Governance Values of Water Systems in The Netherlands and India

Jacko van Ast, Jan Jaap Bouma, Mansee Bal

Department of Public Administration, Faculty of Social Sciences
Erasmus University, Rotterdam, The Netherlands
vanast@fsw.eur.nl, bouma@fsw.eur.nl, bal@fsw.eur.nl

Abstract
One of the ongoing discussions on water governance is about the revival of the old river and lake systems as the physical and social urban infrastructure. These water systems are proving to be the connectors in the societal development today as they did in the times of old and traditional water management practices. Rivers and lakes have always had different social, ecological and economical values at different periods of societal developments. Still there is limited understanding of how the water systems are progressively linked to changing social systems and how upward and downward causation linkages occur within the social systems as well as across diverse sectors and scales of the social systems. The focus of this paper is on the changes that happen at the interface of social systems and water systems, and the impacts of changes in value systems. The paper draws examples of governance of water systems i.e. river and lake systems of the Netherlands and India, and explores the implications of its changes and impacts.

Introduction

During history, water bodies like rivers and lakes provided many important functions for human societies. Also in modern history economical, social and ecological demands are satisfied by water systems. Of the many functions, especially the use as waste collector had a huge impact on the ability of the water system to fulfil the many functions that are depending on water with a high quality. Since water systems with low quality water have significantly less of different types of value than healthy water systems have, the water bodies in many urbanizing area's are strongly reduced in their total value for society.

At the end of the twentieth century on a worldwide scale, a major shift took place in thinking about water management. Technology appeared to be able to clean waste water into relatively clean water. This made it possible to restore healthy water bodies. With the higher environmental standard, the many values that appeared to be depending on the quality of the water also became possible again, even in a complex urban context. It contributed, at least in the Western world, in a revival of old rivers, canals, and lakes in cities. World organisations became aware of the many values that water bodies can have for cities. In developing countries, or countries that only recently developed, a similar process can be identified, however with different characteristics.

In the following we analyse the Dutch and Indian water management on the way values were influencing this development. Which role do values play in the governance of urban water systems? Which values were responsible for the revival we see in many urban areas? Are there any differences between the Dutch and Indian context? Where could this lead to in the near future, where urban population density is expected to further increase? What is the role of the inhabitants in relation to the governance of these urban water systems? Which institutional surrounding can we expect to be established? Does interaction with the physical water system play a role in its management? Which variables determine decisions for more privately or more publicly owned urban water bodies? We touch upon these questions and explore the situation in the Netherlands and India.

The focus of this paper is on the changes at the interface of social and physical systems, more specifically between water systems and urbanisation processes. We firstly discuss the theoretical perspective on the concept of value. Than we describe our empirical field, water management and more specifically the systems that are connected to urban water appearances. This is followed by case studies of the Netherlands and India. The institutional setting plays an important role in this respect. We conclude with some observations about the role of values in relation to the changing concepts of urban water governance.

For social scientists and sustainability researchers, it is an interesting challenge to address the many values of social-ecological (water) systems over time and specifically capture the influence these values have on these systems.

Values

Water management of rivers and lakes evolved from an engineering dominated approach towards an approach aimed at multiple objectives. This modern approach is known as "adaptive management" where water managers continually adjust their actions in response to monitoring data and insights that informs about changes in the characteristics of a water

system and its catchment area, economic conditions and social preferences. For example water resource agencies do not longer dominate the decision-making process related to managing the flow of the river, its quantities and its quality. These agencies become more and more focused on providing technical support to actors within the democratic process of participation (van Ast, 2000). Herein the costs and benefits among the different stakeholders in water systems are to be balanced. Looking closely at the current management approaches there is a need for insights into the processes of valuation by these stakeholders and how processes of these values are and can be institutionalized. Examples are Cost Benefit Analysis, Multi Criteria Analysis, Co-valuation (van Schie and Bouma, 2008) and other assessment methods in water management (Schuijt, 2003, Bouma, et al., 2008, van der Veeren and van Cleef, 2008, van Ast and Bouma, 2008).

The value concept has different interpretations in different disciplines and even different individuals. For individuals for example, 'the value of water' can be seen as the monetary value or the cost that individuals pay for water to consume, or the social-economical value that covers all the benefits of water, or the psychological value that water is 'price-less'. Metaphorically, 'value-less' can be referred to either as 'useless' or 'so precious that it is difficult to measure'. When it comes to the 'value of the river or lake', it is hard to give a monetary value. Individuals usually refer to the benefits of the river/lake.

It is important to distinguish the interpretation of value in various disciplines. In economics, the discussions are on the value of environment (here water), or valuing the environment, since environment offers 'goods' and services' to the society and affects the society's welfare function. Specifically non-economists regard putting prices on environmental 'goods and services' as mis-conceived, while economists advocate the desirability of valuation. One thing is clear: there is a disagreement over the prospects of actually doing valuation in a satisfactory way.

To understand the relationship between value and the environment, it is important to understand the 'goods and services' offered by the environment, or in other words the functions attributed by the environment to the society. How does it affect society's welfare function? For example in case of rivers and lakes, value of rivers and lakes can be interpreted from the Total Economic Value (TEV) framework developed by Kolstad (2000). The TEV (Figure 1) is made up of instrumental value (or use value) and intrinsic or passive (or non use value). The instrumental value is subdivided into direct use value, indirect use value and option value; and the intrinsic value is subdivided into existence value and bequest value. In case of rivers and lakes, ground water recharge, swimming and washing are the direct use value. Experiencing the water, the landscape, the fauna and the flora are examples of the indirect use value, while real estate development belongs to the option value. Conserving it for its very being/identity is called the existence value, and conserving the lake for future generations is the bequest value. Interestingly, the use and non use values combined, are similar to the definition of sustainability, making 'sustainability' a value too.

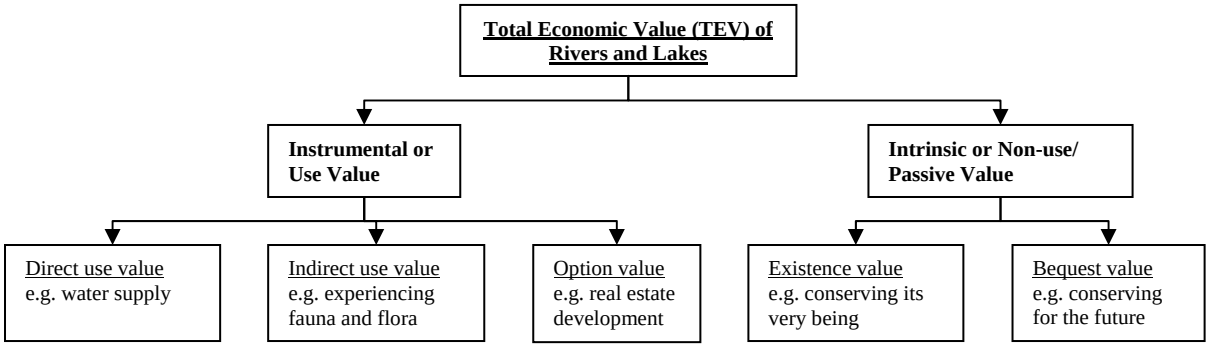

Figure 1 Total Economic Value (TEV) of urban lakes Source: Interpretation from Kolstad (2000).

