

**Water and social sustainability in
Aragón, Spain**
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Water and sustainability in Aragón, Spain

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Foreword

Struggles over natural resources are becoming more frequent as increasing population pressure has a severe impact on fewer per capita natural resources. These struggles have an enormous impact on the environment and interconnectively on the economically marginalized and socially poor people. Fresh water as a natural resource is one of these natural resources under pressure, to cope with the deteriorating socio-environmental conditions sustainable development aspects have been integrated in water management in several western countries. One of these countries is Spain and in particular the region of Aragon, where integrated river basin management has been applied since 1926. This integrated river basin management is connected since the 2001 Aragonese water laws with the three aspects of sustainability to come to a clear and sustainable water management that is to be exported over the globe. With Aragon's World Expo 2008 held in the capital of Zaragoza a scrutiny of the sustainable development in water businesses, and especially the underrated social component of sustainability will be performed in this paper to test the social sustainable friendliness of Aragon concerning their water management based upon the scrutinization of three major water related projects.

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Abstract

Sustainable development is an important phrase since the reports of the Brundtland meeting in 1987; *"Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (UN, 1987). Another important point concerning sustainability and the environment was according to the Brundtland commission: *"Many problems of resource depletion and environmental stress arise from disparities in economic and political power"*. Since the 1987 report much attention has been paid to the economical and environmental component, to the social component of sustainability less attention was paid as social goals were much harder to set and to be interpreted (McCool & Stankey, 2004). In Aragon, Spain, sustainable development has been on the program since the decentralisation of the Spanish government in 1990 in case of water development. In 2006 social sustainable goals were added to their water policy, with many of them implying retroactive effects. For three projects concerning water and sustainable development; The Yesa dam expansion, the Ebro water relocation and the Expo 2008, the roles of the Aragonese water management for the social sustainable goals in the 2006 document were compared with the social sustainable goals achieved in the three projects. This comparison revealed discrepancies between the social sustainable goals set and the sustainable goals achieved. The discrepancies between the two can be explained by using political ecology; explaining events by focussing on the integration of urban space and nature through related historical contexts (Swyngedouw, 2000/2003/2005, Kaika, 2000/2003, Heijnen, 2004). Maria Kaika already revealed in her 2003 political ecology study of the water system of Athens, that a number of premises and events caused a rush hour in waterworks construction, thereby neglecting the social aspects of water. A comparison with Aragon shows a striking similarity in order of events and type of events that have led to the contemporary socially unbalanced water system of Athens. Though Aragon has not walked the entire path Athens has, the three water related projects show in combination with background events and with the immanency of water pricing inducement, that the end stage is nearly reached for Aragon. The most important cause for the discrepancies between social sustainable goal setting and social sustainable goal achieving is the commodification of water; this is taking water out of its socio-environmental realm, after which water can be used as a product or good that can be used in negotiations or on the market. It is the role of the Aragonese water management in the Ebro water relocation and the Expo 2008 that shows the use of its water as a negotiation tool and water as a resource to be harnessed and commodified. This commodification of water in combination with the technological fixes for artificially created droughts (Yesa dam) are merely a wedge for an ever increasing amount of technological fixes to alleviate more artificially created droughts. It is no surprise therefore that after the implementation of sustainable goals even more and more dams are designed in Aragon. The case of Athens also emphasised the role of water pricing in giving the authorities more abilities to apply more technological fixes. For Aragon water pricing is not yet applied, but it is seen as a tool for water use efficiency and as a vessel to create a fair social balance. In the case of Athens however it are the socially and economically poor that have to bear the costs of the water pricing, and with the authorities of Aragon taking more control over the water realm causing the economically and socially poor to bear the costs of the Aragonese water system is just one rational step away. It is recommended for avoiding conflicts between social sustainable goal setting and social sustainable goal achieving in water projects to have a real citizen participation and to focus more on ways to use water in the most efficient way. Most large water projects have an irreversible effect that can not only be felt in the environment, in social equity but als in people's wallets. Increasing water usage is shown to cause a snowball effect, it is therefore important to focus on diminishing water use and letting more water flow naturally as water is after all a natural resource with a very clear social and life supporting function, and therefore it must be protected and preserved for the future generations.

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Introduction

Roughly 75% of the earth is covered with water, with only 1% of water being fresh water. Fresh water is a multi-usage resource for flora and fauna, as well as for industrial activities and numerous other interests. Therefore water has to be, and is, regarded as a precious and scarce resource which we have to protect. In the original Brundtland report of 1987 (UN, 1987), water is seen as an essential need for mankind, which has to be ensured for the future, along with food, energy, sanitation and jobs. The Brundtland commission gathered to find a solution to worldwide deteriorating environmental conditions. They came up with the term “sustainability”, which included an environmental, economical and social base. According to the Brundtland commission the environment, the economy and the social aspect can not be seen separately, since actions in one domain always have an effect on the other domains. For the environment it was clear that this domain was deteriorating, it was hard to ensure the same environmental conditions for future generations. For the economical and social domain, it was important to ensure environmental resources as most economical activities thrive on an environmental resource base. Deterioration in the environmental domain therefore would have a large impact on the economy (Medio Ambiente, 2007b). Though the environment – economy combination was the trigger for the commission to adopt the concept of sustainability, the social component was not overlooked. The Brundtland commission underlined that “*Many problems of resource depletion and environmental stress arise from disparities in economic and political power*”(UN, 1987) often the poor have to suffer from deteriorating environmental conditions. Equity for all people and equal opportunities is therefore advised by the commission. The commission did point out in 1987 that policies have to change at governmental levels to meet the requirements for sustainability. Environmentally many changes have been made in regulations and laws since then, for the social side however not much change has been achieved. Environmental indicators are easy to understand, which has caused people to see changes in the environmental domain, social indicators on the other side are much harder to understand, or even to construct (McCool & Stankey, 2004). An executive branch in which sustainability has been given much attention is the field of water. In the water sector, the European Union has constructed an EU water framework directive in 2000, which is a guideline for an integrated river basin management (EU, 2000), and contains some aspects of social sustainability for example on water pricing and water usage quantities (EU, 2007). Political changes are obliged as river basins now have to have one overlooking authority. One of the first regions in Europe to integrate the social aspects of sustainability and to apply the European Union water framework directive laws and regulations to their water management is Aragón, Spain (Embido et al., 2007). Because of deteriorating water resources and deteriorating environmental conditions due to dam construction and water relocations, the region has adopted the credo of sustainable development. Water has been a source of conflict between Spanish regions for centuries, it is therefore interesting to see how the Aragonese water management deals with these conflicts in a social sustainable way in combination with their sustainable development goals. This paper will therefore explore possible problems that arise when actors with different interests in water management conflict with social sustainable goals set by the Aragonese water management in three water projects in the region of Aragón, and to try to understand why these problems have arisen through investigation of the perspectives on water and cultural historical background of the actors in the field of water management, and to make general recommendations for setting future social sustainable goals. The analyses of the projects will be done using “political ecology”, a leading contemporary holistic approach for unravelling complex battles over natural resources (water). This paper is written against the background of the Aragonese capital of Zaragoza being host of the World Expo 2008; “Sustainable development and water”.

Key words: “Political ecology”, “Social Sustainability”, “Water”, “Spain”, “Aragón”

1.1 Research Problems

There are several indications in the public domain that the inclusion of social sustainable goals in the field of water have only led to moderate improvements in social sustainability in Europe (EU commission, 2007) and that, though a convergence is going on, the actors in the field of social sustainability have to converge in their views and perspectives. For Spain the case seems similar as social sustainable goals have been set by governments on all levels (Embido, 2007/ ,Medio Ambiente 2007b / MMA Aragón, 2007) but problems between actors arise in the execution of the goals (McCool & Stankey, 2004). Therefore the first research problem is: ***The views, perspectives and cultural history of the actors in Aragonese Water Management conflict with the social sustainable water goals set by the Aragonese government.*** In Aragón efforts have been made to include social

components to their water management (MMA Aragon, 2007/ Embid, 2007). The three examined cases of Aragon will therefore act as lessons learned for water managements in general. Because of the problems in general between setting sustainable goals and the views, perspectives and cultural history of the actors, the second research problem is that: ***The views, perspectives and cultural history of all combined actors are conflicting with the social sustainable water goals set in general.*** To help alleviate the problems concerning the conflict between social sustainable goal setting and actor's properties, objectives for this paper have to be stated to find a solution to these research problems.

1.2 Research objective

The main objective of the report is: to understand and explain conflicts between social sustainable goal setting and reaching these goals on one side, and actor's views, perspectives and cultural history on the other side, through investigation of three water projects in the region of Aragon and with using political ecology.

The second objective of the report is: to give recommendations from the lessons learned, to water managements in general about problems that might arise between social sustainable goal setting and actor's properties.

In achieving both objectives it is important to distinguish the sustainable goal setting and achieving part from the actor's properties part.

1.3 Research questions

In order to be able to answer the main questions several background questions have to be asked to clarify used terms, to have backgrounds on actor's properties and to position social sustainability among actor's background characteristics in Aragon.

Background questions:

To grasp the meaning of social sustainability and to get insight in social sustainability the following question has to be stated:

- What constitutes social sustainability?

To be able to understand the arena of actors, each actor's backgrounds have to be known in order to understand decisions taken by the actors. Hence, a number of properties of each actor will be described in the background part of the paper. The background question leading to answering the actor's properties is:

- What are the views, perspectives and cultural history of the actors in Aragonese water management?

Also derived from these actor's properties is how social sustainability is positioned for each actor, the relating background question for this statement is:

- What is the position of social sustainability among the actor's properties in Aragon?

Main questions:

- What are conflicts between social sustainable goal setting and attaining on one side, and actor's views, perspectives and cultural history on the other side, through the investigation of three water projects in Aragon, and how can this be understood through the use of political ecology?
- Which recommendations can be given to water managements in general concerning the lessons learned from the three projects in Aragon on problems between social sustainable goal setting and actors properties?

Concluding questions:

- Which conflicts between social sustainable goal setting - attaining and actor's properties can emerge in water projects and how are these conflicts embedded in the actor's properties?
- Which lessons learned from the Aragonese examples can be recommended to the water managements in general concerning the social sustainable goal setting and actor's properties?

1.4 Research methodology

The research methodology for this paper is based on qualitative data from two types of literature; information gained about the three projects and the area of Aragón, which are mostly Spanish sources, and information gained through the use of international literature, which is mostly about the theoretical part on sustainability and key literature on political ecology.

The introduction statements on sustainability and the EU water framework directive are based on EU and UN literature available on their internet portals. The position of Aragón towards sustainability and the EU water framework is derived from Spanish literature provided by Spanish national government online documents and book articles from local Aragonese water specialists. The research questions and objectives are based on international literature of the EU, and the literature used in the introduction statements (McCool & Stankey for example). The relevance for conducting this research is derived from the previously mentioned international literature and the local Spanish literature.

The theoretical part of the sustainability theory will be answered by using scientific articles found on university websites and other singular credible internet sources. These include United Nations websites as well as Agenda 21 internet sources and transcriptions of UN meetings on sustainability. Furthermore discussions and interviews with qualified Spanish university staff contribute to this theory part. The theoretical part on the social power theory and political ecology will be answered by using online scientific articles from prominent actors in the social power and water field; Swyngedouw, Heijnen, Kaika and Keil. Also online scientific articles are used from authors in the social field to contribute to the theory of social power and water.

In order to answer the main questions, a conceptual framework has been made based on the theory of (social) sustainability and the explanatory power of (urban) political ecology. In combination with the background information on water management in Aragón and the characteristics of the actors in the region, discrepancies between social sustainable goal setting and achieving can be explained through the use of the conceptual framework. The use of political ecology only would not have been sufficient to explain conflicts as the subject of the paper is not the urban environment in general, but the paper focuses mainly on social sustainability

The background part of the information of actor's properties will be explained here through each actor and separately the sources on views, perspectives on water and cultural history (if necessary):

- Aragonese Water management & ChdE views & perspectives: Yearbooks of the Confederacion Hidrografica del Ebro (which manages the Ebro watershed and resides in Zaragoza). Online documents from the ChdE .
- Aragonese Water management & ChdE cultural history: A history can be seen on their own website. For other overviews of Aragonese cultural water history with regards to a water management authority online documents and websites are used.
- Civilians/ civil groups views & perspectives: Online protest sites (mainly Expo/ Yesa), newspapers (Heraldo de Aragón, online or paper), other online sources.
- Civilians/ civil groups cultural history: Falls together with the history of the region, so the same sources are used as for the regional government.
- Environmental groups views & perspectives and cultural history: Mainly derived from websites of green movements and organisations. Also views and perspectives of environmental organisations can be derived from local newspapers, although in a lesser extend than the views and perspectives of local citizen's and NGO's views and perspectives.
- EU views & perspectives: Mainly derived from online documents on the official EU websites. Also official EU laws on water and water policy give strong indications of the views and perspectives of the EU on water and water policy.
- EU cultural history: because of young age of the EU the cultural history is not relevant. Motives for behaviour have to be found on a more local regional or national level.
- National government views & perspectives: online documents on official regional government internet pages.
- National government cultural history: several internet sources such as the Iberian library or articles of Swyngedouw on Spanish water history.
- Regional government views & perspectives: online documents on official regional government internet page.
- Regional government cultural history: several internet sources such as the Iberian library.

