

Hamun Lakes: The three lakes (Hamun-e-Puzak, Hamun-e-Saberi, and Hamun-e-Hirmand) are located in North, Northwestern and Northeastern parts of Sistan depression. When sufficient water is available the wetlands system are formed in an area of almost 5000 km^2 and hey are very shallow (UNEP, 2006). Due to the intermittent flow of the rivers, there is fluctuation in water volume in these lakes. Hamun lakes are one of the few sources of fresh water for hundreds of kilometers and numerous species of plants and animals came to rely on its reeded shallow (Weier, J., 2002). These lakes have been the main source of livelihood of the people. There has been a dry period from 1998 to 2005 in which the inflow to these lakes stopped and consequently the lakes dried out in 2001-2002 (Whitney, 2006).

Also: in Iranian side, Kohak (1955) and Zahak barrages are constructed on the Sistan River in Iran. Kohak barrage is not properly in operation but the other one heads up the water for the local irrigation canals. There are also some small-scale other hydraulic infrastructure in Common Parian and Sistan rivers.

Furthermore, there are other future plans to develop water infrastructures. Kamal Khan Flood Project in Afghanistan would divert water directly from Hirmand/Helmand to the saline lake of Gowd-e-Zareh. It seems that in this project the environmental impacts have not been taken into account. According to UNEP Post-Conflict Branch report (2006) these projects would most probably have adverse impact on water quality. The salt from the whole basin is deposited in Gowd-e-Zareh Lake which is the final destination for Hirmand/Helmand River and other water flows from the basin. Considerable amounts of salt have accumulated on the lakebed, making it doubtful to be a proper reservoir for irrigation in the area (Ibid.). Moreover, considering the potential capacity of agricultural development of this area in Sistan Basin, there are some irrigation and drainage schemes under construction like Sistan Drainage and Irrigation Completion and Rehabilitation Project.

3.2.4 Agriculture

Agriculture's share of total economic activity is significant in countries located in Central and South Asia including Afghanistan and Iran. Agricultural workers account for almost one-third of all employment in Iran; in Afghanistan, farmers and those connected to agricultural sector represent more than two-thirds of the labor force (Jurenas, 2001)**.** Both countries are very much dependent on food imports. Iran is one the largest wheat importing countries in the world. The consecutive drought periods in both countries has exacerbated the situation. To this we can add the 20-year unrest period and its several negative consequences in Afghanistan. Below more detailed information is provided for each country.

– **Iran**

People have lived in the lower Hirmand/Helmand Basin for over 5000 years. The ruins of the vast irrigated fields in the Helmand/Hirmand valley especially in Sistan exist (Whitney, 2006). In spite of the fact that this area has tough natural situation because of little rainfalls, high rate of evaporation, warm and continuous winds and limited

groundwater recourses; the considerable amount of water flow of Hirmand/Helmand River has changed the image of the area and made it potentially arable land. Sistan area, have been always dependent mainly on irrigated agriculture and fisheries. About 38 percent of the local people are employed in these two sectors. Unfortunately, the flood and drought phenomena which are unpredictable in timing and duration can create severe environmental, socio-economic problems. As Whitney (2006) states, 'In Seistan, as in Egypt, there is no cultivation without irrigation, both owe their experience to the fertility brought to an almost rainless tract by surplus water of a far distant catchment…'.

Agriculture is the main income source for the families in this region. People heavily depend on the river flow and the Hamuns which restores its water. There are plans to expand the irrigated area, although the demand for the irrigated agriculture currently is 2069 MCM/year the actual supply is 1169 MCM/year (Beek et al., 2008). In this area the proper cultivation season is winter. During mid-spring to summer the 'Winds of 120 days' and at the same time lack of enough water are the main constraints on cultivation. Noteworthy, during the water-sufficient periods when enough water flows for a longer time in the river, the farmers could take advantage of summer cultivation by the traditional irrigation patterns (Pars Consult engineering company, 2007).

River fluctuations and lack of reliable water flow, climatic condition, extreme drought periods, unpredictable floods, non-existent storage capacity for irrigation are the challenging issues in this area for agricultural sector. The planned water schemes in the upstream are complicating the situation since this would certainly decrease the water flow to the downstream of the basin which makes the future of agricultural activities vague.

– **Afghanistan**

The Afghan government have been interested in expanding its agricultural sector in order to increase exports and benefit form its other outcomes. As mentioned before, the HVP project was the largest project aiming at economic and agricultural development in the country. By the mid-1970s, after constructing the water infrastructure in Afghanistan, the region was producing cotton, fruits, etc. After more than two decades of war and civil conflicts, Afghanistan is suffering lack of effective management. Afghanistan is one the poorest countries in the world. In Afghanistan, due to recent drought periods and other

factors like population increase, political conflicts and instabilities in Afghanistan, food shortage and poverty in this area is dominant.

Currently Afghanistan and particularly its Helmand province is the world's largest opium producer. During the early years of 21st century the main crop in Afghan side of the region is opium and in 2002 the Hirmand/Helmand province had 30,000-35,000 ha under poppy production, the most of any province in the country (Whitney, 2006.). More than half of total irrigated arable land is in the north, while most of the remaining lies in the Hirmand/Helmand River Basin.

3.3 The century-old water dispute

Iran and Afghanistan have been involved in a long-running dispute over access to the Hirmand/Helmand River. The dispute between Iran and Afghanistan can be traced to the 1870s. At that time, Afghan rulers believed they could use the waters of the Hirmand/Helmand River as they saw fit. Afghanistan was a British protectorate, and furthermore, British boundary arbitration officers drew borders without making accommodations for the division of water resources. More disputes arose when the river changed its course in 1896. A treaty on the river's water was signed in 1939 by the governments but the Afghans refused to ratify the treaty.

3.3.1 1973 agreement[17]

Iranian then Prime Minister and the Afghan counterpart signed an accord on Hirmand/Helmand River in 1973 that determined the specific amount of water that should flow into Iran: 26 cubic meters of water per second. Implementation of the agreement continued to be delayed as a result of other events: the 1973 Afghan coup, the 1978-1979 revolution in Iran, the 1979 Soviet invasion of Afghanistan, and the rise and fall of the Taliban. The agreed upon 810 MCM per year is only a fraction of the average water availability of the Hirmand/Helmand (Beek &Meijer, 2006). It is a single purpose one, limited in scope and only guarantees Iran a minimal amount of water sufficient for drinking water purposes. The implementation of the 1973 treaty is under question, presumably because of the Afghans' failure to provide the amount of water agreed upon, despite the agreement. Reportedly in several cases, the water flow reaching Iran has not been enough, meaning the volume has fallen short of agreed levels and the agreement has

been disrupted eventually. In last years, several discussions have taken place between Iran and Afghanistan officials on Hirmand/Helmand water rights and some decisions have been made but still, after the long-term drought periods and their consequences, the local people are waiting for more effective ways and answers toward this. According to UNEP (2003)[18] in 2001 and during the Taliban regime, the tensions between two countries escalated. Afghans reportedly attribute this to drought as the main reason. But Iran has been frequently accusing Afghanistan of not honoring the 1973 agreement (Ibid.) The main reasons that Iran signed this agreement:

- Because of the unstable political condition in Afghanistan in 1971 and later coup and regime change and the fear of then Iranian government of Communist groups' empowerment in Afghanistan which were supported by the USSR, Iranian government was trying not to pose pressure on Afghan counterpart and support the then Kingdom of Afghanistan. US also pushed Iran to sign the treaty which is mainly in favor of Afghans.
- Iran's oil income was increasing during the period so then-authorities views on the country's future welfare were positive. These led them to sign this treaty which was based on an unrealistic estimation of water requirements.

[17] More information on the 1973 agreement has been given later in the next chapters
[18] Available at: http://www.reliefweb.int/rw/RWFiles2003.nsf/FilesByRWDocUNIDFileName/OCHA-64CMUE-unep-afg-01feb.pdf (Accessed : 6th April 2009)

Chapter Four

4 Problematic situation analysis in Iran and Afghanistan

Given the stated problems in previous parts (mainly acquired from secondary sources especially for the Afghanistan side), in this section according to these given data and the ones that were collected during the field visit and interviews, more emphasis is placed on analysis of Hirmand/Helmand's problematic situation. Different perspectives with the help of mutual learning (with local and non-local people) have contributed to expand the knowledge on the variety of interacting components and their impact on each other. Meanwhile, some new facts were obtained from these interviews. Attempts are made to support what was obtained previously and realize what was not mentioned in the articles, books, etc. In fact, problem analysis and discussion are brought together with the conversational realties and perspectives in this part to be able to better categorizing the issues, supporting claims and recommendations mentioned in the next parts.

All the tools which were used such as interviews, conversations, secondary documents and rich pictures were employed in order to provide the answer to:

4.1 What is happening in this Basin?

Assembling all rich pictures acquired from interviews, conversations and observations has resulted in figure 4 which indicates the overall problematic situation. Taking into account all the information, within this research, three categories of issues where distinguished. Clearly information gathered from Iranian side is much more completed than those from the other riparian country, Afghanistan. This diagram’s purpose is to visualize the issues (if not all, at least as much as have been collected) existing within the Hirmand/Helmand Basin system. It makes it much easier to understand to what extent complex the situation is, considering the issues and the non- linear relationship between them.