In main stream sociology, values usually refer to social-cultural behaviour linked to ethics, customs, beliefs and traditions in society. In the case of water systems, the attention would go to the way the water and connected ecology is treated.

This aspect is further elaborated in the example from India. At an individual level it can be said that, 'I have certain values' and at a societal level it can be said that, 'the society has certain values'. In this argument, value is usually linked to something like a system or some behavior/belief that is institutionalized. It can be seen as value systems. A classic example with respect to a river would be the water that originates from the melting point of the Gangotri glacier in the Himalayas, that is considered by Indians as 'a drink to immortalize oneself' (called '*amrut*' in Hindi language). A similar reference to 'value' can be seen in the study on the analysis of institutions, where Ostrom (1994) uses 'norms, customs, and traditions as a referent to value and attributes to the society

Another approach is taken by Ostrom (2007, 2008, and 2009) and others who study socio-ecological systems from the governance perspective. They use the term 'resource unit' as a referent to 'value'. In the multitier framework (commonly called the SES framework) for analyzing social-ecological systems, the resource unit is referred to the functions that the resource system (in observation) offers. The resource unit is one of the eight main variables of the SES framework. The other seven variables are i) resource systems, ii) governance systems, iii) users, iv) socio-economic, political settings, v) related ecosystems, vi) interaction, and vii) outcomes. Identifying the resource system and its resource units is considered fundamental to answering the research question in a given SES framework. The values that are particularly considered in the research are categorised as sub-variables under the resource units. The sub-variables thus differ depending on the research and the researcher. In a study of the variable performances of user groups for canal irrigation in India, Meinzen-Dick and Ostrom (2007) illustrate the factors that affect institutional performance. The research identifies that critical factors affecting irrigation institutions can lead to sustainable approaches that are adapted to specific contextual attributes. They constructed the sub-variables into 2nd level and 3rd level. When we perceive a water system as a social-ecological system, the multitier framework (Ostrom, 2007) clarifies how different concepts of values are embedded in variables (figure 2).

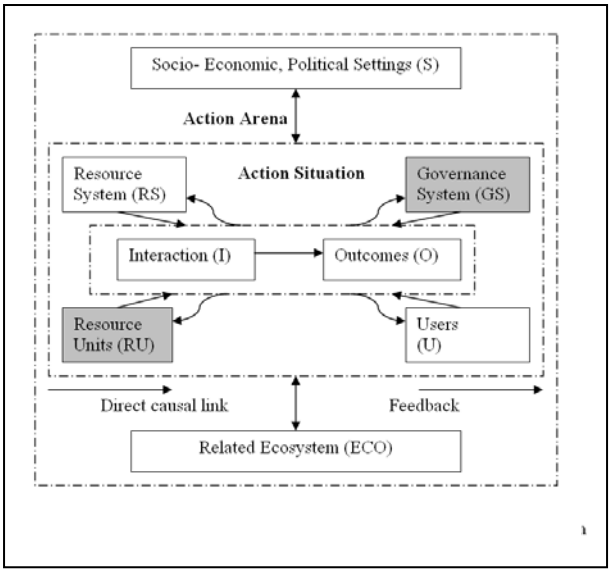

Figure 2: A multitier framework for analyzing a social-ecological system. Source: Ostrom (2007)

The economic value is one of the sub-variables of the resource units. Aspects like mobility, availability, spatial and temporal distribution and hydrological interaction are also categorised under resource units. On the other hand, sub-variables like scarcity, equilibrium properties and predictability are categorised under resource systems.

Looking at the sub-variables, the first-level variables of the resource system and the resource units in the SES-framework are characteristics of a water system that can be regarded as stepping stones towards a specific governance system. Together with the characteristics of the users, a governance system could be customized to local circumstances.

The sub-variables of a governance system can be reflected in property-right systems, collective-choice rules, constitutional rules, formal regulation, habits and norms, and policy instruments that enhance certain (economic) values. The interactions between these variables produce outcomes. It is a challenge to many policy makers to capture the different stakes and values of stakeholders in the process of formulating water governance strategies, in order to deal with potential conflicting value-concepts of actors and the costs and benefits in a national and international context.

Water Systems as Common Pool Resources

Urban water systems may reveal many different types of non rival and non excludable goods and services. Some of these water systems are considered to be Common Pool Resources (CPR) because they are natural resources like the air or the oceans. However, water systems provide non excludable goods and services to human societies, of which (raw) water is the most important. In terms of Ostrom (1990) a Common Pool Resource Situation is a natural or man-made resource system that is sufficiently large as to make it costly, but not impossible, to exclude potential beneficiaries from obtaining benefits from its use. These common goods and services are rival but non excludable. Most river basins, geographical areas within which waters of natural origin (rain, groundwater flow, melting of snow and ice) feed a certain river (UN, 1978), fit with this definition. Also the global run off water can be considered to be a Common Pool Resource.

With respect to the most effective management of common pool resources in the sense that values are protected, Ostrom (2007) warns that there are no panaceas. Every type of resource has its own value chain(s) and institutional setting, which makes one solution for all situations unlikely to exist. Sometimes liberalisation or privatization could bring improvements, other times regulation or the introduction of property rights could be of help. In order to identify guidelines for such solutions, modelling could contribute considerably to the tracking down of applicable institutional arrangements for common pool resources management. In the following we focus on water basins of rivers and lakes as an example of a partial common pool resource.