The background question on the social sustainable water management goals will be answered using official decrees of the regional government by the Aragonese court. The goals used are from the 2006 document "Bases de la política del agua en Aragón", which contains 110 laws and sublaws to construct a framework for water management in Aragon. A number of these laws are applicable to social sustainability. Furthermore this document replaces the 2001 document on water management in the region, however both documents have a large resemblance.

The data part on the three projects will be answered through Spanish literature (mostly translated into English), local Spanish literature, regional newspaper articles and interviews. For the Yesa project this includes an interview at the Confederación Hidrografico del Ebro and an interview with a local ecologist. For the Expo 2008 an interview with the General manager of the construction site has been kept. In the analysis part, the information from the data part on the three projects will be put into the conceptual framework.

The analysis part will deal with the discrepancies between the real outcome and the expected outcome of social sustainable goals that can be explained here by using the conceptual framework; which is mainly derived from political ecology, and social sustainability theories.

In the conclusion part the outcomes of the three projects regarding the executed policies and goals on social sustainability will be shortly described. The explanation of how these discrepancies have emerged within the conceptual framework will be shortly described, to come to a final conclusion of how discrepancies between goal setting and attaining on social sustainability arise in water projects within the framework of political ecology and social sustainability.

Finally in **the recommendations chapter**, recommendations will be given to water managements in general to strategically deal with problems that might arise concerning local political ecology conditions and social sustainable goal setting and attaining from the lessons learned in the three examined Spanish cases in this paper.

1.5 Thesis outline

In chapter 2 the used theories will be discussed; the theory of sustainability in general and the derived theory of social sustainability. The second theory is the theory of social power and water which is based on (urban)political ecology. From these theories a conceptual framework will be derived in order to be able to explain conflicts between social sustainable goal setting and achieving. This chapter will also give an explanation of the operationalization of the conceptual framework. In chapter 3 the backgrounds for the research will given, which includes a detailed description of actor's properties, a geographical background and the social sustainable goals set by the Aragonese water management. Chapter 4 contains all the data of the three projects and main events concerning water planning, which will be analyzed in chapter 5 with the three projects. As for answering the main questions is concerned, final conclusions on the conflicts between social sustainable goal setting and actor's properties of the three projects separately will be stated in chapter 6. Chapter 7 will finally give recommendations to water managements in general and thereby give an answer to the second main question.

1.6 Relevance of the paper

In the field of water construction the focus has changed over time from technocratic to a more holistic approach. Contemporary paradigms are determined by the concept of sustainability, with its economical, ecological and social components. Attention however is paid more to the economical and ecological components rather than to the social component. Therefore more insight is needed in the use of the social component in water construction. The social component of sustainability can not be detached however from the properties of the actors participating in the water arena, as both deal with the social aspects of our society. According to several sources social sustainable water goals which have been set in earlier stages as a reaction to changing social paradigms or programs (Millenium goals/ EU water framework/ holistic approaches), have been hard to reach (McCool & Stankey, 2004). This is caused not only by optimistical goals, but for the main part by conflicts between actors participating in the field of water. More insight is needed in the conflicts between social sustainable goal setting on one side and actor's properties on the other side for water projects. Aragon is an excellent candidate to investigate these conflicts as water plays a prominent role in every day's lives of

people in this region and the region has to deal with water issues which will play an important role in the future in general. Because of this prominence of water and a new cooperating paradigm of the regional government, the water arena seems fairly transparent at first sight and offers excellent opportunities to investigate conflicts between social sustainable goal setting and actor's properties. Moreover the Aragonese capital of Zaragoza has been the host of 2008's World Expo with the theme "Water and sustainable development", therefore a scrutinization of Aragon's sustainable development is needed.

2. Theories: Sustainability and Social power & water

Before presenting the data it is of importance to construct a conceptual framework to help answer the main research questions. The conceptual framework is based on the Thomas and Grindle (1990) linear model and is constructed with two theories; the theory of sustainability and the theory of social power & water. The sustainability theory is derived from the original Brundtland report and provides a reference framework for social sustainable goals in the conceptual framework. The theory of social power & water is based on political ecology and it provides an insight in the relationship and political processes between water and social power in this paper.

2.1 Theoretical framework: sustainability theory

Since the Club of Rome report in 1972 long term human activity, worldwide changing environmental conditions and sustainability have been increasingly paid attention to. Due to problems arising because of deteriorating environmental conditions, governments were faced with a task to sustain their productive systems and to maintain or improve the environmental conditions of their property. For this purpose many governments have found a solution in applying the aspect of sustainability to their programs (WSCCD, 2008). According to the definition of the 1987 Brundtland commission; "Sustainable Development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 1987).

The Three Spheres of Sustainability

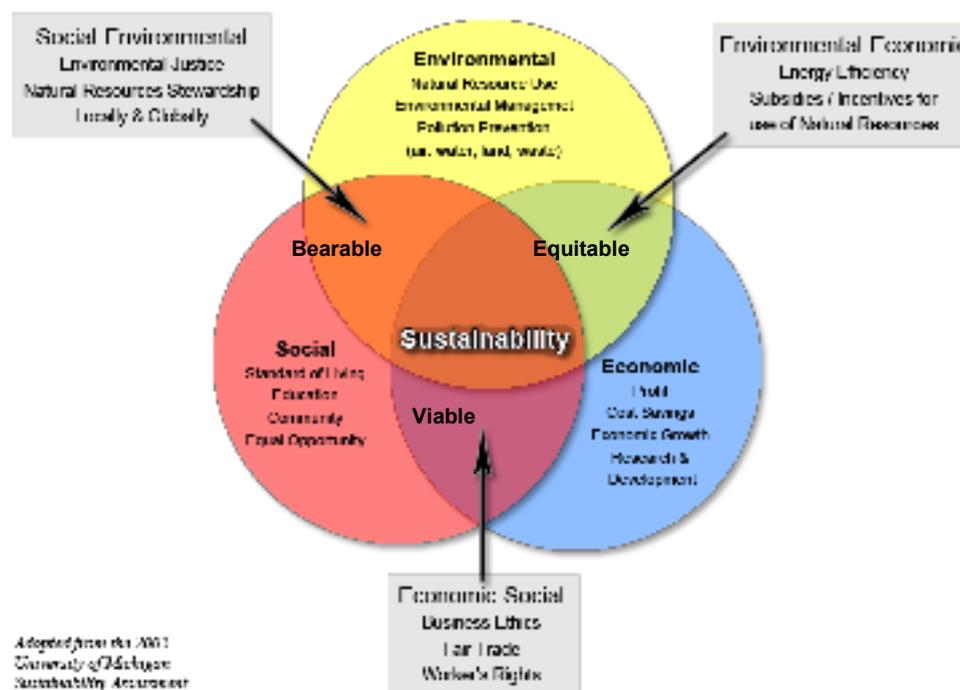


figure 2.1 The Three spheres / E's of Sustainability: Environment, Social Equity, and Economy (Vanderbilt, 2007)

In 1992 during the Rio de Janeiro summit an action plan was created, Agenda 21, which provided a list of premises for sustainable development (UN1, 1992). In the 1992 declaration a three-dimensional model was created, consisting of a balance of three important pillars: Environmental protection, Economic growth and Social development. In figure 2.1 the three pillars are drawn interconnectivity, together with their interplay and different outcomes. In terms of sustainability the most desired outcome is "sustainable", a situation in which the three spheres or pillars are balanced. Other states of projects are bearable, viable and equitable; if the environmental protection and the economic development are balanced a state of viability is achieved. Since the first meetings of the club of Rome, much attention has been paid to the environmental protection and the economic development, thereby neglecting the social component (NGOs Johannesburg, 2001). This has resulted in viable developments in which bearability and equitability have been of less importance to developments. This inequity has resulted for example in unequal conditions and chances for everyone, but has led

instead to a less “equitable” state in terms of socio-economic conditions, especially in the mediterranean (Guille et al., 2006 p.3). This inequity in socio-economic equitability has led to spatial conflicts, which in turn has led to the poor people having to bear the policy costs more than the rich, and therefore having an increased risk of being marginalised (Walubengo, 2001). For the socio-environmental combination, the lack of sustainable developments have caused the poor to bear the most of the environmental deterioration. To achieve a sustainable situation in practice, the social component has to be integrated into sustainability policy. This will require a different approach towards executing projects, with the focus shifting from environmental-economics to a combination of all the three components of sustainability (Agenda21, 2004). Also the configuration of state intervention is of great importance in the way sustainability is achieved in water projects. This will be further elaborated on in the next theory chapter. The incorporation of sustainability in this paper, and especially the socio-economic (equitable) and socio-environmental (bearable) connections aspects of the water projects are dealt with in this paper in the analysis chapter. As can be seen in figure 2.1, the focus on social sustainability will be on Fair trade, Standard of living, education, community, equal opportunities, environmental justice and natural resources stewardship regionally (and nationally if applied to a project) as far as these are stated in the social sustainable laws of the Aragonese water management in the 2006 “*Bases de la política del agua en Aragón*” (§3.3). These aspects are in the social sustainable realm and the interconnected realms of socio-environmentalism and socio-economics and can be found in the setting of the sustainable goals in this paper or in the data chapter.

2.2 Social Power and water

“This theory part will mainly describe political ecology in combination with water. Political ecology studies the effects of politics, economics and social aspects on environmental issues.”

In the 21st century water is no longer regarded as just a natural resource. Whilst obviously fresh water in its physical form is a scarce resource, this scarcity has led to many power struggles in mostly dry areas of the world for water accessibility and water ownage. With these conflicts water has turned into a powerful aspect in negotiations. An important place to fight over water accessibility and ownage in the modern world is the water battle in the major cities. Whilst most water is spend for agricultural purposes, water issues in major cities have been given a lot of attention due to its polymorphical appearance. Water not only comes in its physical shape but also as service provided by the local authorities, as a commodity with a price tag as well as an object for negotiation. To identify the role of water within a city Urban Political Ecology will be used. Urban Political Ecology (UPE) is a leading paradigm nowadays in the field of environment-city relations, or according to Heynen (2004): “*Most often through the use of robust critical social theoretical frameworks, urban political ecology research focuses on the integration of urban space and nature through related historical contexts*”. Connecting the integration of urban space and nature (water!) with historical conditions (local background) as a contemporary paradigm, can prove a solid reason for urban planners and for local politicians for urban development. UPE thereby integrates the economical aspect better than in previous urban development paradigms concerning integration of the environment in cities. Keil (2003, pag 734) in Heynen (2004) describes one such research on UPE as Marxist UPE, this form of UPE is according to Heynen (2004, pag 501) the most appropriate to describe inequities in the distribution of nature in cities. This research by Swyngedouw and Heynen (2003, pag 902) relates the urban environment to the interests of the elite, which has its effect on the poor. In the case of water in cities, water is a scarce resource which is claimed by the elite and therefore marginalises the poor (§2.1). The social power of the elite, derived from Swyngedouw and Heynen, therefore leads in terms of water access to inequalities between the rich and the poor. This theory thus stands directly opposite to neo liberal market economies, in which state intervention is regarded as unnecessary or unefficient, as the market is always supposed to fix its own deficiencies.