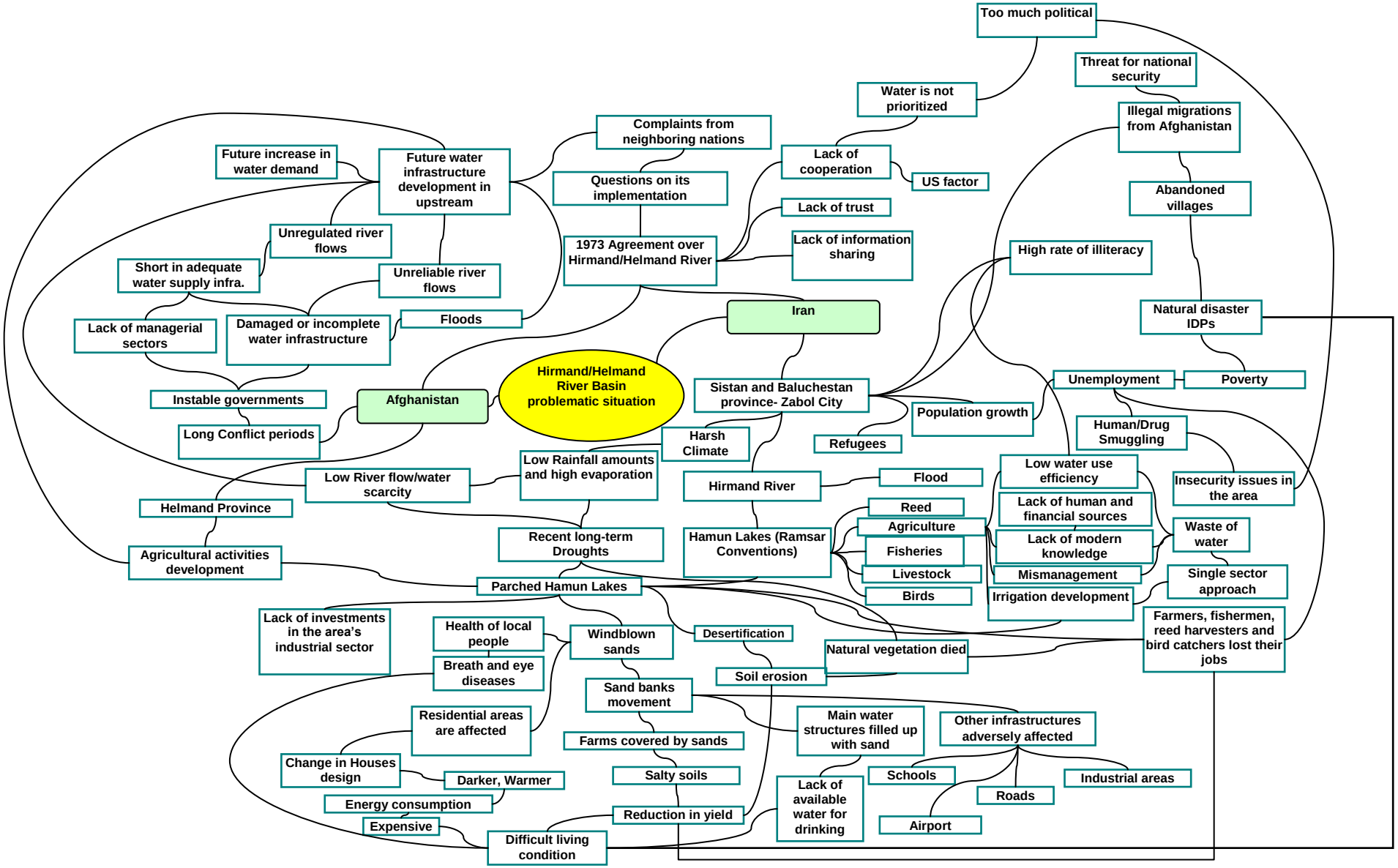

Figure 4: Composite mind map of the Hirmand/Helmand International River Basin situation

In general, the existing issues can fit into three categories:

1. **The natural issues**, which are the major impact of main characteristics of the basin's climate such as consecutive drought periods, floods, etc.
2. **The socio-economic issues,** which are to some extent resulted from the natural condition of this region and at the top of them drought and water scarcity. Authorities' plans and decisions which in a way affect the socio-economic condition of situation are also discussed in this part.
3. **The political issues,** which stem from interactions between two riparian countries and are mainly of the concerns of high level officials of the governments. Since the hydropolitics of the basin is under study, which means the investigation of probable conflicts and opportunities and the degree of cooperation between two riparian, this third category is introduced. Moreover implementation of the existing treaty is under the scope of this category.

Through this research more effort is put into analysis of the socio-economic and political concerns. Although the consequences of natural-induced problems are pervasive in the area, only the activities to mitigate their effect on the area's society and ecosystem can be studied.

4.1.1 In Sistan Delta (Iran)

Of the main existing issues and facts in the situation the following ones are of paramount importance:

– **Natural issues**

According to the secondary sources; Sistan Delta belongs into arid and extremely-arid category. River fluctuations, high weather temperature, high evaporation rate, the 120 days winds, floods, recent consecutive drought years have confused water sector planners. The new concept of climate change has introduced further uncertainties to the situation. The recent drought periods which have been the longest in the history of the area (as long as local people remember and documents indicate), brings the probability of climate change impact into the minds. Whether this phenomenon has happened as a result of climate change or is under natural intervals has to be investigated in other researches.

However, this basin continues to witness the recent drought periods circumstances and famine condition. The huge negative impacts within these drought years on the environment due to parched Hamun Lakes which are also of global importance cannot be neglected. Ensuing issues are definitely of the main consequences of such natural condition.

– **Socio-economic issues**

- **Unemployment**

Sistan Delta which includes the mouth of Hirmand/Helmand River and the major parts of Hamun Lakes (formed when there is enough water in the river) is laid mainly in Iranian territory. These lakes are of notable importance from two perspectives: of great environmental value and also livelihood of the local people of the area. According to Dahmardeh et al. (2009), when the Hamuns are full of water about 41 percent of locals depend on them for their income. Insufficient precipitation, high evaporation rate and consecutive droughts are main characteristics of the area. These have both resulted in lakes to vanish after continuous dry periods from 1998. The lakes running dry have led to several environmental and socio-economic adverse consequences. Because of population growth, high numbers of bird catchers, reed harvesters, fishermen and farmers and their families have been relying on these lakes for income and food. However, after the lakes' desiccation these people have lost their main source of income and food.

- **Smuggling and migrations**

Unemployment rate in the province is high as Sistan and Baluchestan is one of the poorest provinces in Iran. Droughts and lack of water has impeded agriculture activities, livestock grazing and fishing. Therefore, many people have lost their jobs. The unemployment issue has caused some people (especially the youths) to smuggle fuel, drugs and other goods to generate income even at the risk of their lives.

In addition, some of the jobless people have migrated to other parts of the country especially to the contiguous provinces which have better living conditions and job opportunities. This has led some parts of the area to be left abandoned which increases the possibility of Afghani illegal immigrants to illegitimately buy their lands for a very cheap price or occupy the empty houses which can be alert for national security. Other than the unemployment issue, the difficult living environment after droughts is another

reason for the local people to migrate. As an example, the sandstorm that could be to some extent prevented by the water in the lakes, now are worsening the situation. Banks of sand which move to residential areas can cover other infrastructures and create difficulties for people. People change their homes design in order to prevent sand to enter their houses, while at the same time this causes their homes to be darker and warmer. Consequently more energy for lightening and cooling indoors is consumed which is expensive for the people in this area. Beside other reasons, this factor forces the locals to migrate to other places seeking better living conditions.

- **Single-sector approach**

Moreover, in Iran the construction of the fourth Chah Nime Reservoir for increasing the supply of drinking water for urban and rural areas in Zabol city and some parts of Zahedan (capital of Sistan and Baluchestan province) is another reason that will prevent the river flow to reach the Hamun Lakes. According to the informants that were interviewed, the fourth Chah Nime which is under construction has a total storage capacity of more than the other three. It seems that guaranteeing drinking water supplies which is of the main concerns of the local authorities has been prioritized instead of considering the importance of the local ecosystem and other related parameters along with this issue. In this regard, a single-sector approach is noticeable.

Moreover a number of organizations and institutions are involved with the water issues in area. This has caused lack of coherency and integrated approach on the problematic situation in Sistan Delta. In this regard, fragmentation of responsibilities brings confusion and makes the situation more complicated. According to informants, the actions undertaken by the relevant authorities like forming an institution under the 'holistic approach' direction (like assigning management tasks to one governmental agency) has even aggravated the situation.

- **Lack of locals' awareness and their participation**

Through this study it was found out that the role of local people generally has been neglected. While asking one interviewee[19] about role of the bottom levels of this community (local people) in decision making processes and about their preferences, he expresses that basically locals are not involved in any of such processes. Lack of their participation can also be attributed to lack of awareness and knowledge of the local

[19] Dr. M. Alizadeh, demographer. He has been studying on the sociology of Sistan Delta for several years.

residents since illiteracy rate is high in this province comparing to other parts of Iran. Once talking to one of the local people she said: '*They are poor and illiterate, they do not know what is going on and how to complain!*'. This is especially more observed between the older people who are involved in farming activities, cattle grazing etc. Insufficient knowledge of this group of people, also contributes to low water use efficiency especially in agricultural sector. They do not know much about the modern irrigation facilities. On the other hand it seems that less effort has been put into raising awareness plans. The relevant authorities and officials do not support such activities so much. Since the situation is very fragile due to its natural condition, the priority is given to other sectors and, more attempts are made to tackle the issues like providing drinking water for people by devising construction of infrastructure which has immediate outcome and are easily observable by others. Given this fact, such activities that could lead to knowledge dissemination to the locals need additional human and financial sources while at the same time water related development projects are at the top of the decision-makers blueprints to be immediately coped with, therefore, community based actions are overlooked and at some points can be perceived as 'deliberately ignored'.