The value chain (van Ast and Bouma, 2008) in Common Pool Resources can be understood as the meaning of the resource for the different activities, starting with resource generation and ending with the consumption and disposal phase of the product or service. Water systems, including rivers and lakes, are more than just “water”; other physical, chemical and biological functions also form part of these systems. The various types of uses of the water systems and the institutional coordination of these uses show that many value chains are involved. In regional planning it is illustrated how different value chains are connected to water systems. Some of these chains are the housing and building sector, sanitation, drinking water, energy and the transportation sector. The water related infrastructures generate economic opportunities but also societal threats, like risks of flooding and environmental problems. In the field of regional planning and related urban lake planning approaches the threats and opportunities are assessed and result in an outcome which expresses to some degree the performance of functions that water systems are expected to fulfil. In the related decision making processes the benefits and costs of the functions of water systems are evaluated. The final and actual decision-making processes in regional planning and urban lake management with or without participation of stakeholders and possible use of assessment tools such as multi criteria analysis or Cost-Benefit Assessments reveal how and what values are integrated or involved in the governance of water systems.

The Involvement of Values

The final set of functions that water systems are offering a society, can to some extent be coordinated by market mechanisms with its economic values (maximization of profits) as value paradigm. The role of the market mechanism however is subject to an ongoing debate. Between the value chains, actors can compete for accessibility to the water systems. In this respect, different value chains may be organized in different ways with different market conditions. The overall coordination of the relevant value-chains within one state and between states connected to a water system is regarded as problematic. Different countries have often different traditions and sets of values associated with water systems. They also vary in the way how property right systems are embedded in legal codifications. Also, different value chains may be characterized by their own governance model or framework with only a limited coordination between them. In regional and urban planning many values are involved. In this context historical, cultural, recreational and other economic values may overrule or consolidate the ecological values of a water system. However, the coordination of a water system is not overarching all other coordination systems that in the end of the day explain the quality of a water system in an urbanized region. It becomes even more complex because over time different coordination systems responsible for the quality of a water systems or parts of it change.

An innovative approach gives the concept of 'virtual water' or 'water footprint analysis' (Hoekstra, 2008). Trade in virtual water should allow that water is channelled towards those value chains and those units within these chains that provide the highest value. However, it is unclear how this valuation process should be organized and woven into practical governance models or frameworks and which values are to be included in the value concept that is relevant in the governance of a water system. It is suggested that there should be more than only the market values. Ecological and social values such as social justice are accounted too. Concepts such as virtual water are not yet worked out to an extent that they can be implemented in real life policy contexts for the coordination of value chains. There is a strong need for institutional design of the organization of water allocation where the water related infrastructures manage the flows and stocks of water. This is a process of constant change that is boosted by far-reaching threats such as Climate Change and general economic developments. The driver behind these changes can be framed as conflicts between natural and man-made infrastructures (for example the issue of flooding) or between actors who compete for water to be used in different value chains. The conflicts themselves are not necessarily perceived as threats but instead can be regarded as opportunities for further institutional innovations that increase or sustain welfare.

General notions on the role of institutions in the coordination mechanisms in infrastructures (Williamson (1979; 1998) and North (1990) consider the impacts of relevant mechanisms of processes of institutionalization (DiMagio and Powell, 1983). It is still fuzzy if and how current and future adaptive strategies for managing water systems embed the values that are reflected in the theoretical framework and acknowledge the performance measures (outcomes) policy makers aim for (Valkering & Offermans, 2008). The impacts of Climate Change on water systems and their multiple value chains introduced a permanent degree of uncertainties on the final effects on societies. In the current approaches towards managing water systems in an urban setting this is a challenge to the process of formulating adaptive water strategies how to deal with potential conflicting value-concepts of actors and the costs and benefits in an urbanized context.

In the following, an analysis has been made from the role of values in the development of water governance in The Netherlands and India. After traditional and economical values are discussed, some specific subjects are elaborated, like the approach to consider the water system according to the separate values it delivers (sectoral water management), the transboundary issues and the institutional framework. Furthermore the transition towards integrated and sustainable water management is described. An important valuation aspect is given special attention: ownership and financial issues. The paragraphs finish with a practical example of the development in value perception with regard to urban lakes (in respectively Tilburg and Ahmedabad).

Water governance in the Netherlands

Introduction

Water governance can be defined in different ways. The Dublin Conference on Water and the Environment coined this field of governance as "Integrated Resource Management" and based it on four principles (ICWE, 1992):

- Water is a finite, vulnerable and essential resource, which should be managed in an integrated manner;

- Water resources development and management should be based on a participatory approach, involving all relevant actors (i.e. all stakeholders);
- Women play a central role in the provision, management and safeguarding of water;
- Water has an economic value and should be recognised as an economic good, taking into account affordability and equity criteria.

Clearly, the governance of water systems depends on local and contextual variables. Some of these variables are the involved traditional and economic values that are at stake. Other variables are related to the institutional arrangements that embed the specific values into the management of watersystems. Sometimes this may result into the dominance of some economic sectors that use the specific water system. Other institutional variables refer to the management of transboundary issues and/or the distribution of costs and benefits of managing a water system. Also, local tendencies towards or away from integrated and sustainable water management approaches are key characteristics of water governance. In this respect more and more attention has been given to the role of ownership and financing in the governance of water systems. Each of these contextual variables will be discussed in the setting of the Netherlands and illustrated at a local scale for a urban lake situated in the Province of Brabant.

Values

The history of Dutch water management shows a long paradigmatic development (Van Ast, 1999; Van der Brugge et al., 2010). Although The Netherlands were shaped by rivers and sea and the value of clean drinking water was essential for human health, the water did not get a very positive value in society. In the commonly followed Dutch religions, water did never play an important role. The abundance of water in the Netherlands made that water was primarily associated with the fear of flooding. Many efforts were made to fight the water. At first, mounds were formed; small hills of a few meters, where the water could not reach the houses. Later, the construction of dikes became the major strategy to keep the water away from the land. After some centuries of experience with dikes and drainage ditches, the combination with windmill technology created a very successful combination. It appeared that it was even possible to create land from the sea, by just making a ring of dikes and consequently pump the water out. These efforts result from the dominating values of these times, when population increased and agriculture needed more space to food all inhabitants. Productive land was highly valued during these times (Dubbelman, 1999).

Looking at the economic value of water, fishing had the earliest focus. The existence of great bodies of water assured the availability of food for inhabitants of the wet areas of the Netherlands. Later, collapsed fish stocks due to pollution and over harvesting, in combination with changing menu's diminished this value during the twentieth century to minor proportions. From Medieval times, another value related to water systems had been obtaining importance: water as a mode for transportation. It resulted in a large canal infrastructure through the country and the canalisation of the main rivers. In their efforts to connect cities and villages, canal-diggers made use of the existing natural lakes and rivers in their planning of shipping ways. Nowadays shipping is still an important factor, added by water infrastructure in use for pipes and cables.