Another important aspect in the field of social power and water, is the locus of control for the water market. The locus of control is not only the authority which controls the physical element of water but also the authority which establishes the local/regional/national paradigm on water issues. The paradigms on water on a local scale have a great influence in the way water issues are dealt with. As for example a technocratic paradigm will cause the authority on the locus of control to design technocratic solutions, whereas a paradigm that leaves room for negotiation will produce a design which does the least harm to all participants. In case of the previously mentioned fights over water in dry regions and the different roles of water, water scarcity can provide a powerful mechanism for certain authorities to realise their ideas on water management. In modern societies water pricing is

often used to control water usage, however water pricing has its influence beyond the boundaries of water usage, as Swyngedouw (2005) derived from Kaika (2003a) states: *“The discursive built-up of a particular water narrative and ideology.....serves specific political and economic policies and objectives. A climate of actual, pending, or imagined water crisis, i.e. the discursive production of the immanency of a hydro-socio-ecological disaster, not only serves to facilitate further investment in the expansion of the water supply side...it also fuels and underpins drives towards commodification. As the price signal is hailed as a prime mechanism to manage “scarcity”, the discursive construction of water as a “scarce” good becomes an important part of a strategy towards commodification, if not privatisation”*. Pointed out here is that a projected or real immanency of water scarcity leads, through the locus of control, to an increased physical controlling of water, where water is portrayed as a commodity rather than a natural resource. And because the commodity of water is portrayed as scarce, neo-liberal market practices can be easily applied*. As Swyngedouw 2005 states: *“...it takes attention away from the political nature of ‘scarcity’ as socially and politically “produced” and focuses instead on the available technological fixes”*. Water is regarded here as a commodity which has to be controlled first in order to be able to put it on the market, and proclaimed water scarcities can be used to regulate the water price as well as induce new measures to control the commodity water. Now fresh water is portrayed as a commodity in general, that is being controlled and regulated by authorities, and is ready to be put on the market, it is of importance to recognise the uniqueness of water as a commodity as it is not only of economic importance but also of social and environmental importance. A good example for this process has been described by Maria Kaika in her study of Athens (Kaika, 2003b), which is an urban political ecology study of the water supply in Athens. A change in the paradigm of the authorities caused a neoliberal policy swing in which water was commodified and later when water consumption had vastly increased, a false alert of water scarcity was created that enabled the local authority to even further expand their grip on water. Or as Kaika states: *“The exposure of the political-economic character of discourses and debates over water scarcity scrutinises the dominant managerial approach towards resolving resource-scarcity problems and the tendency to translate the inevitability of natural phenomena (eg drought) into a self-explanatory inevitability of socially constructed phenomena (eg water scarcity) with very serious social, political and economic consequences”*(Kaika, 2003b, p.919). In the Athens case droughts were seen as inevitable and water scarcity is seen as a logical consequence of this drought. Because of the general awareness of social, political and economical consequences of water scarcity (e.g. drought), the government was able to put even more technological fixes into place to resolve the water scarcity. This example of Athens is in line with Swyngedouw’s statement of governmental actions when water scarcity is socially and politically produced after water has been commodified (Swyngedouw, 2005). To elaborate on the case of Athens; water demand and water supply had increased spectacularly in the last decades which led to a dramatic water crisis in 1991 as demands outnumbered the (increasing!) output of water. While the water supply had increased the government proclaimed the water crisis as nature’s fault, thereby enabling a number of technological fixes to enhance Athens’ water supply (Kaika, 2003b). As for equality aspects between regions is concerned, like between Athens and the surrounding areas where water is being taken from, unequal water distributions will profoundly cause unequal power distribution amongst the “wetter” and the “drier” region, certainly when the above described insinuation of immanency of a hydro-socio-ecological disaster is at hand. Because of water being a commodity, the wetter region can now use water as a tool for negotiations when the drier regions tries to bargain for water. Water can in this case be “traded” or “exchanged” against other commodities, as Kaika and Swyngedouw (2000) state: *“Blurring the socio-environmental process of their production by foregrounding their character as universally exchangeable for anything else becomes an amazingly powerful mechanism”*. With the commodification of water, water is now virtually withdrawn from the realm of water as a social and natural resource. It is these unequal distribution of power, the exchangeability of water against another commodity, the control of water as a commodity and the withdrawal of water from the socio-environmental realm that seem to contradict the sustainable aspects of sustainability.

Regions have for long battled over water, and a few years ago Catalunya and Aragon had a dispute over ownership and usage of water of the river Ebro. The poorer Aragon would not allow the richer Catalunya to use the water of the river Ebro, thus turning the resource water into a powerful instrument in negotiations. This scarcity of water in other regions and the abundance (dependent on the season) of water in nearby Aragon is and has been a source of conflict. The ownership of the river Ebro gives Aragon a great social responsibility in providing water also for other regions which depend on the water of the Ebro. Or as Swyngedouw (2006) states this:

“In many instances, controlling water generates considerable social power. While the latter permits re-enforcing or extending this control. In other words; social power and the control of nature are mutually constitutive”.

That the waterworks in Aragon have been centrally developed is no surprise as only such large governmental bodies have the resources to undertake large irrigations projects. Centuries ago the scarcity of water in Aragon has led to a hierarchical system in which the key position was fulfilled by high governments. This internal control over water and thus of social power of the government was then further extended with each new water structure placed. Wittfogel (1957) has already theoretically proven this connection between irrigation systems and development of a hierarchical society with high government officials on the highest positions. This theory not only proves the link between waterworks and early societies but it also explains the large technocratic measures taken by the Spanish central government in their power struggle for water access and power over water.

* This falls together in Spain as the European Water Framework directive of 2000 is a step from “government to governance” (Kaika, 2003), thus giving more room for privatisation.

2.3 Conceptual Framework

A conceptual framework (figure 2.2) is made to help understand how to answer the main questions. The conceptual framework consists of the theory of (social) sustainability and the connection between social power and water, which will be used in the investigation of the discrepancies between social sustainable goal setting and attaining through the use of political ecology. The base for the model is the linear policy process model of Grindle & Thomas (1990). The linear model by Grindle and Thomas originally consist of three sequential stages; the agenda phase, the decision phase and the implementation phase. In the agenda phase a topic is put on the agenda of the policy makers. It is tried to pay as much attention as possible to the topic to be chosen by the policy makers to be put further into the policy making process. The next step is the decision phase in which preparations will be made for the content of the action program. In this stage hard decisions and soft decisions will be made. In the implementation phase the action program will be activated. Though the original Grindle & Thomas model is a linear model without feedbacks and is criticised for its unrealistic depiction of reality, it has been used as the basis for the conceptual model because of its functionality; in this paper the discrepancies between the decision and the implementation phase will be analysed and explained through the use of political ecology; in which the analysis of the actor’s properties is a premise. The model also takes into account the fact that properties of the actors influence the outcome of the process. Also while a conceptual framework helps to understand the research process, in this case political ecology is the format by which the analysis will be done and the conceptual model is created as a framework to clarify the process ongoing to the application of political ecology. Therefore the model synchronizes with political ecology and does fit well to this paper.

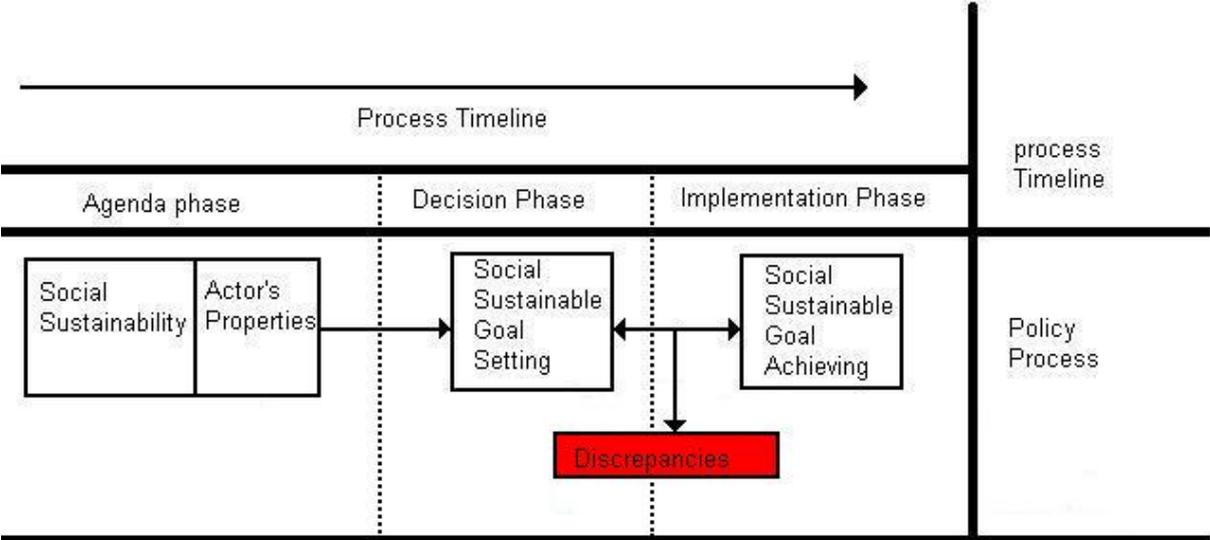


Figure 2.2 Conceptual framework derived from the Grindle & Thomas Linear model (1990)

The agenda phase consists of sustainability in general and the actors and their properties. In the agenda phase the topic has to be put forward. In this case social sustainability has to be separated from economical and ecological sustainability. In the regional policy of Aragon sustainability has indeed been separated further into its three components. Before social sustainability is put on the agenda each actor will determine the importance they give to social sustainability; and will define their views and perspectives on the subject. In the paper this part is the description of the properties of the actors in Aragonese water management in general concerning their views and perspectives on water and social sustainability and their cultural history. The data from the agenda phase is of importance as the actors properties influence the social sustainable goals set in the decision phase. In this paper the decision phase is characterised by the goals set by the Aragonese water management. These goals will be shortly scrutinized using the actor's backgrounds from the agenda phase. The implementation phase consists of the data of the three projects. In the analysis chapter the social sustainable goals set will be compared with the social sustainable goals achieved in the three projects, to state the discrepancies in Aragonese water management between the two phases. The discrepancy between the goals set and the water achievements achieved for the Yesa project, the Expo 2008 and the Ebro relocation program will be explained through the use of political ecology. In this case the focus is on the actor's views perspectives and their cultural history as explained in the agenda phase, and how these contributed to the discrepancy between the social sustainable goals set and the social sustainable goals reached. This will give an answer to the first main question:

- What are conflicts between social sustainable goal setting and attaining on one side, and actor's views, perspectives and cultural history on the other side, through the investigation of three water projects in Aragon, and how can this be understood through the use of political ecology?

To give an answer to the second main question:

- Which recommendations can be given to water managements in general concerning the lessons learned from the three projects in Aragon on problems between social sustainable goal setting and actors properties?

The lessons learned from the three cases can be used to set examples for possible walls policy makers run into between setting social sustainable goals and reaching these social sustainable goals in water projects. These lessons learned depend on the outcome of the political ecology on the projects, lessons learned can reside in each of the three phases. For the agenda phase for example it can be that social sustainability is not well defined or that various actors have a different view on social sustainability. For the decision phase it might be possible that the social sustainable goals are unreal and can never be realised. For the implementation it can be for example that a natural disaster causes a discrepancy between the goals set and reached. For the analysis of political ecology it is of importance to have enough background information to be able to include all of the factors that could have led to disparities in social sustainable goal setting and achieving. These include the views perspective and cultural history of the actors as well as descriptions of common water history of Spain, Aragon and Zaragoza. Without enough relevant background information the statements on the social sustainable water policies of the Aragonese water management can not be solid. In this light it is also of importance to give a description of the geography and climate of Aragon, as can be seen later, the geography and climate have an important influence on the water management, and not only in physical terms (water retainment etc.)

3. Background

As stated in §1.5 the thesis outline, background data is needed to be able to perform political ecology on the discrepancies between social sustainable goal setting and attaining of the three water projects in Aragon. This chapter is divided in three parts; the first one will give a general overview of the history of the region and the city of Zaragoza and the geographical background of Aragon along with its climate. The second background paragraph contains the views and perspectives of the actors in Aragonese water management on water and on social sustainability. The importance of their views and perspectives will show in the analysis part where actor's behaviour in the three projects will be explained through political ecology; which is based upon these views and perspectives. Another important background aspect that makes up for political ecology is the cultural history of the actors. The last paragraph of this chapter will state social sustainable goals set in Aragonese water management. This background chapter is needed to compare with the data generated in the data chapter on the three projects in Aragon, of which the discrepancies will be explained through political ecology.