- **Governmental aids and their long-run efficiency**

In the current tough situation, the Iranian government has initiated some supporting activities to make people stay in the region such as providing minimum living substances, subsidies etc. For example, each family receives up to 10-15 kg wheat flour. By this time this has been an incentive for the rural people, especially old men and women, to remain in villages. However while talking to some of the locals; they stated that since the families have several members (even up to 7-8 children) this amount of flour is not sufficient enough. Moreover some other activities like introduction of the greenhouses have taken place. Unfortunately these greenhouses are not efficient, first because of the 'Winds of 120 days' which can completely destroy its structure in a glance, second these greenhouses are from one local's perspective as '*just a built skeleton to receive gasoline ration by its owner from the government to be sold to Afghans for a higher price!*'. Thirdly according to the interviewees no constant supervision is undertaken by local relevant authorities on these greenhouses functioning. In actuality, greenhouses have a very low efficiency in the area.

However, it seems that the locals are passionate about their land. Because of this, and while still there is enough supplies of drinking water, people are still tolerating the tough living condition. But because of the existing shortcomings, in the long-run the efficiency of such governmental aid programs to sustain the rural residents stay in their villages is somehow vague.

What was emphasized by people?

In addition to the abovementioned issues and after all the discussions with locals and the later drawn rich pictures, some main concerns and expectations that were expressed by them that have been highlighted in order to present further confident recommendations and conclusion in next parts[20].

- **Hirmand/Helmand River flow and Hamun lakes are of crucial importance for the local people**

Undoubtedly people are very much dependent on Hirmand/Helmand River flow and Hamun Lakes. One well-informed interviewee from an engineering firm who has been studying on the area emphasized that '*this area is 100 % dependent on Hirmand River. Nothing else can be substituted for and no one can do anything'*.

In addition, locals have more emphasis on receiving water from Hirmand/Helmand. They do not talk about the amount of water: '*Afghans should only let some sustainable water flow to Sistan for people's livelihood. They just let the water when they cannot control the flood!'*

- **Historical dependency on Hirmand/Helmand River flow in the Sistan Delta**

  According to the remains of archeological sites in Sistan such as 'Shahr-e-Sukhte'[21] which dates from 3200 BC clearly indicates formation of ancient civilizations around the Hamun lakes that receive their water from Hirmand/Helmand River. This has been highlighted while talking to the local people along with a number of written documents. As indicated in figure 5, once the Kuh-e-Khaje which is the only high land area in the Sistan plain, has been used as a huge defense structure (fortress) together with religious purposes etc. in the very ancient times, is surrounded by the Hamun-e-Hirmand Lake. People evidently claim their right over Hirmand/Helmand River water since historically their land has been flourishing and productive as a

[20] See rich pictures in Annex A.

direct result of this water flow. Now the villages that once were the center of numerous income generating activities have been left abandoned, though still some old people still withstand the tough condition and survive with the minimum living requirements.

Figure 5: Kuh-e-Khaje fortress and fire-temple remains surrounded by Hamun-e-Hirmand Lake

- **Nominal local assemblies**

There are some so-called public assemblies in the region and they are supposed to be both constituted from and run by the local people. However, the nominees have to be approved by the government before elections and it seems that these local assemblies have a nominal role in the decision making and their function is questionable.

- **No NGOs!**

During this research, attempts were made to find a NGO in the area to find out about their activities. Seemingly, almost no NGO is noticeably active in the area or if some, very feeble efficiency. Fear of political issues can be considered as one main reason according to a general perception. In fact, there are several major barriers against creation of NGOs in Iran.

- **Lack of reliable data from both riparian countries, information exchange and lack of transparency**

[21] Shahr-e-Sukhte which means the burnt city was the biggest city in Iran plain during the early times of the Bronze Age.

'*No one has a reliable data about river flow and discharge except those high-level government authorities in Energy Ministry*' stated an informant from the engineering firm who are working and studying on water projects in the Sistan Delta. While asking one high level authority to line out some information about the shared basin, he resolutely refused to answer. In addition, reliable and concrete data indicating the actual water use in upstream country and the existing developing projects is lacking.

On the other hand, no one knows much about the negotiations between Iran and Afghanistan over Hirmand/Helmand River. While local people are talking about it, highly speculative statements can be heard, such as '*they [authorities] have paid for this flowing water for a limited period of time etc.*'

- **Lack of financial resources in government-backed projects**

Lack of financial resources has been consider as one main hindering factor for projects implementation, infrastructure maintenance, training of local people was repeatedly emphasized by several people and informants.

- **Insecure area**

Because of the drug and human smugglers and rebellions from the two neighboring countries that are in challenge with their civil conflicts, this area is also suffering from armed clashes along the border. Several military and non-military people are killed each year during these violent armed conflicts. Local people had video footages in their cellphones from the Iranian army soldiers and police forces killed by the smugglers and rebels.

- **Weak executive bodies**

Main informants such as those from engineering firms, researchers etc have underscored the weaknesses in executive bodies and organizations in conversations/interviews with them. This is mainly due to lack of well-experienced and skillful human resources. Unfortunately some of those employed in the local governmental organizations; lack enough relevant knowledge and education. Although a number of effective work has been done in this region, but weak-functioning local organizations has resulted in some inefficiencies in the area which some of them has been mentioned in earlier parts.

- **Hirmand/Helmand on the news:**

Once the attention of public newspapers is drawn into a specific event in the society and attempts are made to bring it to the fore, the issue is not isolated anymore. Such media

attention indicates the importance of the issue especially from social and political point of views. The main reports in the newspapers are around the global water scarcity particularly in Iran, the consecutive drought years which has been pervasive in the entire country in recent decade in addition to the local news which embraces news on Hirmand/Helmand River flow, Iran-Afghanistan relationship on this river, dry Hamun lakes, drought in Sistan and Baluchestan province etc. Some reports present the current concerns about the potential climate change impacts and global warming which has led less rainfalls and more frequent and longer drought periods prevailing in the country. Also because of population growth more uncertainties will be faced by the policy-makers that are emphasized in such newspapers reports.

– **Political issues**[22]

Although Iran and Afghanistan have ratified the 1973 treaty over Hirmand/Helmand River and this agreement is still in effect, the local people's claims and the current undesirable condition as a result of water scarcity in the region, call treaty's implementation into question. Even though this treaty includes a stipulation that a total amount of 26 m^3/s (supply of 22 m^3/s and additional 4 m^3/s as the sign of goodwill) has to be delivered to the Iranian side, but it seems Afghan party have failed to comply with this stipulation. Moreover, 1973 agreement consists of an article which bans construction of any structure related to the river which might reduce the aforementioned allocated amount of water in the treaty without approval of the other party. In spite of this, and due to the existing information, Afghanistan intends to develop the irrigated agriculture in the upstream of the basin by expanding the water infrastructure around the Hirmand/Helmand River. According to various sources, this has already begun and will impede sufficient water flow to reach the Sistan Delta.

Another neglected part in the treaty by two riparian countries is establishment of the joint committee including representatives from both states. These committee members have different responsibilities such as supervision over the treaty implementing process, holding meetings, hydrometrical and other relevant data exchange, undertaking urgent mutual actions when severe droughts happen, etc. In practice this section of treaty is

[22] This section has been drawn mainly from an interview with Dr. F. Mohammad Alipour researcher of international law and organizations in Iran.

overlooked. Even if a committee has been formed in some periods, its functioning has been unclear and inefficient due to different reasons such as the fast pace of change in the ruling parties in Iran and general instability in the Afghan government.

Given this situation, thus far the Iranian government has made some attempts to convince the Afghan government to conform to the 1973 agreement. These negotiations over the treaty between two countries have resulted in only some short-term consensus and temporary positive actions. Since the central Afghan government does not have yet the full authority over the states (Velayats) and consequently the subdivided sectors are not well functioning, Iranian authorities are facing complications in identifying their Afghan counterpart to discuss such issues with. This has also resulted in indefinitely postponement of effective negotiations to ensure Afghans authorities' compliance with the treaty. Meanwhile Iran is inclined to offer some assistance to Afghanistan in different areas such as technical supports in infrastructure, power distribution networks, etc. It has to be pointed out that exertion of political authority and pressure on a weak or unstable government could not and would not bear fruits the way it was anticipated and this is exactly what is happening in this case.

A further factor holding back the Iran-Afghanistan cooperation over their shared basin is the US led coalition forces based in Afghanistan. Since the vision of Iran-US political relationship is highly ambiguous, under its circumstances, Iran's affiliation with other countries is affected.

However, Iran has Boundary Rivers with its seven neighboring countries. In some of them Iran is the upstream country like in some western river basins and in other basins it is located in the lower part. Although Iran is struggling to implement new water plans considering IWRM concepts and principles in its interior river basins, unfortunately an integrated framework toward all Iran's transboundary basins is still missing due to the complicated situation and political issues. In general, negligence in considering all riparian countries' rights over the shared water resources in such situations is common. Owing to inadequate national long-term plans over shared basins some contradictory behavior of Iranian government may happen and hamper Iran's efforts to persuade Afghanis government and authorities to achieve desirable long-term results through the negotiations while such weaknesses exist.

In addition, when international basins come to discussions it involves more political debates rather than technical. This is especially observable in transboundary basins located in arid and semi-arid areas where the water scarcity brings more concerns over water availability for each riparian country. Hirmand/Helmand River Basin is such a case. In Iran the Ministry of Foreign Affairs is the main body in the government involved in negotiations over Hirmand/Helmand River Basin issues with the Afghan authorities. The Ministry of Energy which is involved with the water related plans and projects in Iran is usually referred to only when technical data is required. Water is not prioritized in Eastern boundaries of Iran since this part of the country is involved in much more important issues like drug smuggling and illegal migrants from Afghanistan. Hence, the main focus is on the activities that are necessary to overcome such problems in the area and are more strongly supported by the government.