With the development of mass tourism in the 20th century, recreational activities on the water increased considerably. Most of tourism in the Netherlands nowadays has a link with water. In the last decades many companies use the water for cooling their production facilities, among them electricity production. Furthermore, some hydropower has been installed along

the river Rhine. Sand and clay is used in building and recently the water got an important economic value for housing projects, since water is perceived to attribute beauty to the surroundings. House owners are willing to pay for this originally aesthetic value in the prices for housing.

Paradigms in Water Management

The field of interest of the water manager has always followed the value perception in society and broadened considerably in time. Consequently, more and more functions were added to the policy scope of the water manager. During the 20th century, for each of the various functions of water systems, a specific water sector policy was designed. This sectoral water management brings many new values explicit, like recreational, ecological and aesthetical values. The environmental value of water became significant by the mid twentieth century. Apart from the traditional values of water, the use of water for nature became important. During these times, people became aware that the use of water as waste collector is not unavoidable. New technology can make water bodies clean. This technology push made the many values that depend on clean water realistic and the paradigm shift from “fighting the water” towards “living with water” possible.

When in the mid eighties the consciousness increased that sector optimization created major drawbacks, the concept of integrated water resources management was born (V & W, 1985; Saeijs, 1995). The integration refers not only to surface water and groundwater or to water quality and water quantity. It also includes the various uses and the connected policy focused upon it. Integrated water (resources) management is based on a water systems approach, transcending environmental compartments. It focuses on the preservation of all features of the water system, on the long term and on a river basin level. First there was the protection of humans against the water, now explicitly attention is paid to the protection of the water against humans. In this phase of integrated water (resources) management, a number of other significant changes in thinking emerged. Perhaps the most important insight of the water system perspective is that ecology is the basis of all handling of water. It means that the ecosystem approach (Allen et al, 1992) is embedded in water management.

In the nineties of last century, water management also became increasingly focused on sustainable development. Dutch policy accepted the definition of the WCED (1987): sustainable management of water systems means that the current social and economic needs are met without sacrificing the ability of future generations to meet their needs (WCED, 1987). It incorporates concepts as dynamic or adaptive water management (Geldof, 1994), total water management (Van Rooy et al, 1997) participative, and interactive water management (Van Ast, 1999).

Transboundary Issues

Holland, the low lying core of the Netherlands at the delta of the Rhine (and Meuse) rivers, always has been depending on upstream countries. Nevertheless the importance of this dependency became urgent when upstream countries started to pollute the river, reducing downstream values. After the Second World War, salt pollution from the French Potassium mines became a politically contested issue. Later, German (and to a smaller extent Swiss and French) chemical discharges came in the centre of attention. The devastating influence on the mouth of the Rivers, and in the North Sea was a reason for the Netherlands to take international steps along different paths. The State (Rijkswaterstaat) approached the

International Rhine Commission and the European Union, while municipalities (lead by Rotterdam) and the drinking water companies put claims at polluting companies like BASF, Bayer, Sandoz and the French Potassium mines. Indirectly an economic value was at stake, since the costs of storage of the polluted harbour sludge at the river mouth raised sky high. Later, conflicts arose over the pollution of the rivers with Belgium (Meuse and the Scheldt). Furthermore, groundwater streams reveal transboundary effects on current and future uses of water systems. Pollution and risks of nuclear contaminated groundwater recently came at stake.

Institutions, Ownership and Finances

A large system of institutions is involved in governing the Dutch river, canal, lake, stream, ditch and sea water systems. Water governance can be divided in many different actors, on different levels of scale and various policy fields. In general terms the State (ministry) is responsible for the main rivers and canals, while a specific layer of democratic water boards that manages the regional water infrastructure. Ground water is part of Provincial responsibilities and the drinking water sector belongs to the state level again.

Both ministries, provinces and municipalities own water systems. In some cases, smaller physical water bodies are sold to the private sector. In these cases, the State sets conditions for their maintenance. Usually only water that does not have a function in the main water infrastructure is privately owned. Privatization of the drinking water has not taken place.

Waterworks and the maintenance of water systems have their own specific arrangements. Some rely on local taxation schemes (water board taxation). Others, especially those works that are of importance for safety reasons are financed out of collective national funds.

Case: small Lakes in the Surrounding of Tilburg

Small lakes, situated in the area of the city of Tilburg, for ages had been fulfilling many different functions. In the beginning natural conditions shaped their governance and soon after urbanization started, the lake fulfilled increasingly recreational functions. However, more recently the recreational function became less important as a result of increased supply of competing recreational arrangements with water systems (indoor swimming pools, and other opportunities for spending leisure time). The integration of the value of water systems into regional planning initiatives often started from a private business perspective. Here economic values were being integrated in the (future) governance of the water system. Sometimes managing water quantities in a lake system focuses on a specific policy objective. A local lake may be reshaped and managed more in line with recreational demands. In the same community other lakes and the connections between the lakes (ground water systems or small rivers) may be developed to focus on the historical and the natural conditions in the past. This example shows that even within the context of one city, the water quantity and water quality characteristics are very context and time depending.

Summarizing History of Water Governance in the Netherlands

In summary, the Dutch history of water management consists of three main stages, in which in every new historical phase, new values emerged.

Historic Times

The first activities of humans in relation to water aimed at obtaining drinking water. However, abundance of water in the Netherlands, limited the urgency of management activities. Therefore the first phase was primarily focusing on flood control; starting even before the middle ages. Safety was the essential value, since the life in the low-lands of Holland was very vulnerable to flooding, both from the rivers and from the sea. Later, values like safety oriented water quantity management, the improvement of inland navigation got more importance. Later land reclaiming projects came in the centre of Dutch water management attention, with the final aim to create production lands.

Modernisation

In the twentieth century, an acceleration of the use of functions of water systems was realised. Sectors like agriculture, industry, drinking water etc., all called for specific attention from the water managers. In this stage of sectoral water management, even the quality of water in 1970 formally got its sectoral place, when a specific law was published, followed by a row of water quality policy documents. The State is the service provider and community, agriculture and industries are the users. Water systems had to follow the social systems, i.c governmental planning. In the eighties of the twentieth century, the sectoral approach reached its limits. It became necessary to make decisions about the water system as a whole. This urged for integrated water management, aiming at the ability of the total water system to supply the optimum of the many demanding sectors.