3.1 Background and Geographical situation of Zaragoza and Aragon



Figure 3.1 Geographical positioning of the projects

agriculture during drier periods. Low precipitation levels and the need for water for agriculture led to the construction of the Canal Imperial in 1789 (GEA, 1999), which transports water from a higher section of the Ebro in another province to dry regions in Aragon. This interregional project could have been a sign of later Aragonese participatory traditions concerning water issues. In figure 3.1 the city of Zaragoza in central Aragon is shown along with the Yesa project and the Ebro water relocation project which starts near the end of the Ebro river between Barcelona and Valencia. The Canal Imperial runs south of the Ebro river. Melting water contributes for a substantial part to the Ebro river. The Ebro itself is flowing from the west into the province of Aragon, through the city of Zaragoza and flowing a bit more to the east of the province into the Mediterranean Sea. In the northern part of the province a large dam has been created in the Aragon river near the town of Yesa. The Aragon river flows into the Ebro river some 100 kilometers upstream of Zaragoza. The Ebro water relocation project is an ambitious plan to redirect water from the Ebro river to Barcelona and more south to Valencia, Murcia and Almería, because of the declining river flows of the Júcar and Segura River. Most of this water will be directed to the south for agricultural purposes. Also worth noting is the fact that the region of Aragon surrounding Zaragoza has an average annual rainfall of just over 300 mm, which classifies it as a desertous area. Moreover precipitation trends show a decrease in future rainfall and more intense rainfall. (Cuadrat et al, 2007).

3.2 Actor's properties; views & perspectives on water & social sustainability and actor's cultural histories

In this paragraph actor's properties concerning their views and perspectives on water and social sustainability are given, and additionally when necessary their cultural history. The background information in this part will be of importance for the use of political ecology to explain discrepancies between social sustainable goal setting and attaining in Aragonese water projects. The views, perspectives and cultural history will be discussed in alphabetical order of the group. For some actors the cultural history is in the same paragraph as the views and perspectives, this is for clarity reasons.

- Aragonese Water management and the Confederacion Hydrografica del Ebro views & perspectives: The execution of the water management within its borders for the autonomous region of Aragon has been delegated to the AragonWater Institute by the Aragonese parliament under chapter II of the 2001 Water Law. The Aragon Water Institute consists of a Chairman, responsible for environmental issues, Directors responsible for the executed works and a Board of Management of the directos, chairman and 9 representatives of various departments concerning the Institutes strategy. The Water Institute has been given aims and targets under the 2001 Water law, which are of great importance for achieving sustainability or conducting sustainable development and which are pointed out by Embid (2007) and Lacasa (2007) because *"they show the specific aims of the law as part of the ideology"*:

- *"Responsibility for the constitution of the forum of debate and meeting place of all stakeholders in water policy; with the aim of achieving minimal proposals and of correcting the lack of representation of some of the parties in other organisms that deal with water"*
- *"Responsibilities for the promotion of compensatory measures that set out by repairing the enormous historic debt that society as a whole owes to the counties and municipalities that throughout the 20th century have suffered the harmful effects of water infrastructure projects"*.

The 2001 document is considered to be far more sustainable compared to its 1992 predecessor which was constructed in the old technocratic style (Embid et al., 2007). Furthermore the Water Commission that has been created by the Water Institute in order to form a forum of debate, consists of a very broad support of ecologists, university staff, experts, politicians, social parties; the chairman is the Aragonese minister of Environment. The main aim of the model of consultative participation and thus of the Water Commission is to follow the agreements set on the Rio summit of 1992 and according to Boné Pueyo (2007) is to *"reach agreements that can form the basis for the implementation of achievable policies that improve people's quality of life, and do so in a sustainable way, or in the most sustainable way possible"*. The aim of this Water Commission therefore fit into the ideas of social sustainability. The Aragonese water management is for almost 90% incorporated in the Ebro valley authority or Confederacion Hydrografica del Ebro (ChdE). The valley authority contains 11 regions through which the Ebro flows.

- Aragonese Water management cultural history: Inaugurated in 1926 (Heraldo, 2009), it is one of the oldest valley authorities in the world and in that sense the Ebro valley authority runs decades ahead of the European Water Framework Directive. Though the Aragonese water management does not have its own authority over its water (water jurisdiction in Spain is given to the water basins, since Aragon does not own an entire water basin, Aragon has no direct jurisdiction over its water bodies, this jurisdiction is in the hands of the Spanish government), it can still make plans and try to pursue these plans through influencing policy.

- Civilians/ civil groups views & perspectives: While execution of large constructional works in Aragon has always been a matter of the government, water has always been a matter of the public in Aragon. It is not a surprise therefore that water is a major topic of the citizens of Aragon, this is also shown in the regional newspapers, in which water issues are often placed on the frontpage (Heraldo de Aragon, 2007). Water is regarded as a source of nature that is the property of all the citizens of Aragon, and moreover the Aragonese people feel they have a culture of water (Heraldo, 2008a), which is displayed for example in a massive turn out at the demonstration against the relocation of Ebro water to other regions in Spain (Hernandez-Mora, 2007). This aspect of the view of Aragonese citizens towards water is closely interlinked with their view on social sustainability (Heraldo, 2008b); having a voice in water matters is of high importance to the Aragonese people. Local politicians are aware of this and have placed water issues on a high spot in their election programs. Even the national level elections are thought to have been influenced by the viewpoints of the election parties on water, and especially on the national hydrographical plan during the national elections of 2002 (Greenbudgetnews, 2003). Local citizens are also aware of the social equity water can bring, as it is already obligatory around

Zaragoza to ensure a steady water supply before housing construction can begin. The perspective the citizens have taken is an active and participating role, this is especially the case since the introduction of the Aragonese water commission. The Aragonese Water commission is an initiative of the Aragonese Water Institute to act as a multiskilled platform in which all relevant actors concerning water projects, are incorporated (Aranda Martín, 2007). This includes an active citizen participation. Also the massive demonstration against the Ebro water relocation is a good example of the active and participatory role the citizens in general feel they have. Although skepticism exists, people seem very optimistical about reaching sustainable goals in Zaragoza. The skepticism is mainly found at protest sites on the internet, focussed against solitary water projects such as the Yesa dam or the Expo 2008 (ZH2NO, 2008 / Barricadas, 2008) or with protestgroups with a wider range of action (Yesano, 2009).

- Civilians/ civil groups cultural history: Civilians in Aragon have a long history of connecting with water. In earlier days groups of citizens concerned with water were mostly farmers concerned with the distribution of water among the lands. As societies changed and the political landscape changed to a post-Franco democracy, citizens received more influence on political matters including the water management of Aragon, since water has always been a matter of political importance for Aragon. The citizens of Zaragoza have already shown their commitment to water matters in the region as they massively reduced their per capita water consumption in 1998 after a campaign launched by the local government to cut domestical water use in the city (MedioAmbiente, 2002).

- Environmental groups views & perspectives and cultural history: For environmental groups water is mainly seen as a natural resource that belongs to nature. Though water use for people's everyday lives is taken for granted, water should be mainly used to support ecosystems in their view (Ecologistas, 2009). Unnecessary use of water and water spillage subjective to their opinions are redeemed unsustainable at forehand and construction of new industries are adviced against. The environmentalists take a protectionist perspective towards water. Environmental groups are more concerned with these environmental sustainable aspects rather than with social sustainability. In some cases like the Yesa dam project the environmental groups can form powerful alliances with local citizens if their goals correspond with each other. The history of environmental groups as such is only short, due to the emergence of these groups only in the seventies, but nature conservation groups have existed for longer in Aragon. Since 1978 diverse ecologist and environmental groups have united in a collective ecologist group (Asamblea Ecologista) which represents all the wings of ecologists (Enciclopedia, 2000).

- EU views & perspectives: The views and perspectives of the Eu are mainly described in the manifest "The European Water Framework Directive" which is the basis for European water policies in the beginning of the twenty-first century. The Eu is a strong supporter of water pricing; water pricing is seen as a solution for the increasing water demands in the European Union. The water prices should mitigate for the environmental damage that is caused through use and extraction the water. The European Union states that: "*Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such*" (EU, 2000). With this statement the Eu not only declares water a commodified natural resource, but it also gives a special social provisional status to this resource. In the case of water, social sustainability consist of a number of main points. An important social sustainable aspect of the EFWD is the incorporation of public participation. According to the EFWD public participation, it states that is it "*is essential that the process (of economical rationalisation of water projects) is open to the scrutiny of those who will be affected*" (Eu, 2000). The second reason for enforcing public participation is the transparency it offers during the planning process, and thereby forces plans to be environmentally sound due to the ability of self control. Furthermore the water pricing is also seen as an instrument to achieve sustainability. In the case of social sustainability the water pricing is suppose to flatten out social differences as water is seen as a resource that has caused social inequity, with equal water prices this social inequity is to be erased (Eu, 2000).

- National government views & perspectives: For decades the Spanish national government has tried to solve water problems with technocratic measures, giving Spain world leadership on the number of dams with 1200 constructed dams and numerous planned dams (Hispagua, 2006). Since the electional turn of 2004 a more social direction has been taken in water policies, in which technological measures were redeemed and more sustainable water policies were adopted. This also caused a premature death of the original national hydrographical plan, the growth rate of the number of dams to be constructed did not lower however. The liberalisation of the water sector in Spain, which had been initialised by the previous right wing government, was not altered and therefore the liberalisation

process of the water market is still in execution. Water is regarded as an essential tool in development of Spain. Not only for the agriculture but also for city construction and tourism. The national government is most worried to be unable to supply enough water to its main tourism and agricultural areas (the coast line and arid inland agricultural areas). The original national hydrographical plan was a good example of the aims of the government concerning their water policy. The national policy on water also includes and encourages public participation with an advisory role in regional and local water policy processes (MedioAmbiente, 2007). The role of social sustainability in the national government's water policy is limited to the forementioned point as more attention sustainability wise is paid to economical and environmental sustainability, as is posed as a research problem in §1.1. In the planning scheme of water works derived from the Spanish ministry of Environment, only environmental sustainability is depicted in the scheme. The ministry for environmental affairs (MMA in short) published a report in 2007 on strategies for sustainable development, in which social sustainability in general is discussed in a separate chapter (Medio Ambiente 2007b), this chapter has no relevancy however for social sustainability concerning water projects.

- National government cultural history: Due to its dry climate (average of 750mm annually) and its warm and for agriculture profitable climate, water constructions in Spain are as old as civilization in the country. The massive scale on which water constructions have been made in the past has prolonged in the twentieth century to harness and capture as much water as possible for the agriculture and tourism. The national water culture therefore always has had a technocratic foundation. For the national government water planning became important in the nineteenth and twentieth century as larger constructions became interregionally and had to be planned from the top level: the national government. It's policy on water planning has focused in the twentieth century on river basin management. This implies that catchment basins which cross regional boundaries fall under the jurisdiction of the national government. Jurisdiction for regions is only allowed if a catchment basin does not cross the regional boundary (Embid et al., 2007).

- Regional government views & perspectives: Since settlements in Aragon can only exist due to a nearby source of water, water has shaped and still does shape the allocation of human activity, thus placing water in an important position within spatial planning (Lacasa, 2007). For some time the water affairs of Aragon were dealt with from the top level in Madrid, however the administrative decentralisation in 1990 led to the fragmentation of the Spanish planning system which created almost autonomous regions in the field of planning, and creating disparities between provinces. These disparities in economical power and the following abilities to conduct planning have caused tensions between various regions in which water turned into a key element, with Aragon protecting water within its region against misuse by other regions (Navarro / Catalunya). A few stages have led to the contemporary conflictuous situation of planning in Spain, of course with a large influence on contemporary water planning. The three main stages according to Gonzalez-Perez (2007) are:

- *Urban planning versus development (Land use acts 1956 / 1975)*
- *Democracy and administrative decentralization (Land use act 1990)*
- *Land deregulation and commercialization (Land use act 1998)*

From this perspective the Spanish land use planning has shifted within five decades from a centralist planning to regional urban planning (Gonzalez-Perez, 2007). Thus implying a greater freedom for regions to develop their own goals, mainly aimed at urban planning due to urbanised population concentrations. Due to the 1998 land use act, urban expansion may only be projected in an area that has not been environmentally valued before, which is of importance to the water sector. Thus implying that ecological watersystems have a preference above urban development, however only when appointed so by "*extra-municipal or municipal decisions*" (Gonzalez-Perez, 2007).

- Regional government cultural history: The official documents in which water is mentioned are mainly stated in the 2006 "Bases for the water policy in Aragon", a document that according to Embid e.a. (2007), is "*basically influenced by the perspective of water as a natural resource that has to be preserved above all, without prejudice to its use in the service of society*". An important fact hereby is that the jurisdictional power over Aragon's water bodies are in control of the state, leaving Aragon with the responsibility over water supply, sewage treatment, water pricing, diffuse pollution reduction and water ecosystem protection. Aragon also created its own water law in 2001 in which citizens participate through the Water Commission, a body specially constructed by the Aragon Water Institute for participative and consultative planning processes concerning water, and presence of clear information is regulated. This law also led to the 2006 document (Embid e.a., 2007).