4.1.2 In Afghanistan

Although the constraints and limitations preventing the research to be undertaken in the whole basin area has been noticed earlier, but with the help of some limited results obtained from internet, some important issues is being pointed out:

– **Conflict periods and civil wars**

Within the last 25 years Afghanistan has been experiencing prolonged period of war. This has resulted in major war depredations, poverty, environmental degradation and governmental instability and weak management sectors. Now in the post-war period more efforts is being made in reconstruction of several damaged areas and infrastructure, resuming the interrupted projects and new plans is being devised to develop renewable and non-renewable natural resources within the country by Afghans and international organizations. Meanwhile, through existing data and documents, it can be realized that after the conflict period, the development projects (which were interrupted because of war) are being unilaterally recommenced such as building other infrastructure on the Hirmand/Helmand River which can affect the downstream parts. However, there is no evidence for any mutual cooperation between two countries in this regard.

- **Developments in agriculture sector and poppy cultivation**

On the one hand are the Sistan Delta and the Hamun Lakes, local people's dependency on the lakes along with other interconnected issues which relates to Iran; and on the other hand is the upstream country, Afghanistan. Hirmand/Helmand Basin is located in Helmand Province. This river basin is almost the largest one in this country. Agriculture is the main activity in this region. Poppy cultivation is pervasive in the area due to its high income for the people in the area. Though Afghan government tries to prevent them doing so, but since poppy cultivation is supported by rebellions, still it is a long way to achieve this. Over-exploitation by people around the river is considered as the main issue which prevents the water to reach the lakes and Sistan Delta.

Though there is not sufficient, updated and reliable data from the developments in the upstream of the river, but through the existing ones and talking to the local people it can be concluded that following the construction of the water structures on the Hirmand/Helmand River in pervious decades and expansion of irrigation agriculture the flow of the river has decreased. In some sources it is mentioned that even if the release of water from the Kajaki dam has been sufficient, the over-exploitations of water by the farmers on its path prevents it to reach to the lower parts.

4.2 Problems at different levels of the basin

Following the overall view of the situation, clearly lacking of a holistic approach is noticeable in the whole basin. Since the basin consists of parts from two neighboring countries because of the border-crossing Hirmand/Helmand River, issues are identified at three levels.

1. **Local level** which includes all interconnected issues happening in the Sistan Basin, the final part of the Hirmand/Helmand basin that lies mainly in Iran and the larger part within Afghanistan territory.
2. **National level** which embraces all plans and decisions made by one riparian country's high-level authorities that controls or affects the situation at local level. This may also have an impact on some affairs between two countries regarding the shared river subject.

3. **Interstate level** that refers to the relationship and the extent of cooperation between governments of two countries considering the shared river basin issues and the implementation of 1973 agreement.

Figure 6, indicates the categorized issues at each level.

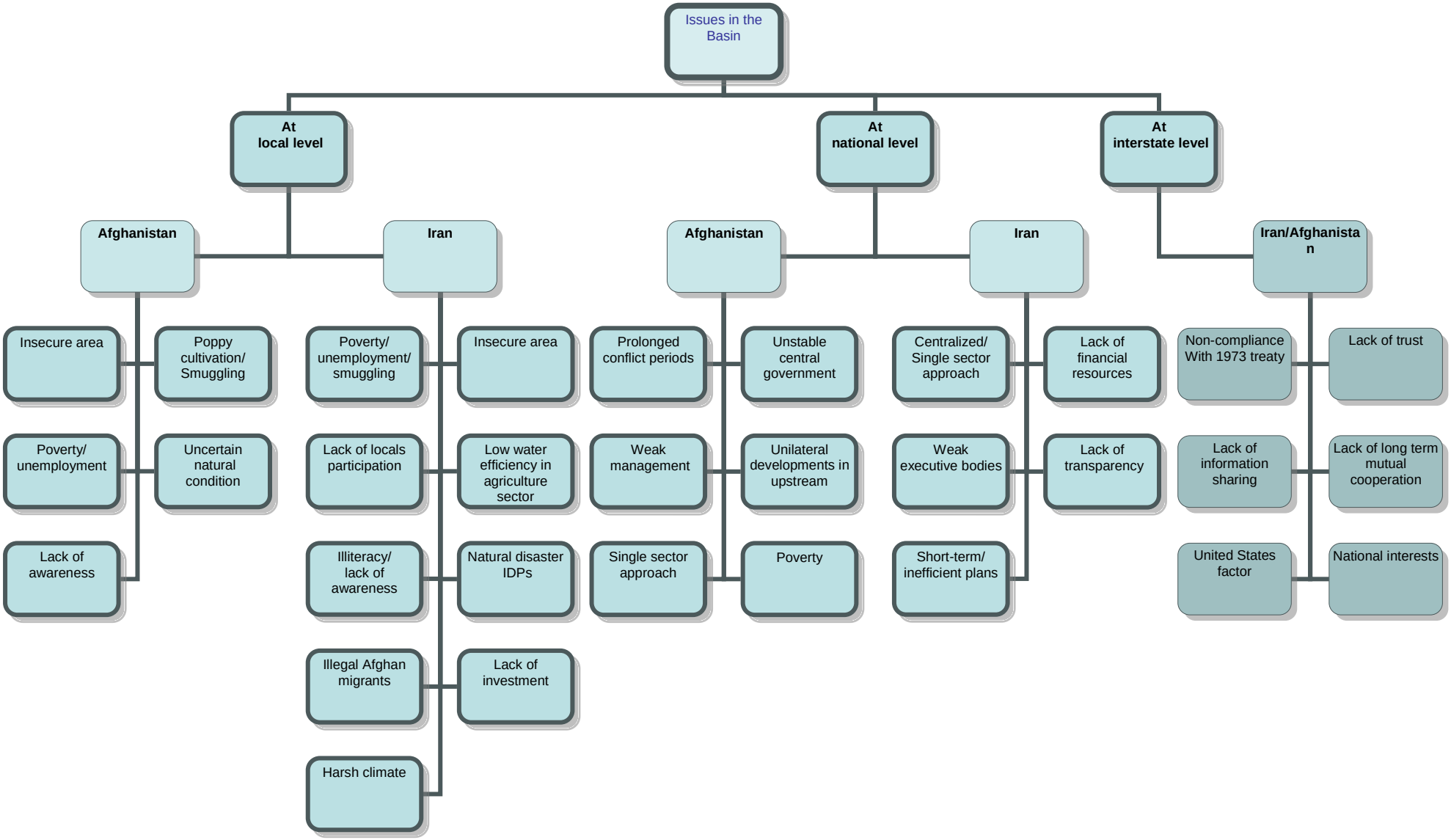

Figure 6: Categorization of the problems in the basin

4.2.1 Opportunities

Although the Iranian part of the basin is located in an arid to extreme arid area and also is one of the poorest areas of the country, the existing opportunities should not be overshadowed by issues and deficiencies. In Afghanistan also, at least some opportunities can be found. Afterwards, following opportunities would contribute to suggest recommendations in the further parts of this research.

– **Drought experience**

Although no one denies the extreme negative impacts of several continuous drought years on the society and environment of the area, but these tough periods have led to change in local people, farmers and authorities perspective. After the dry years, all the residents in the area were facing one great challenge: water availability. Authorities were concerned about the sources for water supply. They initiated reviewing the water plans and projects under the new harsh natural condition. Local people and farmers were struggling to continue their lives and activities even in smaller scales despite the hard living conditions. The drought and lack of available water resources has raised local stakeholders understanding of the value of this limited vital natural resource in the area. In actuality, the water scarcity has raised locals' awareness and inclined them to get familiar with the new irrigation technologies. Knowing the fact that water is limited for agriculture and other activities that require certain amount of water, now local people realize that the former traditional practices will no longer be efficient. This provides suitable grounds for water sector planners to consider the locals willingness while attempting to introduce new technologies in water demanding sectors. This also helps relevant authorities take into account the important role of local people at any stage of their job.

– **Historical sites**

The Sistan Delta consists of several historical sites that go back to thousands years ago. Unfortunately because of the current undesirable situation in the area and on the other hand the negligence of the relevant officials this opportunity has not been taken into account as a chance for attracting tourists and visitors to this area. If the national and local authorities take this opportunity, significant changes will be made in the economic

situation of Sistan Basin. Good economic condition will result in more available funds which in turn can be a financial source for other activities lacking such supports.

– **Government support**

Sistan and Baluchestan province is considered as a highly sensitive region in Iran. Due to its proximity to Pakistan and Afghanistan which both of them are experiencing civil strife, the border region is affected by the rebellion groups and other issues resulting from insecurity in the neighboring countries. To control such disturbances in this extremely vulnerable region and because of the difficult living condition ensuing from natural condition, the government is willing to support different sectors developments and the livelihood of locals as much as possible. Even if some inefficiencies are noticeable but this opportunity can be presumed as a factor that paves the way to further improvements in this region.

– **Academia**

Despite the fact that illiteracy rate among the elderly in this province is high comparing to other parts of the country, the number of high educated people among the younger generation is high. Zabol University as an example of an academic community is involved in several researches undertaken in the area and holding or sponsoring academic events[23]in this region. This opportunity should not be ignored. Scholars from the region can help planners in several aspects when requested. Their experience is valuable. Besides Zabol University; there are some other academic institutions in Sistan area. Such institutions have been involved in research and training groups of people in different areas..