Recent times

In the beginning of the 21st century a paradigmatic shift, or transition (Van der Brugge 2009) is taking place. Terms like resilience, participation, adaptation, and transition management refer to the practice of sustainable water management, generally characterized as "adaptive water management". In this approach the water managers adapt to the values the water system provides. If values change, their management will change. Nowadays, the concern (in itself a value) that has been given to the climate change issues plays an important role. Again the development is directed to more complexity, where land planning increasingly follows the natural systems, not in the last place in order to avoid additional costs. But more and more, social systems (and planning) follow the water systems.

Water Governance in India

Introduction

From the early civilization, environmental values linked to the water resources were veiled behind the socio-economic and cultural values. Like air, wind and sun beams, water was considered to be an unlimited resource in ancient India. Water received significant concern by the end of twentieth century in terms of its availability and accessibility, which started affecting economic growth and even the balance of human life. The state of rivers and lakes, the community and also the water management systems changed. This was primarily attributed to the urbanization pattern, modernization of infrastructure services and the

institutional arrangements. The growing demand and competition between municipal consumption and industry due to the rapid urbanization made water a scarce resource in the cities. The uncontrolled access to surface water and groundwater and the lack of proper institutional arrangements led to pollution and degradation of surface water and ground water sources. The water exploitation indiscriminately affected the health of rivers and lakes; while droughts and floods became common in many cities. The river and lake beds turned into large cesspools and became the recipient of industrial and domestic wastes, generated from the cities. In addition, land encroachment and squatting by the residents, industries and sometimes even by the state institutions affected the rivers and lakes in the cities. A realization of threat to existence of rivers and lakes was made strong by environmental experts and scientists. The environmental sector became an important domain in water management.

Values

Since antiquity in India, water enjoyed a respectable and unique status amongst all the natural resources. Agarwal and Narain (2001) mention the first reference to the hydrological cycle in the world: the Chandogya. It is part of one of the principle philosophical texts of Hindu religion called the Upanishads. The main agenda of water management till the mid twentieth century was on the one hand linked to the demand of water for domestic and irrigation purposes and on the other hand to the protection against floods and droughts (Bansil, 1991). Since agriculture became part of civilization, land management interlinked with water management was in the forefront. Usually, planning of settlements and agricultural land followed the water systems (Bal, 1999). But with water as a deciding factor for growth and prosperity. Indigenous practices of water conservation, water harvesting, and transportation of water from remote areas ensured the meeting of water needs. These practices were given shades of ritualistic overtones and woven into the religious and social-cultural habits resulting into a widespread practice at community level.

An important aspect of water in reference to socio-cultural values in India is that rivers and lakes are still considered to be sacred. Every religious and ceremonial occasion in India has an association with rivers and lakes (Agarwal and Narain, 2001). Rivers are referred by the names of a female goddess, such as the five main holy rivers of the country are called by Ganga, Jamuna, Godavari, Narmada and Kaveri. It is believed that a dip in any of these five holy rivers washes ones sins away. The sacredness is testified by the fact that even today, thousands of pilgrims perform the holy pilgrimage of Circumbulation (called Parikrama) to these rivers every year. Other rivers and lakes enjoy a similar holy status in India. Traditional fairs like Kumbh Mela at the banks of river Ganges and Pushkar Mela at Pushkar Lake are still very popular across the country and even got attention internationally.

Looking at the economic values of water, fishing, transportation and irrigation have the traditional focus. Although pilgrimage to sacred rivers and lakes were socio-cultural events, they also involve many economic activities such as religious fairs, trade fairs, animal fairs and even bride/groom fairs. Tourism linked to recreation, ecotourism and water sports are more of recent origin. Popular traditional events are still organised on many rivers and lakes and at their banks around the country. The value of water in economic terms started changing by the mid twentieth century. Apart from the traditional values of water, the use of water in hydropower, industry and municipal consumption gained prominence. Technological developments such as dams linked to rivers and lakes, brought common water reservoirs; where energy generation and irrigation were considered to be the key economic drivers. In addition, the interlinking of water bodies through canals across several cities and states are big

investments made for these developments. Water management involved scientific and sophisticated tools aimed at optimal utilisation and management of the water resources and to make the development more complimentary to the environment and vice versa.

Paradigms in Water Management

According to the World Bank (1998), the separation between surface and ground water functions and their responsibilities discourages a unitary analysis of water and its use as a single resource. The separation of water quality and quantity is also superficial. The fragmentation not only creates ambiguity and duplications, it also makes it difficult to fix responsibility and accountability. The fragmentation also hinders inter-sectoral water allocation, e.g. from agriculture to industry to domestic consumption. When water became scarce and the allocation demands diverted to high value or priority uses, the current institutional mechanism became inappropriate. Narain (2000) advocates institutional reforms in India's water sector in three ways: (1) securing greater coordination and integration within the water management organizations; (2) restructuring water bureaucracies as inter-disciplinary, financially autonomous organizations; (3) well-definition of water rights and dual accountability between user groups and the bureaucracy. Reddy and Chhar (2004) call for a similar approach of governance for rivers and lakes and they promote the Integrated River Basin Management model as a way to manage rivers and lakes in India. The authors also highlight the role of international organisations and the local users for effective management of the water resources. The revised National Water Policy of 2002 (original policy in 1987) emphasizes on integrated water resource development and management for optimal and sustainable utilization of available surface and ground water resources, creation of well developed information systems, use of traditional methods of water conservation, non-conventional methods for water utilization and demand management; and to have a synergy between the government and non-governmental organisation for water conservation and utilization (GOI, 2002).

The growing awareness that sector based water management will not solve the water problems in India, led to the acceptance of the concept of integrated water resource management (IWRM). This can be seen as a process to promote coordinated development and management of water, in order to maximize economic and social welfare in an equitable manner, without compromising the sustainability of vital eco-systems, i.e. the water system (Bansil, 1991). There was an overtone of socio-economic values being dominant when IWRM system was conceptualized. There was stress on the developing the IWRM model in such a way that all the stakeholders participate at all levels. Still the mindset that water is a government's business prevailed. This was the time when the slogan of 'access to water was considered to be a fundamental right of every citizen'. The state being the authority was obliged to take care of 'water as a good', with the citizens as end users.

In the last decade, sustainability of water resources like lakes and rivers became high on the water policy agenda in India. After the dominance of the socio-economic value of water for decades, depleting natural resources and climate change issues brought the ecological value of water back as a top-priority. Water gained more focus on environmental grounds when the concepts of climate change and global warming came in the forefront of global environmental agendas. The year 2003 was declared as the 'International Year of Freshwater' by the United Nations. Water has become the subject of most environmental and developmental discourses. National and international water initiatives became very active in India, such as the formation of the National Lake Conservation Plan (NLCP) in 2003 an the promotion of River Basin

Organisations (RBO), in line with integrated river basin management. At the time 23 sites were declared as Ramsar sites for wetland conservation and the National Water Policy was revised in 2002. The legal institutions and community based organizations are also more active than before with respect to environmental concern over water.