- Regional government cultural history: The Aragonese water history is mainly dominated by its early irrigation and high fertility of its agriculture. The second important aspect is the absence of an abundance of water; due to the irrigation and the lack of water, water constructions have dominated Aragon for over 2000 years. Since ancient times the covered distance of the water from the reservoirs or stream to the cities and irrigation areas was so large that only governmental bodies would have been able to construct the necessary infrastructure. Local or regional rulers therefore became connected to the water from early on. During the last centuries the Spanish central government gained more grip on the water situation in Aragon until the end of the twentieth century when the decentralisation of the Spanish government resulted in increased legislative and executive power for Aragon.

3.3 Social sustainable goals set by the Aragonese water management

Before presenting the data for the three projects, the social sustainable goals set by the Aragonese water management (The Water Institute) will be stated here. The laws stated subsequently are derived from the 2006 “*Bases de la política del agua en Aragón*”, which presents the basic policy rules for Aragonese water management. According to Embid et al.(2007) this document “*Is basically influenced by the perspective of water as a natural resource that has to be preserved above all, without prejudice to its use in the service of society*”.

NR 3.2: The Government of Aragon is obliged to do all that is necessary to implement these rules and with the utmost prudence to avoid socio-economic disadvantages.

NR 11: In the execution of hydraulic works, the government of Aragon should keep in mind the present cultural values in the territory, such as monuments, historic places or anthropologically important sites. The government should protect as many cultural, scientific, historic or artistic elements of value in Aragon.

NR 13.2: The management of the water should not aggravate the differences between the more developed and less developed regions.

NR 13.3: The water should be considered as environmental and social assets and it is a basic element for development.

NR 15.5: To increase the efficiency of water usage modernizing infrastructures and applying water pricing and technologies are the best way as they also suppress the exploitation of rivers and aquifers.

NR 19.1: Irrigation is the biggest user of water in Aragon, for which the sustainable usage of water is deeply conditioned by the balance between the irrigation and the protection of the ecology.

NR 103: Mitigation is obligatory for not only quantifiable damage but also for imponderable damage caused by large hydroinfrastructural projects of general interest.

NR 104.1: The law of water states that when a hydraulic work affects the socio-economic municipal equilibrium a project of land use mitigation will be executed.

NR 104.3: The Socio-economic development plans elaboration process of the affected zones should contemplate not only for new projects but also for existing projects along the 20th

NR 105.1: The object of the restitution should be to promote and to support the sustainable development in the affected region, keeping in mind its unique characteristics, the management of its own resources, the environmental deficit and the general needs of the affected region.

NR 105.2: The development plan should not be limited to the execution of infrastructures; but it should be lent the maximum attention to the measures of management, support or formation that turn out to be indispensable for the objective indicated.

NR 106.1: Besides the measures contemplated the following aspects will be kept in mind: Elimination of the barriers that affect the communication routes of the zone affected / Elaboration of an archaeological study for the recovery of materials or objects of interest that could exist in the areas to be flooded / Adoption of a strategy directed to promote the tourism, recreational uses and of fishing of the reservoirs and to facilitate the construction that contribute to invigorate the economy of the zone.

NR 106.2: With relation to the works already executed, is estimated convenient: To Analyze the negative effects produced in the zones to be flooded and to adopt the opportune measures for its economic and social dynamicity / The improvement of the affected communication routes, as well as the possible recovery of the artistic, ethnological, and architectural patrimony or of springs of thermal water affected by the reservoir / To promote the participation of those who will be affected by the measures of territorial clearing by already executed or new reservoirs.

NR 107.2: The commission has to act according to the following priorities or requisites: A) Elaboration on the projection of restitution of the regions and municipalities affected by existing reservoirs. B) The approval of any big new hydraulic infrastructures should be helds simultaneous with the approval of the project of restitution by the Commission, along with certainty of its financing.

In the next chapter the data for this paper will be presented in a chronological order, the data chapter is set up to align with the requirements of political ecology (history / views and perspectives) and contains important events in the field of water as well as three projects which will be scrutinized on their contribution to social sustainability. In the analysis chapter the data will be analysed to find and explain discrepancies between the social sustainable goals set and the social sustainable goals achieved in the three projects. The remaining data is used to support the analysis of the three projects and to place the three projects in their own time frame, leading up to a conclusion on contemporary social sustainable achievability of the Aragonese water management.

4. Data: Main water events and three projects

In this chapter main water events are chronologically described as well as three projects concerning water, with the involvement of the Aragonese government. The chronological description suits better to political ecology, in which history is acknowledged as a determinant for the current situation. The purpose of the projects and their effects will be discussed later in the analysis chapter; the remaining data will support the statements on the projects and the achievements in the realm of social sustainability. Because of the chronology of this chapter it will start with the most ancient known water history.

4.1 Ancient water in Aragon

Because of its strategical position along north-south trade routes and their junction with the Ebro river, settlements have existed even before the roman era. Because of its warm climate and the water provided by the Ebro, yields are high in Aragon, but the water had to be extracted from its main source; the river Ebro. Already in early centuries the Ebro water had to be rerouted in order to secure a steady supply of water for towns and to secure water for the precious agriculture (though there is no direct evidence for irrigational purposes in the roman era). J. Castillo revealed *“72 dams whose construction dates from the first to the fourth century a.d.”* (Arenillas, 2007). Every new kingdom tried to secure its water and constructed their own infrastructure to achieve this, however no major works were created in the middle ages. The Kingdoms mainly used the old infrastructure of the Romans, as the Moors did for example (Arenillas, 2007). An important infrastructural achievement is the Canal Imperial, constructed in 1789 to transport water from upstream Ebro to Zaragoza and more importantly to irrigation areas. The canal imperial must have been one of the first water projects to cross two regions; Aragon and Navarra. Due to this crossregional aspect, plans from earlier centuries could only be executed at first in the eighteenth century.. One could say that building dams and other infrastructure for water retainment or irrigation is native to the Aragon regio. The foundations for the traditional Spanish technocratic water management are mainly derived from the need to retain enough water for citizens and agriculture during the dry seasons. To exert their power, it has always been of importance for Aragonese rulers to secure the water supply to Zaragoza because of its vital role. Or as Arenillas (2007) concludes on the water management of ancient times: *“All these projects reflect a long and continuous process of hydraulic activity, and of water management in Aragon over the centuries. The great Roman works, the smaller but numerous projects of the middle Ages, and the reactivation of the process from the 16th century onwards reflects the ... efforts of the various societies ... in Aragon to overcome a frequently unfavourable climate”*. It can be concluded in ancient times that water equaled power in this dry region, with an annual rainfall of less than 500 mm (Cuadrat et al. 2007) and that in ancient times numerous technocratic projects have been executed in order to secure water supply for the citizens and for the agriculture.

4.2 Expansion of the irrigation system

The construction of the Canal Imperial was the beginning of a new series of dams and other water supply expansions. Due to an increase in water demand for the agriculture, the constructed dams exceeded the height of the Roman dams. Further expansions of the Spanish irrigation system led to the construction of the 1879 Water law, which had to regulate the amount of water for irrigation. Because of the constant need for more water in the ever growing irrigated lands, more and more dams were constructed. In 1902 the first Hydraulic Plan was enacted, which foresaw an irrigated area of 1,5 million hectares, a rise of 500,000 hectares from the moment the plan was drafted (ICID, 2001). According to ICID after the Spanish Civil war the Spanish government took full control over the water resources, as they saw the water as an important asset for economic development. The act of April 21 in 1949 also enabled irrigation plans for less developed areas. This act was the beginning of a faster increasement in irrigation and thus an increase in dam building. For Aragon, dams have always been important for irrigation and preventing floods; in the new act of 1949 dams were planned for the Ebro river and to be more precise the Aragon river, which with a neighbouring river counts for almost 50% of the inflow of the Ebro river. The Yesa dam was therefore constructed in 1960. Due to higher calculated demands of water for the agriculture and for the city of Zaragoza, an expansion of the Yesa reservoir was planned in 1969. The technocratic and rigid water planning at this time encountered heavy resistance from the local citizens against the plan. Due to law suites developments of the plan stagnated for almost 30! years, creating a stalemate and putting more pressure on the water supplies

of Aragón. Another important event occurred in 1985 when a new national water law was created due to changed water demand patterns in Spain. The law was then modified in 1999 due to Spain joining the EU and incorporation of private parties in water development. Another structural change with a major impact was the administrative decentralisation of Spain in 1990, which gave the Regions more autonomy and the possibility to create their own water management. For Aragón this meant an opportunity to control the Ebro water for their agriculture. The decentralisation was only one aspect that has changed since the fall of Franco's nationalist regime in 1975. Due to isolation politics Spain lagged behind the other Western European nations on a number of aspects such as in various infrastructural realms and in socioeconomical content. It has been argued that Spain quickly wanted to recover from their backward position and to be an important world player again (Wiarda, 2000). This idea is still apparent in modern times and this will reflect in the analysis chapter.

4.3 A new paradigm; Zaragoza the water saving city and the Water Commission

An important strategical aspect of the retainment of water for agriculture (most importantly the Barrenas area) already was (and is) the Yesa reservoir, which provides water to important agricultural areas in Aragón with a direct pipeline, as well as providing water to the city of Zaragoza. However with the agriculture consuming approximately 90% of the total water use in Aragón, it is also the expansion of the agricultural sector that is the main engine for water retainment expansion. Because the limits of the Aragonese water system were within reach, an expansion of the Yesa reservoir had been on the political agenda for over 30 years. Due to resistance of the local citizens and numerous law suits, judicial gratification was postponed numerous times until a paradigm shift occurred in the Aragonese water management. In 1997 the Agenda 21 bureau, a European Union driven organisation for sustainability, started a campaign entitled "Zaragoza the water saving city" (Lopez-Moreno, 2002). The campaign was aimed to make citizens aware of their water consumption and to reduce the annual per capita water consumption. Due to the success of this campaign and thanks to the European Water-Zaragoza relation through the LIFE project, a decision was made to run ahead of the oncoming European Water framework directive and to implement sustainability to infrastructural projects. This switch in paradigm had important consequences for the water sector in Aragón; The first important shift was the change from a technocratic perspective on water development to a more holistic approach in order to comply with the theory of sustainability. Technological fixes for problems in the water system were not sufficient anymore as environmental and mostly social aspects had to be taken into account in the water development planning process. The second shift was to move from a hierarchical state driven water management to a water management with a more participatory approach. The latter resulted in the creation of a participatory advisory organ for the Aragonese Water Institute (The Aragonese governmental water management). This advisory organ, the Water commission, consists of members from the most important actors in Aragonese water. Examples are economists, ecologists, citizens and farmers. The thought behind the creation of the commission was to solve complex problems through dialogue and through negotiation, in order to reach a consensus on water developments (Montoya-Hidalgo, 2007). One of the first tasks of this Water commission was to solve the everlasting Yesa reservoir expansion stalemate.

4.4 The first major success: The Yesa reservoir expansion

Original plans were drawn to increase the height of the Yesa dam above the level of the ancient village of Sigües, which could be flooded in case of excess rainfall. For many local citizens this had been their main reason for resistance against the plan. Another aspect was the mitigation for the local residents. On the other side the reservoir expansion not only meant an increase of water retention during the dry season, but also an extra safeguard against floods. Rainfall around Zaragoza is sparse, but in the Pyrenees severe rain showers occur, which have caused many floods in history (For example the Biescas flood). Building dams therefore is not only appreciated for its water retention but in Aragón it is also appreciated for its flood prevention (García Vera). To resolve matters the Water Commission included local citizens in the revision of the Yesa reservoir expansion. When the negotiating had finished the Water Commission had reached an agreement upon the further expansion of the reservoir. Concessions had been made to most prominently the local citizens; Because of shrinking plans of the expansion, no compensatory measures for moving civilians had to be taken anymore, according to Aranda Martín (2007) the final agreement by the Aragón Commission concluded: "*The social cost of flooding the town of Sigües and moving the villagers elsewhere is unacceptable*". However in the new water law is stated that Aragón holds itself responsible for taking compensatory measures for society in case of harmful effects of water infrastructure projects.

Therefore financial and social educational compensatory measures has to be taken to compensate for lost economical assets and for historic losses. Also local programmes have been compromised to integrate measures taken within the whole Yesa action program. In the final agreement, agreements have been made to create a development program for the region (Aranda Martín, 2007) in accordance with the local municipalities. Further there is clearly stated that rational water use has been prioritised, giving way to modern irrigation measures, repairments of leakages and better channeling (Aranda Martín, 2007). Where technocratic water planning had failed for over 30 years, the new Aragonese water management accomplished an agreement within a few years. The participatory planning in a negotiation arena had forced the all relevant actors in the former stalemate to understand each others arguments and brought them closer together to come to an agreement. Though an advisory role was appointed to the Water Commission, the regional government already agreed to adopt the advice of the Water Commission in case of an internal agreement on Yesa.