– **Iran-Afghanistan, contiguous countries**

Afghanistan is experiencing a 'rebuilding period' after almost 25 years of unrest and civil wars. Afghanistan with the help of international organizations is moving toward increasing its capabilities for further progression in various sectors. Meanwhile Iran provides landlocked Afghanistan access to international water courses a way to international markets by international highways and railroads. For instance, Chabahar-

[23] In this regard can be mentioned: the First International Conference of Water Crisis, 10-12 March 2009, Zabol University, Iran.

Milak[24] highway has made it much simpler for goods transportation from other parts of the world to Afghanistan. Also expanding some infrastructure like building railroad which links the Iranian eastern provinces to Harat province in Afghanistan is an additional option for easier access to Europe and the Middle East for Afghans. This leads to interconnectedness between two countries. On the other hand, Afghanistan has mineral resources which many of them are planned to be exploited in near future. In this regard, Iran can offer Afghans technical and marketing assistant according to the Iranians experiences in this field. With the further development in such infrastructure the relationship between two countries can be improved due to such cooperation among them.

Iran and Afghanistan are close to each other in language, cultural and religious aspects since historically these two states used to be one single country. Iran can take advantage of this opportunity in its future plans for forging relationships with Afghanistan.

[24] Chabahar is one main commercial port in Southeast of Iran by the Oman Sea. Milak is a border town between Iran and Afghanistan.

5 Concluding discussion

5.1 What does all this mean?

The human activity systems and the water resources interaction brings a dynamic complex situation in which several issues at different levels have to be dealt with. International river basins bring different challenges for water policy makers. At some point, it is out of the country's water authorities hands since other group of stakeholders with different interests and perspectives from a different state come in. High level policy makers have to be convinced about the complex situation and then be engaged. Therefore, in international river basins different aspects of the situation has to be taken into account. The integrated water resources management approach at basin level by its holistic attitude struggles to bring sustainable solutions for such messy situations which some of them have been discussed earlier in this study.

The international Hirmand/Helmand Basin is shared between two contiguous countries, Iran and Afghanistan. About 90 percent of this basin is located in Afghanistan and the remained 10 percent is laid within Iranian territory. The Sistan Delta which is the end part of the basin embraces the Hamun Lakes that are of particular environmental importance since they are registered in the Ramsar Convention on wetlands. In general people living in the basin whether in Afghanistan or Iran are dependent on this river for their livelihood. The main activity of this people is farming. Some infrastructure has been already constructed in the river and according to some news others are under construction. This area and especially the final parts are experiencing consecutive drought periods. Water scarcity due to the harsh climate condition in the area and over-exploitations in the upstream have resulted in limited or intermittent water flow in the river to reach to lower parts of the basin. In Recent droughts, Hamun lakes have almost completely dried up. Unfortunately, many undesired social, economic, and environmental consequences have resulted from this event.

However, there is an agreement between two countries over Hirmand/Helmand River basin since 1973. According to this treaty the shared river is apportioned between two countries for a total amount of 26 m^3/s. Iranians claim that this treaty is not equitable and reasonable since this allocated water only guarantees supplies of drinking water and the agricultural activities and ecosystem of the area has been overlooked in through this

agreement. So far, the implantation of the 1973 agreement has been under question. The prolonged conflict periods in Afghanistan and weak management bodies and other reasons, have prevented the agreement to be properly applied.

After analyzing the issues, three major claims can be extracted. Each one is visualized by a multiple causal diagram to support these claims.

5.1.1 Lack of integrated approach and mutual cooperation in the whole basin

Sufficient basin-wide institutional capacities at different basin levels within an enabling environment are necessary for management of international river basins. Joint actions and mutual cooperation are of the main initial steps that have to be taken by the riparian countries policy makers and authorities to provide such environment for further decision making processes. While these factors are missing and relevant authorities form both sides do not get efficiently involved in the management process, achieving a desirable situation seems far-fetched and IWRM principles per se can not bring an answer. In this regard, in the following part the identified factors (figure 7) address lack of application of an integrated basin-scale approach.

While the 1973 agreement is not fully abided by the upstream country, the lower parts of the basin suffer several consequences considering this issue. Firstly, an institution (a joint committee) which is mentioned in the treaty to be established from both countries representatives has not been taken into account seriously. Even if one has been formed, due to the changes in officials in Iranian side and instabilities in Afghanistan, this committee's functioning is still vague. Since both countries presumably tend to prioritize their own national interests, lack of trust between two countries exist and in several occasions they reject to share information on Hirmand/Helmand River basin. One of the missions of the joint committee is information exchange. In the absence of such committee, data sharing have faced obstacles. Moreover, according to some available sources, Afghanistan intends to unilaterally develop its water infrastructure in the Helmand Basin which is against the existing treaty. Clearly, such actions will impede sufficient water flow to reach the Sistan Basin. In the agreement it has been stated that even during the dry years Afghanistan should release some amount of water less than what is stated for normal years, depends to what extend the water flow has decreased in the upper parts of the river. This item has also been neglected and generally no water is

received by the lower parts of the basin in drought periods. As agriculture is the main activity for local people in both countries and the basin is generally under arid to extremely arid condition, people are completely dependent on Hirmand/Helmand River water. This dependency has had two sides: first, over-exploitation in the upstream; second, limited available water in the downstream of the basin. Although the lower parts may receive some water during the year, usually this amount of water is insufficient or intermittent and can only be used within a very short period of time and its availability is not guaranteed. In addition, United State may also hinder the cooperation process between two countries due to Iran's relationship with it.

In general, lack of long-term cooperation and an established permanent institution or river basin organization to manage and administer the affairs within the whole basin are noticeable. Since activities toward putting the treaty into practice in a systematic manner needs to be more organized and institutional, apparent lack of such institution embracing interactions between two governments over Hirmand/Helmand issues is noticeable. This has led to several negative social, economic and environmental impacts since the lower area has almost no access to the river and the Hamun Lakes water, the main source for locals' livelihood and the habitat for several species of flora and fauna.

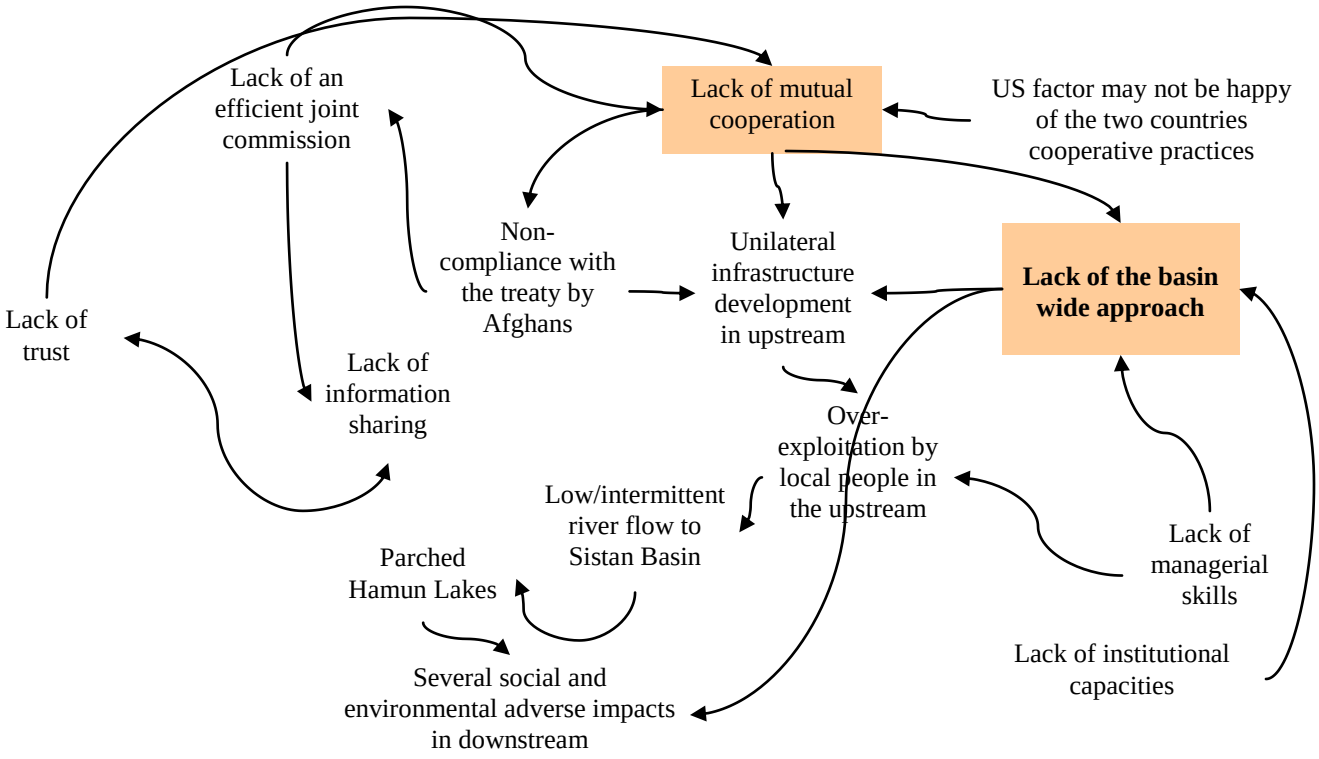

Figure 7: Multiple cause diagram indicating lack of mutual cooperation and integrated approach

5.1.2 Too much political: water is not prioritized

In international basins, as interests of more than one country is involved over the vital limited natural resources (water), new concerns of the states over their national security and sovereignty come in. When time for the interstate interactions and negotiations, inevitably the policy makers from other political bodies such as foreign ministry officials come first. As these challenges may seem more important rather than issues like water scarcity at local or sub-basin level, generally the local authorities or those specialized in water sector are less engaged because water is less prioritized.