The concept of sustainable water management (SWM) is common in the policy and research domain now in India. The catch here is who uses it and how do they interpret it. Sustainability of rivers and lakes are linked to the sustainability of cities. It is also the time when bringing people back into the issue of water governance got its prominence. Water Users Association (WUA) formation for managing canals, ponds, portion of rivers, irrigation systems is considered as the most efficient way to get better outputs in water management (Narain, 2000). The WUA concept became effective and functioning in many rural areas but as it was expected, it is still facing problems to take-off in urban areas.

Three issues still limit the sustainable management of water resources: policy failures and institutional weaknesses, competition for water, and the health and environmental needs and effects. At grass root level people give a fundamental argument that the urban lifestyle and occupation keeps them away from direct interaction to the water resources where rivers and lakes are just perceived as places of recreation and its water as a 'service'. People consider their job done after paying taxes for the services and user charges for the recreation. When traditional communities managed their fresh water resources, they also managed other natural resources such as forests and water basins, improve sanitation and reduce diseases as an integrated approach. Such concepts and practices are now back in practice and are embedded in the larger domain of water governance and further complimented by stronger technology and policy tools. With the changed values of water and the different management systems, the following years will show the outcome of the current water governance approach.

Transboundary Issues

By the mid twentieth century, water became a politically contested resource at city level, state level, national level and even international level. With the increase in urban development activities, many rivers and lakes are engulfed within the cities. Reclamation of land from the rivers and lakes for urban development activity is common at city level. Urban development and planning began to dominate over the existence of the water systems (Bal, 1999). Transboundary river management between the states is an ongoing political issue among many states such as the Narmada between Gujarat and Madhya Pradesh and Cauvery between Karnataka and Tamilnadu. The idea of inter-linking rivers at the national level known as the National Water Grid, was high on the agenda in the beginning of this century. The aim of the Inter-linking of rivers project is to distribute the water to different rivers in the country to counter the recurring droughts and floods at different regions. Doubts about financial viability, technological capability, ecological sustainability and political feasibility are delaying the project to start (Bansil, 1991). At the international level, water negotiations linked to rivers and water reservoirs continue with neighbouring countries Pakistan, Bangladesh and Nepal.

Institutions, Ownership and Finances

The several values involved in the water systems in India are reflected in the fact that there are several institutions involved in governing the river and lake systems. Water governance involves different environmental sectors (and the ministries and organizations that manage

them) such as resource management, surface water management, ground water management and inter-basin water resources management. Related sectors such as pollution boards, urban development, environment etc. are also associated with the water management. The river and lake managements are closely associated to all these sectors. In a paper on challenges of governance in India's water crisis, Narain (2000) presents a comprehensive list of organizations at several levels and various policies linked to water management. In another paper on management of lakes in India, Reddy and Chhar (2004) present a similar illustration of organizations and policies with respect to lake/river management. Both the papers present a grave concern over the fragmentation of responsibilities and coordination amongst the organisations and policy implementations.

Since water is considered to have a strong link with urban development and planning, river and lake management are seen as part of land management (Bal, 2006) One of the prominent ways in which changes in the water systems are observed is in current spatial development. Examples like plans and projects for river and lake revival and redevelopments; rehabilitation of slums encroaching the river/lake beds; waste water treatment plans; and rain water harvesting. They all became common in nearly every city to revitalize the lost values of the rivers and lakes. Since developing new sources of water is costly; the logic of re-using the waste water generated from municipal consumption and industry also rose as a new domain in water management. It is realised to be an alternative source of water. Such initiatives are underway within the Jawahar lal Nehru National Urban Renewal Mission (JnNURM, 2005) under which many cities are tackling river and lake management under the infrastructure development regime.

In the earlier days, the social processes were following the water system. The values of the water systems were directly linked to the people of the community and the management of rivers and lakes was inherently integrated in the community life. Although the property rights of rivers and lakes remained with the government; formal and informal rules were usually crafted by the community for water usage, maintenance, sanctions etc. (Ostrom, 1990). The hydrological cycle, the water balance principles and the community water management systems were known to the community through wisdom and experience passed from one generation to the other (Bansil, 1991).

Most of the wetlands such as rivers and lakes in India are still under the national government of the Ministry of Forest and Environment. However, the funding for most river/lake management is now a direct responsibility of the national government only. At the local level, the authority to maintain and develop the rivers and lakes lies with the national District Collector. Various ministries and boards such as the urban development board, the central ground water board, the pollution board, the water supply and sanitation board etc. are also involved in funding depending on their role in the water management. Interestingly, there is no direct monetary involvement from inhabitants in the river/lake management. There is no way even to regulate the ground water and surface water consumption, except the Water Tax which is levied on every property in the urban areas. The water tax varies according to the land use such as residential, commercial, institutional, industrial etc.. Recently ‘ground water conservancy charges’ are also introduced in the urban areas. Such taxes and charges are still completely missing in the rural areas.

Funding of the water management initiatives linked to river and lake management is usually a combination of national, state and city level governments, supported by international development loans. In most larger river and lake management projects under the Jawahar lal

Nehru National Urban Renewal Mission (JnNURM, 2005), the national government contributes a maximum of 70% of the total project development costs. State government contributes 10% and the city government is expected to contribute 10% as revenue and 10% as collection from the community. Generally spoken, local governments' ability to show 20% revenue for the project is the decisive factor for higher level funding approval. Initiatives like the National Lake Conservation Plan (NLCP in 2003) are designed in a similar way. There are also independent projects such as the Sabarmati River Front Development Project in Ahmedabad, for which an independent authority such as Sabarmati River Front Development Corporation Limited (SRFDCL) is carved out with experts from the state and city level government. The funding is independently generated and the use of funds is at the discretion of the authority. Such projects receive funds directly from national and state government with support of international funding from institutions such as World Bank, Asia Development Bank etc. A similar approach can be seen in the case of Bhopal Lake Development, Hyderabad Lake Development etc. The role of the private sector in the funding is nominal and is based on the Build Operate and Transfer (BOT) approach of project implementation. The private sector is also linked to the maintenance of some of the developed projects which is complimented with rights to use the benefits of the development.