4.5 The Yesa reservoir expansion; Who is in and who is out?

The Yesa expansion will mainly deliver water to the important Barrenas irrigation plain to the southeast of the artificial lake. The agriculture therefore is the main subcontractor of water and will also be te main contractor of the extra amount of retained water. Efficiency studies on Aragonese agriculture have revealed however that almost 50% reduction in irrigation water consumption can be attained if technological fixes are applied and leakages are fixed. Other users of water are the citizens of Zaragoza and the local industries. A third water user is the Ebro Valley Authority, as an excess of water that is retained in Yesa can be released and sold to thirsty regions. As more water is available to all, the water price will drop, and that will benefit most parties in the region, at least on the short term. Ecologists are worried however that retaining more water at Yesa will damage not only the ecology around the lake but also downstream as the entire Ebro valley will receive less water. According to ecologists and environmentalists the proposed amount of water that legally has to be send through the dam in order to sustain downstream ecology, is not sufficient for the downstream animal and plant life. Though an environmental study (EIA) has been executed for the affected ecology around Yesa and the results showed no significant damage to the local ecosystem (A prerequisite upon which the EU has donated millions of Euros), a study revealed errors in the EIA. The resulting new EIA can endanger the European Union's funding of the Yesa reservoir. Until to date many groups and individuals still oppose to the Yesa reservoir expansion even if an agreement with most of the citizens has been reached. Constructions on the strategical dam have already commenced and if climatological projections are accurate the eastern and southern regions of Spain face a deteriorating amount of accesable water (Cuadrat et al., 2007) and a major increase in water demand, in which the extra amount of retained water at Yesa offers to be a major strategical advantage for Aragon and the Ebro Valley.

4.6 The Ebro water relocation

Not only the Aragonese government was busy planning major water projects around the turn of the century, the national government had already been planning a water relocation from the Ebro to the southern and eastern parts of Spain for decades. The last major plan that should have been executed by the technocratic water regime was the 2001 Ebro water relocation project, which is the main project of the national hydrological plan. Decreasing rainfall, short rivers, booming settlements and an overall increase in water along the Spanish costas was / is an enormous problem concerning the water supply to these regions. The 2001 water relocation encountered heavy resistance from the Ebro valley regions and from environmental groups. The plan contained a pipeline from the Ebro, near the Mediterranean Sea, to supply 6% of the annual flow of Ebro water to Catalunya in the north, Valencia and even further down to the south (US tech, 2003). Because of the economical importance of these areas, the national goverment was very keen on executing such a project. Besides tourism the agricultural grounds in the south and east also are of a big economical importance, a cost benefit analysis also proved profitable (US tech, 2003). Due to suspected swindle mainly on the environmental data provision, Aragon and other regions filled up the information distribution gap and finally drew their own reports, revealing a large gap between costs and benefits and also detecting uncaredful handling in estimating water prices for the transported water (Tortajada, 2006). Another mistake was made in the investigation of the Ebro Delta, a unique habitat; a statement in the national hydrographical plan declares that environmental conditions in the delta are not allowed to become worse. Environmentalists, ecologists and civil groups proved this statement wrong and revealed pessimistic data on the impact of the water relocation on downstream regions. To release the pressure

on the environmental impact of the plan, the government had already incorporated cleaning up programs for the polluted Ebro and several other guarantees and programs to at least keep the ecology on the same level. Due to the forementioned errors in the environmental impact assesment of the Delta, the environmentalists had already turned their backs against the national government. Though the resistance from the environmentalists alone was somewhat powerless, in combination with the protests from an other actors it proved otherwise. Hundreds of thousands of people protested against the national hydrographical plan in several cities, with an estimated 250,000 people protesting against the plans in Zaragoza. Another blow for the right wing government came from the EU as because of the high costs of the project, the government was forced to report to the EU, which finally decided based upon the EU Water Framework Directive that the economical costs were too high (LambertEU, 2003 / Biswas & Tortajada, 2003). This was a blow for the national water management, but after this defeat it was announced that in the future it would be inevitable that a water relocation to the east and south would be constructed. Valencia already encountered problems with the water supply; it took only a few years before constructions for a new neighbourhood had to be cancelled due to the inadequate guarantee of the local government to be able to provide enough water for the housing. The socialist Government which took over after the national elections (many people claim the national hydrographical plan was the cause of the right wing loss), immediately announced the halt of the water relocation plans. They also claim however that it is inevitable in the future that a water relocation has to be made from the Ebro to the eastern and southern parts of Spain. If this project is to be completed in a social sustainable way, the first parts of the planning process should include more participation than in the case of the 2001 Ebro water relocation.

4.7 The Ebro water relocation: Who is in and who is out?

Because of the contribution of the tourist regions along the Spanish coast, to the national economy and the importance of the local agriculture, the Ebro water relocation serves an important economical purpose. Als the scale of the water problems split amongst several regions, requires the intervention of the national government, as the national government is the only governmental body that can deal with massive projects of this scale. Clearly the people, agriculture, tourism industry and other actors along the Spanish Costas and in the Eastern part of Spain will gain from this project if it were to be executed. Though compensatory measures for the purification of the entire Ebro river had been promised by the government, the people of Aragon and other Ebro Valley regions protested against the increased economical division; the Eastern part of Spain is already one of the richest parts of Spain. Assisting in the enrichment of these areas by means of water delivery from the poorer region of Aragon and others would result in an aggravated division of wealth. This is exactly according to water law §13.2 that states that (economical) differences between developed and less developed regions are not to be aggravated. Another aspect of aggravating social differences in this case is the funding of the project; most of the money was to be paid by the national government. The EU funding was cancelled due to an incomplete EIA performed by the government. The EIA underestimated the impact of the water relocation on the precious Ebro delta downstream. According to Tortajada (2006): *“The Plan also did not consider any of the impacts that such a large water transfer would have on the Ebro Delta in terms of biodiversity, wetlands, ecological flow, and expected changes in land use”*. Other researches on down stream implications were negative about the outcomes if the plan had succeeded (PIPDE, 2006). Some ecologists even claim that the Yesa dam is expanded to supply enough water in case of the Ebro water relocation (Yesano, 2009). Because of the early expansion plans of Yesa and the water relocation plan being drafted decades later this seems chronologically incorrect. A suggestion from Aragon and the other Ebro valley regions to the regions affected by the halt of the relocation plan was to invest in new technologies and to reduce their water consumption. For the national government it is of importance to include more actors into the planning proces and not solely rely on technical data, nor let technical teams give advice for social problems.

4.8 Expo 2008; Aragon as an innovative and world leading water manager

The Expo 2008 presenting “Water and sustainable development” as theme has been held in the Aragonese capital of Zaragoza. Concerning the project not merely it’s physical form as a project that matters to social sustainability and water, but also it’s educational and promotional form matter. Zaragoza was not unfamiliar with water projects aimed at sustainable water development as in 1997 the project “Zaragoza the water saving city” was launched, due to this EU encouraged project (through Agenda 21 & LIFE), the annual per capita water consumption dropped significantly. Citizens were

taught the importance of water and its meaning as a scarce natural resource. This educational element proved such a success that the educational aspect was prolonged to the Expo.

The Expo 2008 is not only a world Expo and business attractor for Aragón, but it's also a platform to promote the self-proclaimed leading role Aragón has in the field of water and sustainable development. To promote their water paradigm, fora have been constructed at the Expo site as well as meetings and debates; follow-up meetings have been scheduled to constructively add a framework to solve various water problems. The Expo is mainly constructed on barren land, which gave an advantage in justifying the location for the Expo, as only ecologists and environmental groups appreciate the former Ranillas meander in the Ebro river for its thicket. Another aspect is that the inhabitants of Zaragoza value park land more than barren land, as artificially constructed nature is seen as to be appreciated and safe for recreation. This has caused the local inhabitants to barely appreciate the former barren land and thus not opposing the land claim of the Expo 2008. The territorial claim of the Expo goes beyond the demarcated Expo terrain as a dam has been constructed in the Ebro river to allow boats to transport people from the city center to the Expo terrain; as without a dam the water levels in this time of the year (summer) do not allow boats to navigate the Ebro. The Expo construction is accompanied by a large infrastructural upgrade of the main roads leading into Zaragoza and of modernizing the rail infrastructure. Though according to the manager of the Expo, Francisco Pellicer, the Expo has nothing to do with the infrastructural upgrading of Zaragoza. Politically the Expo encountered mediocre opposition as the Expo fits in perfectly with the Aragonese strategy of self-promotion. The financing of the infrastructure and of the Expo displays an array of public and private investors with the main investors being the EU, the national government and above all the Aragonese government. Though public-private partnerships are encouraged for the Expo, the share of private investment is well below the share of the public investments. The regional government has calculated the settlement of external businesses due to the Expo as very profitable, and additionally the Expo terrain will host businesses after the Expo. The gains therefore flow back to the businesses as well as to the Aragonese government, and according to the government, these gains will indirectly flow back to the people of the city as the money raised will be expended on social projects in the city. The government therefore did not intend to execute any compensatory measures for the affected people. A number of citizen groups are skeptical about this governmental promise and fear the money raised will only be spent on attracting more businesses and therefore demand a financial compensation. Other citizen groups are opposed to the plans as they feared the Expo would cause substantial noise pollution to their neighbourhood (Actur area) as the Expo would attract about 8 million visitors in 3 months. To minimize opposition and to maximize the idea of sustainable development the managerial framework for the Expo included citizen participation in numerous aspects. Examples are inclusion of citizens in the execution of the plans for the Expo and the inclusion of citizens' designs for the Expo (Candidature book, 2004). Another group of mainly conservative citizens opposing the Expo were largely ignored by the Aragonese government as well as environmentalists. The claim that the Expo imposed unnecessary constructions, waste of material and claiming land were not taken seriously as Expo protagonists declared that the environmentalists are only opposed to development (Pellicer interview). Furthermore the Expo itself displays water as a natural resource that is and will be harnessed by the authorities.

4.9 Water pricing in Aragón

An important aspect of the water management in Aragón and in Spain in general are the subsidies for water usage. The water prices for the agriculture are therefore extremely low, which has caused the water consumption patterns for the agriculture to rise massively. It has also caused the agriculture not to pay attention anymore to leakages and other water-saving measures. With the eastern European member states joining the EU, Spain fears it will lose its EU subsidies. Water prices for the agriculture will therefore raise and will affect the Spanish agriculture. Water for agricultural purposes is of major importance to Spain, as Bakker (2001, p767) states: *"State-led development of water resources was a key element of Spain's modernisation drive in the mid-20th century, intended to redress not only the high degree of temporal and spatial variation in water availability, but also to underpin the agricultural colonisation of the country's arid interior"*. The change for national water policies came in 1999 with the change of the Spanish water law that invited more market policies to be applied to the water sector (Bakker, 2001). For Aragón the water market issues have been clearly stated in the 2006 *"Bases de la política del agua en Aragón"*, which mentions under point 15.5 that "to increase the efficiency of water use, modernizing the infrastructure, applying new technologies and to apply water pricing are the best form of water resource protection and to suppress the exploitation of rivers and aquifers". The

application of water pricing in the future in Aragón reflects the focus of the Aragonese water management on sustainability and in particular the environmental and economical spheres of sustainability. On the environmental part it is believed that applying water pricing will lead to higher prices and therefore less consumption of water, which reallocates water to ecological purposes. On the economical side, water pricing will operate through market mechanisms and will therefore lead to a higher efficiency of water usage. The social sustainable aspect of water pricing is largely ignored by the Aragonese water management as resolving the spatial variability (relocation of water from wet to dry areas) of water is not mentioned in the 2006 "*Bases de la política del agua en Aragón*".

In order to link the previously described events to social sustainable goal achievement by the Aragonese water management, an analysis will be performed in order to search answers for the research questions. The analysis will incorporate this data chapter, the conceptual framework with its sustainability theory and political ecology, the background chapter and first the comparison between social sustainable goal setting and social sustainable goal achieving.

5. Analysis

In this chapter the discrepancies between the social sustainable goals set by the Aragonese water management as in §3.3 will be compared with the outcome of the social sustainable goals achieved by the Aragonese water management §4, and will be analysed and explained through the conceptual framework §2.4 according to political ecology §2.2, which includes the backgrounds of the actors §3.2 and the history of Aragonese water management and Aragonese politics §4. Because political ecology is a deep level analysis of events, actors and history; a pointwise comparison between the social sustainable goals set and the social sustainable goals achieved is not recommended. Instead the analysis of the projects will be split into two parts. The first part checking for discrepancies between the social sustainable goals set (the laws §3.3) and the social sustainable goals achieved (data §4). In the latter the whole project will be analysed.