In Hirmand/Helmand Basin is the same or even this fact shows up stronger. Iran is in neighboring of two countries with several interior problems and unrest because of the rebellions. Drug smugglers and illegal migrants should always be under strict control of Iranian government. Also rebellions who may invade Iran's boundaries are of the main concerns of. Several unarmed local people are killed each year due to the violent actions of invaders. The national government has put more efforts on preventing drugs, illegal migrants from Afghanistan to cross Iranian borders. Meanwhile, the 'water issue' in the area is less prioritized for officials since such posed security issues have to be dealt with urgently. However, the negligence of 'water' would definitely deepen the interwoven issues in such problematic situation.

Moreover, since it has become a political case; lack of transparency is clearly observable. The outcome of negotiations is to some extent kept as a secret rather then being publicly published. This has led locals to be suspicious about the government's actions in this regard. Authorities fear to impart the basin-related information. On the other hand is the non-compliance of Afghans with the treaty. As the central government of the upstream country yet is not able to fully control the states (Velayats), Iranian authorities cannot exert pressure on them to make them adhere to the treaty. Few official formal complaints are made by Iranian authorities in this regard. In addition, currently some technical aids and other supports are offered to the Afghans. All these activities have resulted just in some short-term intermittent water flow to Sistan Basin. Figure 8 shows the political situation in the area.

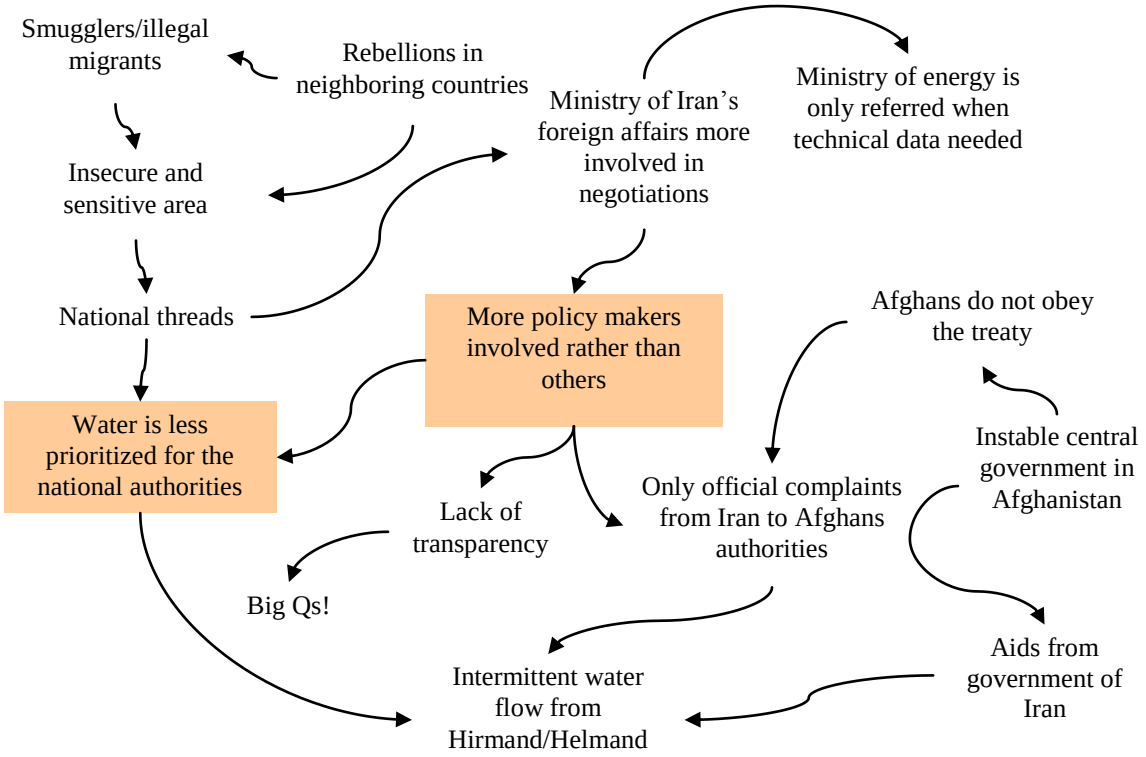

Figure 8: Multiple cause diagram, indicating the prioritizations in the basin

5.1.3 Lack of integrated approach at the local level

According to the second IWRM Dublin guiding principles, 'Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels'. Unfortunately, in the Sistan Basin this principle has been almost neglected as a result of series of issues (figure 9).

Although there may be some so-called local associations, but these people are not actually involved in main decision-making processes. As a result of lack of participation of locals in different stages of water projects, in the operation and maintenance phases in which the role of villagers is determinant several problems is encountered in this area. Farmers are not well trained how to use water more efficiently and because of lack of their responsibility and high evaporation rate in this region, waste of water rate is quite high. Local authorities put less effort in this field while this might be as a result of lack of their own relevant knowledge. The centralized and top-bottom approach has created a wide gap between the end water users and authorities which have led local people not to put their trust in their so-called representatives and other local authorities. Such existing

gap and lack of understanding between locals and authorities would cause farmers to feel less responsible about the available amount of water, existing infrastructure and so on. In fact, within this fragmented approach, such real problems in the lower layers of the community still exist, although big efforts is made to find a way get rid of them at higher levels. Finally, the supply-oriented approach of the officials seems widespread while still it is a long way to control and manage the demanding sectors in such water short area. Noteworthy, the situation would not be much better in Afghanistan, but specific research has to be done on the other side for documenting this claim.

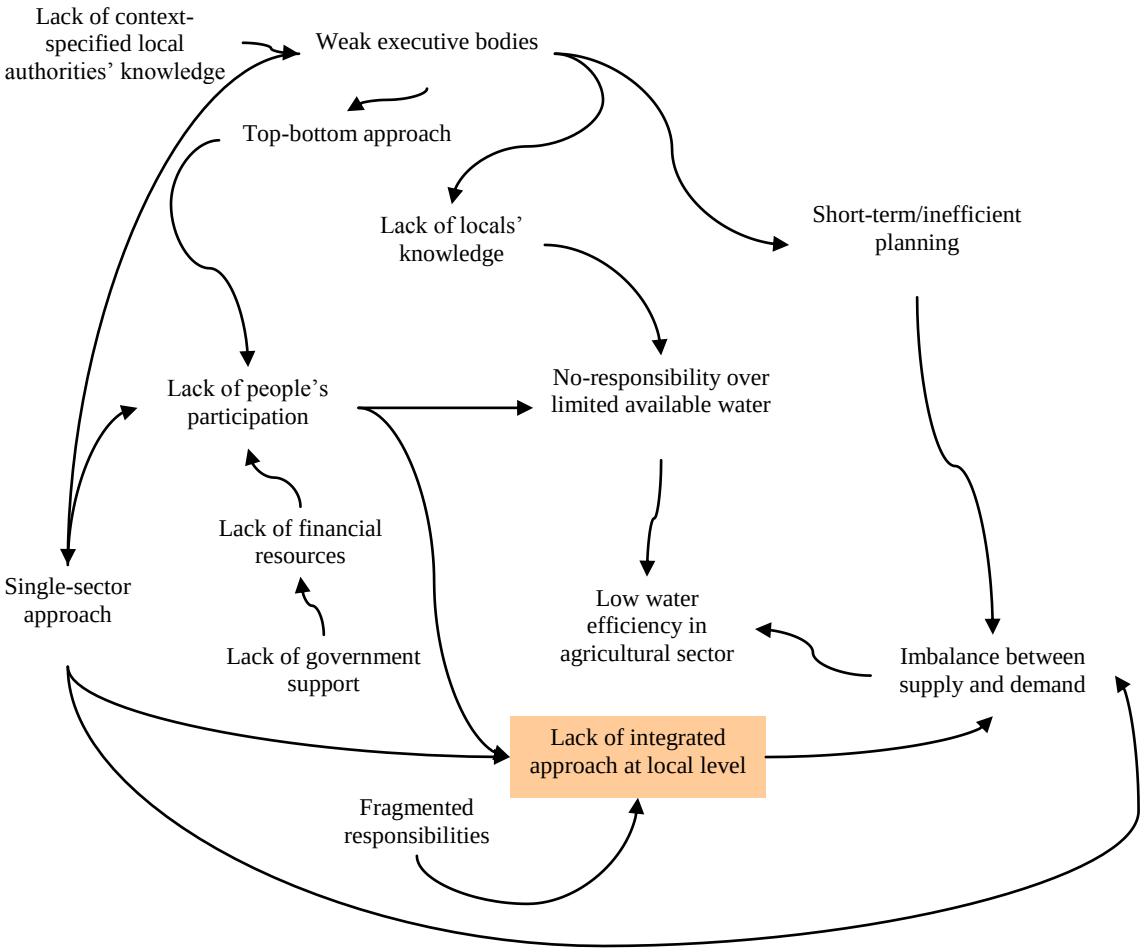

Figure 9: Multiple cause diagram, lack of integarted approach at local level

Chapter Six

6 Recommendations

The distinctive characteristics of the area, requires a context-specified, efficient and practical means to overcome the uncertainties and the current messy situation. In order to achieve an improved situation in the Hirmand/Helmand International River Basin, through the following section and according to the theory and concluding discussion parts, recommendations are made.

6.1 Improvement of institutional arrangements Creation of the basin-scale enabling environment

Institutions are society's means for stabilizing relationships and actions (Steyaert, & Jiggins, 2007). Institutional mechanisms are necessary to start joint basin management. As long as a basin-scale institution which systemically manages the interactions by incorporating all the interconnected components of the whole unit do not exists, no long term efficient solution will be achieved. While individual activities each aimed at one particular part of this problematic situation exist, the desired outcome will never be attained.