In the last decade of the twentieth century, privatization and public-private partnership (PPP) came into the Indian water management scenario. International organizations such as World Bank (WB), International Finance Corporation (IFC), Asian Development Bank (ADB) promoted private sector-led growth in water works and services. PPP's were being promoted as a key, if not the main, vehicle to achieve the required growth in most infrastructures, including the water sector. Soon serious criticisms and disapproval were shown from civil society groups and grass-root movements in India regarding priorities and strategies of the private sectors. PPP's further crumpled with the global recession when government finances were used to bail out many PPP projects (Dwivedi, 2010). However, PPP's self probably will not disappear anymore, but their nature may change over time.

Case: Revival of Lakes in Ahmedabad city

In the earlier days, the villages were strategically located at the edge of lakes and ponds. The lakes and ponds of Ahmedabad served several needs of rural life such as impounding the surplus of rain water, recharging the ground water reservoirs and feeding the wells, providing irrigation, supplying drinking water for human beings and cattle, providing places for bathing, washing, cultivation of water demanding produces, and a number of other functions. The governance of the lakes and ponds was therefore directly in the hands of village people. In the mid twentieth century, when the villages started getting engulfed in Ahmedabad's urban development, the functions of the lakes and ponds slowly changed. They became recipient of human and waste squatting. This was the phase of neglecting lakes and ponds in the city. The governing responsibility was under the national government, to who control and management was a farfetched work. At the same time, the local government was reluctant to go through the bureaucratic process to take over its development. Moreover the community was by far the least interested in development, since the urban occupation and life style had no direct association with the lakes. However, in the last one decade, many lakes in Ahmedabad are revitalized for mainly city's infrastructure functions such as, storm water collections points for the storm water drainage system of the city, for recreational development, and creation of real estate property in the form of land reclamation from the lake area. The quality and quantity of the water in the lakes were not the prima facie agenda but the development of the area is the key. The property prices of the surrounding areas of the lakes that are developed

rose very high. The governance is in the hands of local government trying to reach partnerships with both private sectors and community based organisations. This example shows how the values and governance systems changed over time in Ahmedabad. Today Ahmedabad is called the 'City of Lakes' in India

Summarizing History of Water Governance in India.

A kaleidoscopic overview of the value of water and water governance focusing on the river and lake management in India, which is presented above, is summarized below:

Historic Times
The human health value related to water and food demands are reflected in domestic use, irrigation, safety from flood and drought protection. They were given shades of rituals and are linked to socio-cultural values. Ecological values were the underpinnings of the socio-cultural values. Spatial development followed the existing rivers, lakes and other water bodies. State owned water was usually managed by the community. Social systems followed the water system.

Modernisation
Apart from the traditional economic values, benefits for larger developments at the core such as large and small dams for water reservoirs, energy generation, municipal and industrial consumption. Spatial development manipulated the existence of rivers and lakes and other water bodies that were State owned. State is seen as service provider, while community and industries are the users. Water systems follow the social systems.

Recent times
Periodical Risks and consequences of degradation of water resources brought ecological and sustainability values high on the water management agenda. Economic-socio-cultural values are considered necessary for ecological sustainability. Political value is considered prime in the aversion of the degraded state of water resources. State owned waters are managed increasingly in partnerships, with participation of community and NGOs. Integrated water management and sustainable water management are the main conceptualisations of the attempt to find balance between the social systems and water systems.

Discussion and Recommendations

Over centuries there has been a strong relation between the value of water systems, like rivers and lakes, and the way these water bodies are managed and governed. Several values are associated to rivers and lakes, such as socio-cultural values, economic values, ecological values and environmental values. The history of water management in The Netherlands and in India illustrates these values and the link with the governance.

With the transition to modern times, societies started to exploit water systems in a way that they reached their ecological limits. Here the emphasis changes to co-evolution between ecological and economic values. In a transition towards sustainability a trend can be observed to ground human use on the limits of the natural water system. It leads to practices like adaptation, participation and strengthening of resilience.

Phase	**Concept**	**Value**
1 pre modernisation	flood control (wet areas) drinking water supply (dry areas) water quantity management	human health land use/food production
2 modernisation	sectoral water management integrated water management	human use water system health
3 recent times	sustainable water management	sustainability (long term) (interaction, adaptation, resilience)

Table 1; developments in the concept of water management

In general, the differences between the governance systems in The Netherlands and in the Indian society are large. Some differences in the governance of water systems appear to be temporal, and corresponding with some national or local conditions that will disappear in the long run as a result of overarching trends reflecting on-going modernisation processes. In this respect similarities in water management between two contrasting countries Holland and India are likely to exist. Considering this transition, an overview of conceptual changes can be identified. In the following scheme (*Table 2*), the most important features related to the changes from traditional to modern thinking in water management are mentioned.

Table 2; Changes in water management

FROM traditional water management	***TO Modern water management***
Water as an 'enemy'	Water as a 'friend'
'fighting against water'	'living with water'
Sectoral water management	Integrated water system management
Effective and efficient	Sustainable: long term responsibility
Supply Management	Demand Management
Water systems follow social processes	Social processes follow water systems
Water follows spatial development	Spatial development follows water
Technocratic: build and maintain	Ecosystem based: support resilience and self-regulation
National	International en regional
'command and control' water policy	participative water management

These changes are mainly considered as the outcome of what values are attributed to water systems. 'Beauty' and 'Nature', for example, are values that increased their weight in post-modern times of relative luxury. In this way, the transition corresponds with the change from exploiting the nature for human use to seeing the nature as an independent value that can upgrade civilisation in an esthetical way. Also the awareness that civilisations depend on the large ecosystems of which they are part of, made a contribution to the increase of the value of nature. It also resulted in planning practices that take the characteristics of the ecosystem into account. And it leads to a broader view on transboundary issues. When water systems cross borders, solutions need to be developed for conflicts between different values. The integration in a governance system also has an international dimension that should be taken care of.

Another value that can be added in this context is the democratic view on equity, where people all have the same basic rights. This fundamental value means for water systems that all inhabitants should have access to influence mechanisms on the decisions about these systems. It created the importance of the value of participation of public and stakeholders in water management.

The values mentioned above can also be considered to be responsible for the revival of water bodies in many urban areas. More general, values are extremely important for the sustainable management of natural resources. The question remains where this could this lead to in the near future, when urban population density is expected to further increase. The answer depends mainly on the values that will lead human behaviour. It can be expected that with the continuing scarcity, the ecological value will increase in its importance. Societies have to get acquainted to the fact that water systems bring conditions for humans to make use of them. Sustainability, or another term that refers to the protection of the health of natural systems, will keep its strength. Institutions that will take care of long enduring high scale ecosystems are expected to develop. These institutions can at least make guidelines for the way societies can deal with ecosystems. They should be part of the variables that determinate decisions for more privately or more publicly owned urban water bodies.