5.1 The Yesa project comparison

The Yesa reservoir has existed since the 1960's and has been an object of argument ever since. Due to the imposed expansion of the reservoir citizen protest flared until the paradigm shift of the Aragonese authority in the 21st century. The expansion plans have been halted for decades due to law suits filed by citizens and organisations opposing the reservoir expansion. If the expansion had such an urgency to be executed in order to secure Aragonese drinking water, it would already have been constructed. Even now the need for the reservoir expansion is questioned. Studies have shown that the main contractor for Aragonese water is the Aragonese agriculture (uses 90% of the water), studies also revealed that with new technologies and leakage repair 50% of the agricultural water use can be saved. This means that 45% of the annual Aragonese water consumption can be saved. Further there is clearly stated that rational water use has been prioritized, giving way to modern irrigation measures repairs of leakages and better channeling (Aranda Martín, 2007). If this is the case an expansion of the Yesa reservoir is not necessary for the upcoming years. As law 15.5 states technological fixes are advised to be applied in the agriculture, law 16.1 states on top of that that the irrigation should be applied sustainably regarding ecological protection. Sustainable water use by the Aragonese agriculture would imply technological fixes over the Yesa reservoir expansion, as the expansion puts more pressure on the environment, is worse for the ecological protection, is economically less viable and is socially more damaging. Understanding the choice for reservoir expansion therefore has to be understood in a wider context, which will be dealt with later in this analysis chapter. A statement of the Aragonese government which is repeated numerous times is to pay the debts to society concerning the construction of large hydro projects. If this is to be applied to Yesa, the government should have repaid the citizens affected by the early construction of the Yesa dam, people who had to move out of their town because it was to be flooded, with something that would support sustainable development. For the current execution of the revised plans for the Yesa reservoir expansion compensatory measures for land use did not have to be executed according to the government, the implementation of action programs to make citizens aware is however to be done. The Yesa project is currently halted during construction (feb 2009) due to irregularities in the impact assessments. That constructions have started in the beginning of the 21st century is due to the efforts made by the Aragonese water managements in applying their new laws to their policy and allowing for citizen participation. The main cause for the halt of the project previously, the local citizens and environmental groups, have participated in the process and therefore a satisfying solution has been found for all parties. The new proposal to lower the height of the dam and therefore spare the historically important city of Sigües is in line with law 11 of the waterplan. No intentions have been made however to restore the debts made by the original construction of the Yesa dam. The social conditional differences between the north (poor) and center (rich Zaragoza) will be further put under pressure by this expansion as the retained water will not only serve the agriculture but it will also help Zaragoza develop, as securing water is a precondition for developing business terrains in Aragon. Also the expansion of the dam and retaining more water can have environmental impacts on the long term that are not calculated. With the connection between the environment and the social side as well as the economical side of sustainability in mind, projects of this scale can have unsuspected effects on the long term for the socio-economical and socio-environmental equilibrium. Social disadvantages can occur due to the construction of such a large and irreversible project.

5.2 The Yesa project analysis

The expansion of the Yesa dam is a result of the desire of the ChdE and mostly the Aragonese water management to expand the water reservoir capacity for the agriculture (§4.5). Reasons for the expansion are based upon precipitation trends for the upcoming future, in which Aragon will experience less but more intense rainfall (§3.1). The Yesa reservoir expansion will retain more water as a compensation for the lesser rainfall and it will provide a safeguard against more intense rainfall which otherwise can cause floods, and on top of that it will enable the distribution of water from the area with the most rainfall in Aragon to the area with the least rainfall. The technocratic approach taken in the past by the Aragonese government created a decades long stalemate due to opposition from citizen and environmental groups. Due to a change in paradigm towards sustainable development and active actor participation, the creation of the Water commission in this case, a solution was found among the actors for the expansion of the Yesa reservoir (§4.5). For the Aragonese people it is important to have a say in water affairs; now they have their say in the Water commission and the fact that the Aragonese government listened to the complaints of the citizens, which resulted in a lowering of the proposed dam height, diminished the opposition against the reservoir expansion tremendously. The remaining opposition is mainly of environmental and ecological nature, as the reasons for the social aspects seem to have faded with the input of the citizen inclusion in the Water commission, and thereby dissolving the citizen-environmentalist alliance which had caused so much delay for the expansion (§4.5). However, when analysing the social outcome of the project and comparing it with the social sustainable goals set by the Aragonese water management in the 2006 *“Bases de la política del agua en Aragón”* a number of goals have not been adequately dealt with or some important points strike out. First of all the citizen participation in the Yesa reservoir expansion consists of an advisory role in the Water commission (§4.3). Documents produced by the Water commission are not to be ignored in the political arena, but they are not binding, imposing a freedom for the Aragonese government to approve or discard the advice and thereby ignoring the citizens contribution in the policy process. Another point of concern is the mitigation promised in the 2006 *“Bases de la política del agua en Aragón”*. Mitigation programs are mainly focused on educating the local people on water matters. A law refers to the fact that mitigation should support sustainable development, it is the question in who's favor this mitigation in the form of education programs will be. Overall the reservoir expansion will favour the people of Zaragoza and mostly the agriculture (§4.3), for the local people however the negative effects stand out. Considering the fact that these are among the poorest people of the region, financial mitigation should be of priority as this is a logical matter of avoiding aggravation of socio economical differences between the local people affected by the Yesa dam and the citizens of Zaragoza. In the current situation the water flows from the poor region to the rich region, Yesa to Zaragoza, and so is the money. In case of social sustainability it should be attempted to shrink the gap of socio economical differences instead of aggravating the gap. The last point relates to the project itself; the necessity of the reservoir expansion can be questioned. As revealed in the data chapter the agriculture is the main contractor of water, with technological applications and fixing leakages a water consumption reduction of 50% can be achieved for irrigation. This can save almost half of the total annual water consumption of Aragon! Even more when taking into account the fact that the Ebro valley is not unwilling to sell water to other regions (§3.3) it can be severely questioned if the reservoir expansion is necessary and also if the focus on water scarcity (Zaragoza, the water saving city) in the public sector is a real water scarcity. As explained in (§2.2) the artificially constructed immanence or threat of water scarcity can enable governments to have more striking power in executing technocratic works, especially in combination of water pricing, as will be introduced in Aragon (§4.9), and it will lead to a commodification of water, which is directly opposite to the statement of the Aragonese water management that water is a natural resource that has to be protected.

5.3 Ebro water relocation comparison

In this comparison it is of importance to focus on the Aragonese government as the main question of this paper refers to the social sustainable goal setting and achieving of the Aragonese government. This can not be done through political ecology if all the backgrounds of the actors and the background of the project itself are not taken into account. The Ebro water relocation is the most important part of the National hydrographical plan presented by the Spanish national government at the end of the twentieth century. For long it has been a question how to provide water to the dry, but relatively rich, eastern and southern part of Spain and to Barcelona (§3.1). Relocating water from the Ebro to these dry regions would solve most immediate water supply problems in the dry areas and provide for further

growth in the future. Besides the environmental aspect of sustainability it are mostly the social sustainable side, the economical sustainable side and the socio-economical side of sustainability that have been of most interest of Aragon in this project. Early on Aragon claimed that relocating water to these 'rich' regions would further aggravate the socio-economical differences between these 'rich' regions and the poorer region of Aragon (§4.6). That fact and the claim of Aragon that the relocated water was 'their' water resulted in public pressure from within Aragon, which culminated in the 2001 mass demonstration against the National Hydrographical plan in Zaragoza. Aragon has invested a lot of money in previous years in the purification of the Ebro water and more investments in water purification are planned in the near future. If Ebro water was to be relocated further downstream, the richer receiving regions would indirectly profit from Aragon's purification facilities, and therefore socio-economical differences would be even further aggravated. After the rejection of the National Hydrographical Plan the eastern regions of Spain, Valencia immediately felt the pain of the rejection as the area suffered from a drought. Mainly the agriculture of the eastern regions was affected by this drought. Aragon stated that it was important for the affected regions that they invest in technologies and other water saving programs, including raising the awareness of citizens on their water consumption, just as Zaragoza performed in the 1997 "Water saving city" project (§4.3). Aragon proved in the Ebro water relocation project that mobilising society is a powerful tool to influence politics; moreover Aragon proved that it was able to mobilise and influence its own citizens when it comes down to the water theme (§4.7). The national government blew off the National Hydrographical Plan this time, but it also warned that a water relocation is inevitable in the future (§4.6).; time will tell if Aragon wants to and can mobilise its citizens again if the time is there.

5.4 Ebro water relocation analysis

As stated in §4.6, decreasing rainfall, short rivers, booming settlements and an overall increase in water along the Spanish costas was / is an enormous problem concerning the water supply to the eastern and southern part of Spain and to Barcelona. The immanency of water shortage convinced the then right-wing national government of Spain to seek the solution in constructing water relocation infrastructure from the Ebro river to these dry parts of Spain, a reaction precisely expected according to Swyngedouw (§2.2). This National Hydrographical Plan was later on disapproved by the new government for its negative impacts on the environmental, miscalculation of the costs, and for the mass demonstrations against the Plan. Sustainability was not a key factor in the designs, this can be confirmed by looking at the different aspects of sustainability and especially at the social aspect of sustainability. The claim of Aragon that it had invested a lot in water purification infrastructure and that the receiving regions would profit from the Aragonese purification efforts would cause an aggravation of the socio-economic circumstances between the poor Aragon and the rich receiving regions. The pact of Aragon, the environmental groups and the mobilised civilians against the national government seems to be directed at the same goal at first hand. An important aspect however is the way the Aragonese government has used water in this case; water has not been treated as a natural resource but as a commodified good; the claim of Aragon that the Ebro water is also their water implies that the Ebro water is a possession owned by the Ebro Valley regions and therefore withdraws water out of its socio-environmental realm (§2.2). Swyngedouw warns about the detraction of water from the socio-environmental realm: *"Blurring the socio-environmental process of their production by foregrounding their character as universally exchangeable for anything else becomes an amazingly powerful mechanism"* (§2.2). Aragon has misused water (as in opposite to social sustainable behaviour) in this case as an exchangeable commodity not to seek immediate profit from it, but to place water as a commodified export good in a trading position against the economic wealth of the receiving regions. With the national government's statement that a water relocation from the Ebro to the dry parts is inevitable in the future, the fact that Aragon (and others) have blocked the previous attempt of the relocation, and the use by Aragon of water as an exchangeable or commodified good, will all contribute to Aragon having a good bargaining position for the future when it comes to an Ebro water relocation.

5.5 Expo 2008 comparison

Positive vibes from the LIFE-project (part of the EU) from the 1997 "Zaragoza, the water saving city" led to the candidature of Zaragoza for the world expo in 2008 (§4.3). The Expo 2008 "Water and sustainable development" not only set standards for water and sustainable development worldwide, but it also set standards for the execution of the Expo 2008 process itself. Hence the plans were aimed at constructing a sustainable Expo in economical, environmental and in a social way. In this case the analysis will focus once again on the socio-economical and socio-environmental aspects.

The educational aspect of the Expo 2008 stands out among other aspects as education on water is widespread, also among the citizens of Zaragoza. It is also the citizens who will profit from the new parks along the Ebro and the new infrastructure in the city. It are the citizens of Zaragoza that value parkland above natural lands (§3.2), therefore the terrain is a positive gain socio-environmentally. But this profit for the citizens can turn out to be illusive as a part of the costs are drawn from Aragonese funding, but the profits will turn back to the government (more businesses attracted). This can bring a skewness from the contemporary socio-economical balance of the city. Financial mitigation for the people living next to the terrain is not incorporated in the Expo project as the housing will raise in value due to the Expo developments (§4.8). The formerly barren lands on which the Expo is situated therefore do not require any mitigations to be made to the social aspects of sustainability. The financial construction of the Expo also lessens the socio-economic costs for Aragon as much funding is raised from elsewhere (National government / EU). Another disappointment for the citizens can relate to the promises done by the Aragonese government that a part of the financial inflow will be spent on social projects in the city. Skepticism is widespread among the people and the public opinion (§3.2) as political promises always pose a risk if executed. Citizen participation in the project and in the design of the Expo was clearly present, but it seemed that the Expo only invited citizen groups that were positive towards the Expo; other citizen groups and environmental groups claim they have been largely ignored. Sustainability requires all actors to join in in order to come to a sustainable solution (§3.2), in this case opposite groups have been ignored, therefore the end product is not entirely a sustainable product.