The key plan to trigger an in integrated transboundary basin management has to be started by initially building institutional capacities and human resources development considering the Hirmand/Helmand Basin is one manageable unit. This has to be considered as one of the fundamental steps. Establishment of institutions such as a river basin organization is necessary which has to function within a multi-level framework. This means that such organization should include different key relevant authorities/stakeholders from different levels of both riparian countries:

- **Involvement at highest governmental level in both states:** support from both countries national governments is required from the beginning. In fact, commitment of the highest levels of Iran-Afghanistan authorities with legislative powers is necessary to sustain such integrated management initiations in shared river basins. New context-specified rules and laws are required to support the establishment of basin wide institutions. Existence of such authorized national bodies would allow the new established bodies to start legally functioning. Moreover, financial resources are crucial for such activities which have to be obtained from the national agencies and needs the approval of the high level

authorities. Meanwhile, according to aforementioned opportunities, the Iranian government is willing to support the activities and projects that will improve the general condition in the area. Authorities can take advantage of this opportunity to persuade policy makers and high-level officials that water has to be prioritized in this area. Water availability will bring ample economic opportunities for the local people in the Sistan Basin and will put a stop to several issues prevailing in the area such as poverty, unemployment and smuggling.

- **Joint institutional mechanisms between two countries:** in the 1973 treaty there is an article that stipulates the establishment of a joint committee of representatives from two countries. Its fully implementation has been overlooked so far. The water authorities have to inform the government and urge on providing the legal instruments and enforcing the Afghan government to introduce representatives in order to set off formation of the committee. This committee according to the agreement has supervisory tasks on the implementation process of the treaty, taking urgent measures when unpredicted events such has drought and floods happen, taking legal actions while disputes arises over the basin related issues, etc. Given the fact that involvement of politics in international basins is inevitable, at the top of this institution officials from higher political levels have to be involved to strengthen the cooperation process between two countries. While such mutual institution within a basin-scale framework does not exist, lack of sustaining long term cooperation and other ensuing consequences have to be expected. This committee has to be powerfully backed up by constant governmental support. If not, once more questions will bring its future functioning into question.
- **Advisory professional team:** in spite of the fact that hydropolitics in international river basins conveys the message that the decision-making process in such situations is considered as being ‘political’, not all the politician would have enough relevant knowledge and required background for integrated management of the basin’s current problematic situation. Hence, competent experts from different disciplines of both countries are required to provide consultation for the joint committee about the present situation of the basin by studying its natural, social aspects and providing reliable information on the actual water requirement

in the upper and lower part of the basin for different sectors when required for taking further actions. This team has to function along with the joint committee. Simultaneous mutual cooperation among these two institutions is necessary to avoid taking individual short term actions which may only result in some temporary solutions to the situation. The local academicians from Iranian side are one of the best options along with other researchers who have been studying in the area to be considered as one appropriate option in being included in the advisory team.

6.2 Revision of 1973 treaty

In several sources it has been repeatedly affirmed that the 1973 agreement is considered as an 'unreasonable and inequitable' one according to the international conventions. Within the ratification period of this agreement its setting has not been based on understandings of the realities of the situation and historical Iranians water right from Hirmand/Helmand River. For example, the water requirement in the lower parts for other sectors (rather than domestic uses) has not been estimated realistically. In addition, the importance of the Hamun lakes which are of paramount importance in several aspects has been neglected in this treaty. Hence, the revision of the agreement and bringing all necessary overlooked factors in one new mutual framework is required. The following factors could support this recommendation:

- This treaty has been ratified almost one year before the fundamental changes in both riparian countries. The 1979 revolution in Iran leading to the abolition of the Pahlavi monarchy regime and while a bit before this event the Soviet Union invaded Afghanistan caused the consequent unrest period in both countries. Afghanistan is still undergoing unrest and conflict within the country. The instable situation prevented the agreement to be fully implemented. On the other hand the ratification of the treaty has been under special supports of the United States government which had good political relationship with the Iranian government and was inclined to prevent Afghanistan to go under communist regime. Moreover the Shah of Iran tended to keep good relationship with other monarchy neighboring countries like Afghanistan. Therefore, the 1973 treaty seems generally to be more in favor of the Afghans rather than Iranian side. Given

such condition, bilateral negotiations is required to be opened in a new context to reach a more updated reasonable and equitable agreement over Hirmand/Helmand River Basin considering current interdependencies between all components and the interests of stakeholders from both riparian countries.

- The 1973 agreement has a second protocol on referring to arbitration when two countries get into dispute over the implementation process of the treaty while other diplomatic negotiations and third party's efforts could not obtain a solution. Since the diplomatic efforts have not yet been able to force the Afghans to put the treaty into practice in a stable manner, Iranian government can request formation of an arbitration committee to investigate the current situation and judge between two countries to suggest solutions.

6.3 'One' water management body at local level:

As was mentioned earlier in this study, the water management is not taking place within an integrated approach at local level. Initiation of a local integrated water management framework is required for efficiently handling the interconnected issues in the Delta area in long term. Uncoordinated tasks of the fragmented organizations have led to more confusion and unnecessary and even harmful interferences in each others' functioning. Such organizations will definitely perform much more effective under the circumstances of their duties being clearly defined by one local water management body in charge of coordination of the whole set of programs and consequently the tasks aimed at improving the overall situation. Such organization should consider water resources as an integrated entity in which different sectors have interest. All the socio-economic-environmental aspects of the basin have to be taken into account by policy makers from different related sectors. This institution has to work with close collaboration with other relevant organizations. Prioritization of one sector to the others (like developments agriculture versus existence of Hamun lakes) has to be deferred until overall studies investigate the whole basin's multidimensional present and future conditions. The integrated management of the wetlands which are of global importance has also to be in the focus of authorities. Moreover, some further fundamental initial steps have to be taken:

- **Participation, training and raising awareness:** lack of local authorities and people's sufficient relevant knowledge and awareness in dealing with the

problems has led to an aggravated situation as a result of several shortcomings and the imbalance between the water demand and supply. Due to the harsh climatic characteristics and extremely scarce water resources, the water sector management is permanently facing several challenges on its way. Meanwhile, the authorities and locals are not enough experienced to cope with this uncertain situation. Therefore training and raising awareness have to involve two categories of stakeholders in the region:

- **Local people** have to be trained about the water use efficiency concepts to and be able to understand the great value of water especially in this region. New irrigation technologies have to be introduced and taught to the farmers. In addition the crops that farmers grow in the area are not based on a realistic estimation of the available water resources. Particularly in recent drought periods the farmers still tend to cultivate crops that their water requirement rate is high. The crop pattern has to be adapted to the especial condition of this area. Farmers have to be aware of the logic behind such decisions by being involved in decision-making processes at this level in order to accept them. In fact, local people have to feel responsible about the available limited fresh water by better understandings of the situation in the region. People are familiar with the precious value of water and consequences of extreme water scarcity. This provides suitable condition for the facilitators/trainers to work with them.
- **Local authorities** need to change their single-sector and centralized approach toward the problems in the situation. Unless they take decisions individually people will less cooperate with them and will not fully accept their choices. They should be aware that locals have to be taken into account in their planning actions. On the other hand, they have to be selected from those who have more experience in the similar fields rather than being only young inexperienced desk experts. It is necessary to introduce them the principles of IWRM in order to be aware of the need for application of this approach in the Sistan Basin to be able to deal with the existing problems in the long-run. They have to replace their supply-

oriented approach with long-term approaches and a broader focus on the demanding sectors such as agriculture.

In addition new policies have to be made by authorities in dealing with the uncertain situation. These policies have to be context-specified by considering the different situation in the area. Moreover, policies have to be devised in a flexible manner to be capable of coping with uncertainties that may happen in the area. Evidently in the current situation, these activities all will need long times and considerable concerted efforts to be achieved.

However, despite the fact that currently the role of stakeholders in the bottom level have been generally neglected by the national or local authorities, unless the area suffers from the lack of water as a result of upstream unilateral developments, bringing issues like shortcomings in locals empowerment and engagement in decision making processes have to be deferred until the main issues preventing water flowing to the lower parts can be dealt with in a more sustainable manner.

6.4 Economic value of water

Considering the forth IWRM principle, unless the water is available for free or for a very cheap price, no one will feel responsible over using this resource. Authorities should prepare the condition to make people realize that water has an economic value. Since this basin is located in one of the poorest provinces in Iran, and Afghanistan is also suffering from poverty, efficient tools have to be applied for water pricing considering the economic condition, without posing pressure on people.

6.5 Trade-offs

A number of existing opportunities has been identified previously. Considering the current situation of both countries in Hirmand/Helmand River Basin, Afghanistan is in a weaker position from economic perspective. However, the upstream country implicitly tends to exclusively take control over the river flow and believes in its own superiority in the basin as almost 90 percent of the basin is inside Afghan's territory.

While exertion of too much political pressure on Afghanistan is not a rational approach in present situation, Iranian side can offer some trade-offs and incentives which can bring further interconnectedness between two countries. The Milak-Chabahr highway is one good example. Afghans have to use this highway which is within Iranian territory to have

access to international commercial ports to import goods from other parts of the world. Iran can provide acceptable condition for them if Afghan's authorities fulfill Iranians request over their Hirmand/Helmand river water right. On the other hand are the technical and engineering supports which Iranians could offer to the Afghans. A number of construction projects are currently undertaking in this country. Some Iranian engineers are already involved in studying and construction of some development projects. Other efforts can be made to assist Afghans in their projects and instead force them to cooperate more efficiently on the issues related to the Hirmand/Helmand Basin.