Values are a driving factor for changes in water management. But values related to nature and ecosystems are on their turn influenced by interaction with the physical water system. This is a major risk for urban societies, where the opportunities to interact with nature, or here the water systems, are limited. It could be one of the main factors that determine the paradox of on the one hand the high value that generally is attributed to water and on the other hand the current state of rivers and lakes in both India and the Netherlands. At the same time this deteriorated state can also accelerate the transition towards sustainability, and again proof to be a connector of societal development today as it did in the times of ancient and traditional water management practices.

References

Agarwal, A. and Narain, S., and Khurana, I. (2001). *Making Water Everybody's Business, Practice and Policy of Water Harvesting*. Centre for Science and Environment, CSE Delhi.

Allen, T.F.H., Bandurski B.L., King A.W. (1992) *The ecosystem approach: theory and ecosystem integrity*, Washington D.C. (USA): International Joint Commission United States and Canada,.

Anderies, John M., Marco A. Janssen, and Elinor Ostrom (2004), A Framework to Analyze the Robustness of Social-ecological Systems from an Institutional Perspective, *Ecology and Society 9 (1): 18*.

Bal, M. (1999). *Open spaces in the urban context- lakes as an opportunity*. Unpublished Post Graduate Diploma Thesis in Urban Design, School of Architecture, CEPT University, Ahmedabad.

Bansil, P.C. (2004). *Water Management in India*. Concept Publishing Company, New Delhi.

Boulder, CO: Westview Press.

Braungart, M., W., MacDonough, and A. Bollinger (2007), Cradle-to-cradle design: creating healthy emissions – a strategy for eco-effective product and system design, in: *Journal of Cleaner Production* (2007) 15, 1337-1348.

DiMagio, P.J. and W.W. Powell (1983). 'The Iron cage revisited: institutional iso-morphism and collective rationality in organizational fields'. In: *American Sociological Review*, 48, 147-160.
Dubbelman, H. (1999). *Maatschappelijke golven in de waterbouwkunde*, dissertation Delft University of Technology, Delft: Delft University Press,
Dwivedi, G. 2010. *Public-Private Partnerships in Water Sector: Partnerships or Privatisation*? Manthan Adhyayan Kendra, Badwani, India
Geldof, G.D. 1994. Adaptief waterbeheer: in: *Het Waterschap, juni 1994*. Deventer: Tauw.
Government of India, 2002, *National Water Policy*, New Delhi.
Hoekstra, A.Y., (2008), Human appropriation of natural capital: A comparison of ecological footprint and water footprint analysis (2008), *Journal of Ecological Economics*, doi: 10.1016/j.ecolecon.2008.06.021. Elsevier.
Hooper, B.P. (2005). *Integrated River basin Governance*, Learning from International experience, IWM Publishing, London, Seattle.
ICWE (1992), International Conference on Water and the Environment, *Development Issues for the 21st century*, The Dublin Statement Report of the Conference, ICWE Conference January 26-31, 1992, Dublin Ireland, ICWE, Dublin.
Jong, J.D., Rooy, P. T.J.C. V., and Hosper, S.H. (1995). Living with water: At the cross-roads of change. *Water Science and Technology*, Vol. 31, issue 8, pp.393-400.
Jongejan, R.B. (2008). How safe is safe enough? The government's response to industrial and flood risks, Dissertation Delft University of Technology, Delft: Delft University Press,.
Kolstad, C.D. (2000). *Environmental economics*. Oxford University Press.
Narain, V. (2000). India's water crisis: the challenges of Governance, *Water Policy 2, pp.433-444* .
Narain, V. (1998). Towards a new Ground Water Institution for India. *Water Policy, vol.1, issue 3*, pp.357-365.
North, D.C. (1990). *Institutions, institutional change and economic growth. Cambridge*: Cambridge University Press.
Ostrom, E.,(1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. New York: Cambridge University Press.
Ostrom, E., Schroeder, L. & Wynne, S. (1993). *Institutional Incentives and Sustainable Development*: Infrastructure Policies in Perspective.
Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences (PNAS) of the United States of America, USA, vol. 104 no*. 39, pp. 15181-15187.
Ostrom, E. (2008). *Institutions and the Environment.* Institute of the economic affairs, Blackwell Publishing, Oxford
Ostrom, E. 2009. A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, vol. 325, no. 5939, pp. 419 – 422.
Porter, Michael (1990), *Competitive Advantage of Nations*. London: MacMillan.
San Francisco: Institute for Contemporary Studies.
Schuijt, K. (2003) *Valuation of Water: the process of economic valuation of ecosystems in water management*, PhD dissertation, Erasmus University Rotterdam.
Valkering P. and A. Offermans (2008), *Inspelen op verandering: naar een robuuste en flexible strategie voor waterbeheer*. Eindrapportage van de pilotstudie Perspectieven in Integraal Waterbeheer, Maastricht: International Centre for Integrated assessment and Sustainable development.
Van Ast, J.A., (1998),Trends Towards Interactive Water Management; Developments in International River Basin Management, in: *Physics and Chemistry of the Earth (B), Vol. 24, No 6*, Elsevier Science, Oxford, blz 597-602; 1999.

Van Ast, Jacko and Jan Jaap Bouma, (2008), Value Chains in Water Cycles: Innovations in Water Governance, *CRNI*, Vol. 9, No. 4, Intersentia, December 2008, pp. 341-360.
Van der Brugge, R.; Rotmans, J. (2010). Towards Transition Management of European Water Resources, *Journal Water Resource Management*, 2010
Van Rooy, P.T.J.C., van Sluis J.W., Tolkamp H.H., de Jong J. (1997) Op weg naar totaal waterbeheer (7) AUTUNNO. In: *H2O, 11 (30)* 1997:348-355...
Veeren, van der, R. and R van Cleef (2008), *Ervaringen met MKBA in het natuur- en milieubeleid*, Tijdschrift H20/17, pp.17-19.
WCED (1987) World Commission on Environment and Development, *Our Common Future*, Oxford (UK): Oxford University Press.
Williamson, O.E (1998) 'Transaction costs economics: how it works, where is it headed', *The Economist, Vol. 146, No.1*, pp.23-58
Williamson, O.E. (1979) 'Transaction costs economics: the governance of contractual relations', *Journal of Law and Economics*, 22 October, pp. 3-61.
World Bank. (1998). *India. Water Resources Management Sector Review: Report on inter-sectoral water allocation, planning and management*, New York: UN.