5.6 Expo 2008 Analysis

The world Expo 2008 was a profitable project for Aragon in a commercial sense; not only did the Expo attract people from all over the world and is the Aragonese sustainable approach exported over the world, the Expo also attracted businesses for Aragon. To be succesful in its mission the Expo had to be designed sustainable itself. While the economical side of the project was clear, its environmental and social side were less clear. The ignorance of certain groups in the process previous to the Expo is opposite to the idea of sustainability were all groups, no matter their opinion, have to come to a solution which satisfies everyone. This relates to the statement of Embid (2007) and Lacasa (2007) in §3.2 on the aims of the Aragonese water institute:

- *“Responsibility for the constitution of the forum of debate and meeting place of all stakeholders in water policy; with the aim of achieving minimal proposals and of correcting the lack of representation of some of the parties in other organisms that deal with water”*

Because of the prominence of the water aspect in the Expo 2008 and the theme of sustainability participation of all the actors is a requirement for sustainable development. While the Expo paid attention to the connection between the social side and water, water itself was taken outside its socio-environmental realm with the applicable technological fixes (§2.2) being displayed at the Expo (The Torre dela gua for example). It is this focus on technological fixes that points out the difficulty of switching from a previously technocratic water management towards a sustainable management of natural resources. In this case it was also the question what sustainability is; perhaps sustainable use of water would have been a better theme than water and sustainable development.

5.7 Aragonese water management analysis

Where the previous analyses of the three projects have shown the discrepancies between social sustainable goal setting and social sustainable goal achieving in the Aragonese water management, this paragraph will deal with the explanation of the failure of attaining some of the social sustainable goals and thereby gives a deeper level analysis according to political ecology. The Aragonese water management in the early 21th century regarding social sustainability can be summarized when scrutinizing the discrepancies between social sustainable goal setting and social sustainable goal achieving in the three analysed water related projects and thereby incorporating the actor's cultural history, views and perspectives on water, the geographical backgrounds and the theory on social power and water (§2.3). The roles played by the Aragonese water management in the three projects is as versatile as the motives for behaviour; in the Yesa project the Aragonese water management desires to retain natural resources and therefore has a clear constructive and technocratic role (§5.2); in the Ebro water relocation the Aragonese water management tries to prevent unsustainable use of the natural resource water (although commodified by the Aragonese government itself) and therefore plays a role of sustainability defender (§5.4); in the Expo 2008 project the Aragonese water management tries to promote its sustainable water ideas with a clear economic motive and therefore

plays an active role in inducing sustainable water development (§5.6). What links these projects together is a strategical use of sustainability for tactical purposes and giving a twist to the contents of sustainability itself. What will be revealed in this analysis is that the strategical use of sustainability for tactical purposes is the reason for not achieving a number of social sustainable goals. The necessity of the Yesa reservoir expansion has already been questioned, the Yesa reservoir expansion therefore is a good example of a technologic fix to an artificially made drought (§2.2/§5.1). When the equilibrium between water use and water availability is distorted one option is to go for technological fixes in order to restore the balance in favour of the water availability. The inducement that water pricing is the most efficient way to manage water and water scarcity (§3.3) gives the Aragonese water management more power in order to execute the expansion of their water retainment facilities. According to neoliberal market practices the commodified water *“takes attention away from the political nature of ‘scarcity’, as socially and politically “produced” and focuses instead on the available technological fixes”* (§3.3, Swyngedouw, 2005). In the case of Aragon the focus is indeed more on the available technological fixes rather than on reducing water consumption of the agriculture, which is the main contractor for water with 90% of the annual Aragonese water consumption (§5.1). Though it seems that the Aragonese water management has shifted from a technocratical paradigm to a sustainable paradigm, it are still the same technologically educated people that run the shop. The difficulty in changing from a technocratic regime to a sustainable regime is not only reflected in the Yesa case but also in the other cases; The Expo was to be a display of sustainable development and sustainable water use but instead it focused a lot on the technological fixes of water supply shortages. The reduce in per capita annual water consumption of the citizens in Zaragoza in 1997 seems to be a nice achievement, but the reduce in per capita annual water consumption is only a very small part of the total annual water consumption of Aragon. Making people aware of the importance of water is necessary, but it distracts the attention from the big water user: the agriculture. The commodification of water also takes water out of the socio-economic and socio-environmental realm (§5.4) and places it into the realm of economics as water is now regarded as a product (§2.2). A product that in the case of Aragon is used as a bargaining tool as can be witnessed in the Ebro water relocation program, where water is used to negotiate for the economical position of Aragon compared to the economical position of the other rich receiving regions (§5.4). This step takes water completely out of its social and natural realm, as the moral obligation of the sending regions towards the receiving regions is one of social interest. It is also the case that when water pricing is applied (§4.9), it are the poor citizens of Aragon that are paying the fee for the increased water prices. As Kaika showed in her case of Athens (§2.2), higher water prices caused the poor to decrease their water consumption because they had no choice. It appeared that the rich were still using their normal amount of water. In terms of social sustainability water pricing can indeed resolve the supply and demand equilibrium but it are the poor who will eventually pay the price. The same goes for the water relocation programs for the Ebro water but then on a national scale; it is the poorer region of Aragon that is not only losing its water but the poorer citizens indirectly also pay for the water infrastructures. In Aragon that is the case for the people near Yesa and all other water facilities that pay the price for infrastructural works that they can and will not profit from.

6. Conclusion and recommendations

This chapter will give answers to both main research questions (§1.3):

“What are conflicts between social sustainable goal setting and attaining on one side, and actor’s views, perspectives and cultural history on the other side, through the investigation of three water projects in Aragon, and how can this be understood through the use of political ecology?” and:

“Which recommendations can be given to water managements in general concerning the lessons learned from the three projects in Aragon on problems between social sustainable goal setting and actors properties?”.

At first the answer to the first research question will be given using the analysis chapter (§5.7) and the theory chapters (§2.x), then the second research question will be answered using the conclusion of the first main question and the theory chapters. Furthermore implications for the theory of social power & water will be stated.

First of all it is important to establish that there are discrepancies between social sustainable goal setting and social sustainable goal achieving (§5.7). The cases of Yesa, the Ebro water relocation and the Expo are proof of that, furthermore the cause of these discrepancies vary per social sustainable goal that has not passed achievement. For a number of the discrepancies the reason is that the government is not able yet to execute sustainable policies as the sudden paradigm switch has not given the people responsible for executing policies to make a mind shift from the technocratic mindset to a more sustainable mindset. It are still the technically educated people that execute the water policies in Aragon. It is in the very water culture of Spain (§3.2) itself and the geographical background of the Spanish and Aragonese territory (§3.1 / (§3.2)) along with its climate that technocratic water management has thrived over the centuries, and it is this technocratic water management that has caused prosperity for the Spanish lands since the Roman era onwards. But it is also this technocratic base that hampers the progress of sustainability as often a technocratic solution is sought when a sustainable solution is apparent (§5.7). This is the case for example with the Yesa reservoir expansion where a sustainable use of water by the agricultural sector should be preferred in case of sustainability, above the expansion of the Yesa reservoir. Another conflict between social sustainable goals setting and achieving is in case of the water pricing. It is believed that water pricing will make water use more efficient, while in practice as Kaika (§2.2) has shown, that implementing water pricing is often a way to building more dams and other water infrastructures. The need to implement water pricing lies within the Spanish history and also the one of Aragon; during the Franco Era Spain lagged behind the other European countries due to economic sanctions. After the Franco regime Spain had to make up ground compared to the Western European countries, this process is still going on and according Bakker this process also explains the need that is felt in Spain and Aragon to apply neo-liberal market strategies, including water pricing (§4.9). Another point is the fact that the goals for mitigation are hard to achieve, this can also be seen in the execution of the mitigation programs for the three projects, only educational programs have been executed while financial and land compensation are often ignored or redeemed inappropriate. It seems that these goals are not only hard to achieve, but it also seems strict guidelines for executing this mitigation policies are lacking. It is very important for social sustainability that mitigation for affected actors exists, as mitigation is an important aspect in the negotiation between actors previous to the project execution trail (§2.1). None of the previously mentioned points could be made possible without the most important aspect of the Aragonese water management; water is not viewed, placed in perspective or valued as a natural resource but as a commodified good that is universally exchangeable (§2.2 / §5.4). This became most apparent in the project the Aragonese water management was not directly involved in; the Ebro water relocation. To relate back to the main question (§1.3): *“What are conflicts between social sustainable goal setting and attaining on one side, and actor’s views, perspectives and cultural history on the other side, through the investigation of three water projects in Aragon, and how can this be understood through the use of political ecology?”* The three water related projects have all added a different insight into the entire water commodification process that contradicts social sustainability. The Aragonese water management was not reluctant to use water as a bargaining tool to improve its own relatively poor socio-economical position compared to the rich receiving regions of the water relocation. It is speculative if the expansion of the Yesa reservoir is a strategical project in combination with the oncoming water pricing. However it is apparent that the commodification of water by the Aragonese water management and the withdrawal of water from the socio-environmental realm as seen in for example the Expo 2008 and the Ebro water relocation is an enormous contradiction to sustainability, to social sustainability and to the phrase stated by the Aragonese water management that water is a natural resource that is to be protected and to be preserved for future generations (§2.2

/ §3.3). It is the commodification of water and the withdrawal of water from the socio-environmental realm that is the root cause of the application of technological fixes (Yesa), artificial creation of drought (which leads to more technological fixes and feedbacks to commodification of water) and socio-economical and socio-environmental aggravation between the poor and rich.

With the conclusions in the previous chapter, recommendations can be given as stated according to the second main research question: *“Which recommendations can be given to water managements in general concerning the lessons learned from the three projects in Aragón on problems between social sustainable goal setting and actors properties?”*. Attaining social sustainable goals is twofold. The first point is the setting of the social sustainable goals. In the example of Aragón a number of goals have been set too optimistically and unrealistically. Unattainable goals will never be reached, therefore it is important to set realistic goals. Technocratic educated staff can not change into a staff with a sustainable mindset over a few years, therefore it would be wise to set modest social sustainable goals in the first decade of a new sustainable development paradigm. The second point concerns to water as a socially constructing natural resource and the root causes identified in the conclusion chapter. To evade running into discrepancies between social sustainable goal setting and social sustainable goal achieving the root causes; commodification of water and extraction of water from the socio-environmental realm, have to be prevented from occurring as the three projects and the theoretical literature (§2.2) show the implications of these root causes on attaining social sustainable goals. For the commodification of water is concerned, this depends for a large part on the artificially constructed droughts which enable the commodification of water and therefore leads to applying more technological fixes and socio-environmental differences and looping back to more artificially created droughts. To break this spell social sustainability is an excellent solution, but only when applied well. This implies truly executing social sustainable goals in water projects, with a focus on diminishing water use and increasing water use efficiency. A major issue is the 1990 decentralisation of the power over water in Spain. To set up a framework for social sustainable achievements in water projects the national government or the European Union should set up a strict framework in which to operate. This can alleviate the competence among regions over water and it can also prevent the regions from using water as a bargaining tool, therefore preventing water to be commodified. I therefore recommend setting up national frameworks or a European framework for sustainable goal setting concerning water projects, where one authority sets up rules that cover multiple watersheds and multiple nations to prevent an array of competing water bodies and therefore to prevent water from being commodified. The second recommendation is to apply strict sustainable rules to water usage; this will help alleviate the pressure on the water system, reduce technological fixes and looping back to better sustainable goal achieving and a less technocratic water management.

This research confirms the theories on social power and water as from the examples set in the theories chapter mostly all have shown their relevancy in a comparison with Aragón. In my opinion these examples are relevant for most cities or regions in the Western world where the water demand overrates the water supply and governments feel they have to implement technological fixes to water supply problems. For researching sustainability issues concerning cities and regions political ecology has proven to be valuable in explaining phenomena and perhaps even in forecasting phenomena. Above all political ecology has proven to be valuable in explaining phenomena concerning social issues; as McCool and Stankey already stated determining and examining social sustainability is hard due to its very own nature. Political ecology has proven to possess the ability to describe social phenomena on its own level. Furthermore political ecology is capable of dealing with the complexity that comes with water affairs, social sustainability and the political arena as most of the aspects influencing processes and policies are taken into the scrutinization. The only negative aspect is the disability of referencing or checking political agreements made behind closed doors in a scientific manner, and therefore the end results slightly diminish in credibility.

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Figure 2.2: Grindle, M. and Thomas, J. (1990) 'After the Decision: Implementing Policy Reforms in Developing Countries'. *World Development*. Vol. 18 (8).

Figure 3.1: Yesa edited in picture