Regarding this, the cultural and historical proximity of two countries would act as a catalyst for more collaborative efforts between two countries.

And finally:

Conducting a theoretical discussion is far easier than putting words into practice. Integrated Water Resources Management principles seem interesting in theory but it is a long way to fulfill its requirements and provide the enabling environment to apply the principles in the real world. The situation is more difficult when two or more states share one common resource. For the time being, due to the lack of concerted actions at basin-scale, reaching a sustainable solution seems to be unattainable. Two countries have to trigger the cooperation process as well as rethinking their ongoing approaches and taking unilateral actions within their own territories. Both countries and Iran in particular, need to improve their relations with the international communities in order to get more support from third impartial parties in this extremely complex situation to achieve a desirable situation. However, considering the exiting limitations and obstacles, this process will take quite a long time.

References

Ahmadi, H. A., 2005. بررسی تغییرات اقلیمی دوره خشکسالی نسبت به میانگین بلند مدت منطقه سیستان و تاثیر آن بر تولیدات کشاورزی. *Agricultural Aridity and Drought*, Vol. 15, pp. 21-26

Anon., 2002. Afghanistan natural resources and agriculture sector comprehensive needs assessment. Final draft report. [Online]
Available at: http://www.adb.org/documents/others/cna_afg/agriculture/cna_afg_agri.pdf (Accessed 20th February 2009)

Alim, A. K., 2006. Sustainability of water resources in Afghanistan. *Journal of Development in Sustainable Agriculture.* Vol. 1, pp. 53-66.
http://www.jstage.jst.go.jp/article/jdsa/1/1/53/_pdf

Beek, E. V., Meijer, K., 2006. *Integrated water resources management for the Sistan closed inland delta, Iran*. Main report. Ver. 1.3

Beek, E. V. et al., 2008. Limits to agricultural growth in the Sistan Closed Inland Delta, Iran. *Irrigation and Drainage Systems, [Online]*. Vol. 22, pp. 131-143.
Available at: http://www.springerlink.com/content/np17113m4613676p/fulltext.pdf (Accessed: 22nd February 2009)

Chavoshian, S. A., Takeuchi, K., Funada, S. 2005?. An overview to transboundary and shared water resources management in Iran, technical challenges and solutions. [Online]
Available at: http://www.mekongnet.org/images/7/75/Ali.pdf (Accessed: 17th February 2009)

Dahmardeh, M. et al., 2009.
بررسي اهميت تالاب هامون در رفع فقر و بيكاري و كاهش مهاجرت حاشيه‌نشينان تالاب هامون.

In: Zabol University, 1st International Water crisis Conference. Zabol, Sistan and Baluchestan . March 2009: Zabol University, Iran.

Elhance, Arun P., 2000. Hydropolitics: grounds for despair, reasons for hope. s. i: s. n.

Gleick, P. H., 2003. Global freshwater resources: Soft-path solutions for the 21st century. *Science* . Vol. 302. (www.sciencemag.org)

Global Water Partnership (Technical Advisory Committee), 2000. Integrated water resources management. No. 4, Sweden: Global Water Partnership.

Global Water Partnership (Technical Advisory Committee), 2000. Policy brief. Sweden: Elanders.

Global Water Partnership (Technical Advisory Committee), 2009. A handbook for integrated water resources management in basins. Sweden: Elanders.

Gourbesville, P., 2008. Integrated river basin management, ICT and DDS: Challenges and needs. *Physics and Chemistry of the Earth*, Vol. 33, pp. 312-321.

Available online at www.sciencedirect.com

Haghighatjoo, P. & Shamohammadi. H, Z., 2002. بررسی احتمالات خشکسالی و ترسالی منطقه سیستان با توجه به بده رودخانه هیرمند In: Zabol University, 1st International Water crisis Conference. Zabol, Sistan and Baluchestan . March 2009: Zabol University, Iran

The Integrated Water Resource Management MSc group report, 2008. Restoring Lake Tämnaren, An MSc field research report submitted to the Tämnaren local water council. Unit of Environmental Communication Department of Urban and Rural Development, the Swedish University of Agricultural Sciences Uppsala.

Shiklomanov, I.A., 1997. World water resources and water use in the beginning of the 21st century. In: IWRA (International Water Resources Association), IXth World water congress: water resources outlook for the 21st century: conflicts and opportunities. Montreal, Quebec, Canada 1-6 September 1997. Collection Environment: Montreal

Jamab Consulting Engineers, 2000. Country's comprehensive water resources plan, Hirmand Basin (طرح جامع آب کشور، حوزه آبریز هیرمند). s. i: s. n.

Jihad-e-Agriculture Organization of Sistan and Baluchestan province, 2005. Effects of drought crisis and the activities in this regard. *Agricultural Aridity and Drought*, Vol. 14, pp. 35-49

Jurenas, R., 2001. Agriculture in Afghanistan and neighboring Asian countries. [online]. Available at: http://www.nationalaglawcenter.org/assets/crs/RL31190.pdf (Accessed: 21st February 2009)

Kwadijk, J., Diermanse, F., 2006. *Integrated water resources management for the Sistan closed inland delta, Iran, annex B: forecasting the flow from Afghanistan,* version 1.2. [PDF]
Available at: http://www.wldelft.nl/cons/area/rbm/wrp1/pdf/annex_b.pdf
(Accessed: 10th February 2009)

Haddadin, M. J., Water issues in the Middle East, challenges and opportunities. *Water policy*, no. 4, 2002, pp. 205-222

Lonergan, S., water resources and conflicts: examples from the Middle East. Paper presented in the conflict and the environment, NATO advanced research workshop, Bolkesjo, Norway, 12-16 June 1996

Molle, F., 2007. Scales and power in river basin management: the Chao Phraya River in Thailand. *The Geographical Journal*, Vol. 173[4], pp. 358-373.

Pars Consult engineering company, 2007. *Revision report on Shib-ab and Posht-ab irrigation and drainage networks in Sistan*
(مطالعات بازنگری شبکه های آبیاری و زهکشی مناطق شیب آب و پشت آب در سیستان) , Vol. 9. Final synthesis report. s. i: s. n.

Shiklomanov, I.A., 1997. World water resources and water use in the beginning of the 21st century. In: IWRA (International Water Resources Association),IXth World water congress: water resources outlook for the 21st century: conflicts and opportunities. Montreal, Quebec, Canada 1-6 September 1997. Collection Environment: Montreal

Snowden, D., 2002. Complex acts of knowing--paradox and descriptive self-awareness. *Knowledge Management*, 6(2): 100-111.

Steyaert, P. & Jiggins, J., 2007. Governance of complex environmental situations through social learning: a synthesis of SLIM's lessons for research, policy and practice. *Environmental Science & Policy*, 10(6): 575 – 586.

Steyaert, P. et al., 2007. The role of knowledge and research in facilitating social learning among stakeholders in natural resources management in the French Atlantic coastal wetlands. *Environmental Science & Policy*, Vol. 10(6), pp. 537 – 550

Swain, A., 2004. *Managing water conflict: Asia, Africa and the Middle East*. Chap.1. London and New York: Routledge

Swauk, Larry A., Motsholapheko, M., 2008. Communicating integrated water resources management: From global discourse to local practice – Chronicling an experience from the Boteti River sub-basin, Botswana. *Physics and Chemistry of the Erath*. Vol. 33, pp.881-888.
Available at www.elsevier.com/locate/pce (Accessed: 8th July 2008).

'The dry century is ahead (خشک قرنی در راه است.)', *Ettela'at, (*24 January 2009), p.17

United Nations Environment Programme Post-Conflict Branch, 2003. Afghanistan post-conflict environmental assessment'. [Online] Switzerland: United Nations Environment Programme
Available at:
http://www.reliefweb.int/rw/RWFiles2003.nsf/FilesByRWDocUNIDFileName/OCHA-64CMUE-unep-afg-01feb.pdf (Accessed: 6th April 2009)

United Nations Environment Programme Post-Conflict Branch, 2006. 'History of environmental change in the Sistan basin, Based on satellite image analisys: 1976-2005'. [Online] Switzerland: United Nations Environment Programme
Available at: http://postconflict.unep.ch/publications/sistan.pdf (Accessed: 11th February 2009)

Vining, K. C., Vecchia, A. V., 2008. Historical and hypothetical future sedimentation in water storage in Kajaki Reservoir, Central Afghanistan: [online] USGS Afghanistan Project Product Number 176. Fact sheet 2008-3002.
Available at: http://pdf.usaid.gov/pdf_docs/PNADN729.pdf (Accessed: 12th February 2009)

World Bank, 1992. World development report 1992: Development and the environment. New York: Oxford University Press

Wolf, A. T. et al., 2005. Managing water conflict and cooperation. *State of the World, Redefining Global Security,* Ch. 5

Zeitoun, M. and Warner, J., 2007. Transboundary water conflicts in the Middle East and North Africa. *Id21 natural resources highlights, Water, Communicating international development research*, 4. Abstract only.
Available at: http://www.id21.org/publications/Water_4.pdf (Accessed: 3rd February 2009)

Whitney, J. W., 2006. *Geology, water, and wind in the lower Helmand Basin, Southern Afghanistan*. US Geological Survey Scientific Investigation Report 2006-5182, 40 p.
Available at: http://pubs.usgs.gov/sir/2006/5182/ (Accessed: 12th February 2009)

Wilson, K. & Morren G.E.B., 1990. *Systems approaches for improvement in agriculture and resource management.* New York: Macmillan Publishing Company.

Weier, J., 2002. From wetland to wasteland, the destruction of the Hamoun Oasis. NASA.
http://earthobservatory.nasa.gov/Features/hamoun/ (Accessed: 16th February 2009)