

# Trends towards interactive water management; developments in international river basin management

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**Abstract.** The Dutch history of water policy shows different phases, in which every new historical stage adds new policy objects to the existing ones. This century a sectoral interpretation of water management emerged, it was followed by the nowadays generally accepted ideas of "integrated water management". A study of new developments in water management however, leads to the conclusion that yet another concept appears. Referring to the principle that the water policy agencies are in an interactive dialogue with watersystem and society system, it can be called "interactive water management". The basic elements, such as interaction, water system approach, integration and sustainability are in line with several global trends and are generally supported by publications with global impact on issues of environment and water. Some of the elements are already put into practice, for example in the international river basin commissions for the river Rhine or in the USA-Canadian and USA-Mexican water commissions. Questions to be answered concern the advantages and disadvantages of these new developments and what can be said about suitable institutional arrangements.

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## 1 Introduction

Institutional arrangements of water management are strongly connected to general trends in society. In the Dutch history of water management, we see that the main policy objects change with time. If we want to know how water management will be organised in the near future, we have to understand common trends in society. In this article it is argued that present developments will lead to a new kind of international river basin management, in which the water managers are in continuous interaction with their social and natural environment.

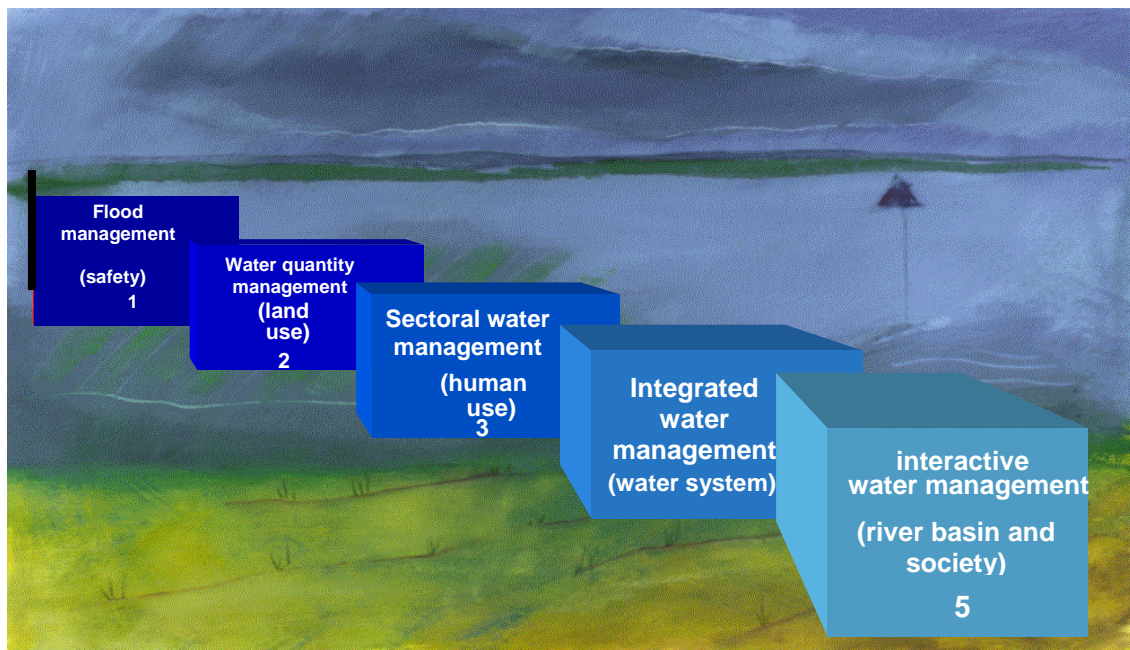
## 2 Development of the concept of water management

In the Dutch history of water management five different stages can be distinguished. In every new historical phase, new policy objects are added to the ones that were in the spotlight in the phase before (see figure 1).

The first phase, flood control, started even before the middle ages. Then, water management was limited to its roots: *safety-management*. The life in the low lands of Holland was very vulnerable to flooding, both from the rivers and from the sea.

But, after some centuries of experience, people found out that they not only could keep the water out, but that they also could actively reclaim land from the sea. This second phase can be called water *quantity management*. For a long period it was done on a small scale, but when new technologies, like windmills and steam engines appeared, land reclaiming projects became larger and larger. In the twentieth century, the land reclamation went on, but the functions of the water itself obtained more and more attention. For example, the inland navigation became increasingly important. Later, sectors like agriculture, industry, drinking water etc., also called for attention from the water managers. The third stage appeared: *sectoral water management*. It took to 1970 before the quality of the water formally got a place in this list of water sectors. In the eighties, all these increasing demands resulted in the awareness that the sectoral approach reached its limits. It is just not possible to fulfill all the demands of every different sector at the same time.

It became necessary to make decisions at a higher level: the watersystem as a whole. This *integrated water management*, the fourth stage, began in The Netherlands around the mid eighties with the policy document "Dealing



with water" (V&W, 1985). Not the demands of the different Stakeholders, but the ability of the total water system to supply all these sectors became the

starting point. This holistic approach came up at more places in the world and nowadays everywhere people are working on the implementation of the ideas of integrated water management.

But, as can be expected, this process did not finish. A fifth stage is about to follow. It can be characterized as *interactive water management*. And again the development is directed to more complexity.

Before I go into more detail about the ins and outs of this concept, I want to pay some more attention to the integration aspect. It is still very important and will keep its value in the coming phases as well.

### **3 Integrated water management**

Integration in water management is the result of the water system approach, in which the total system of biotic and a-biotic elements of a certain water environment is taken into account. This leads to an integrated approach towards all the different elements of the watersystem that are subject of policy. For example surface water and ground water are part of the same system. Neglecting one, leads to unwanted results in the other. Further, the connection between the water and the land or the flora and fauna are stronger than expected before. Only when taking into account all elements of the complete watersystem, one can prevent damage to life sustaining processes.

When the ideas of sustainable development were launched by the Brundtland Commission (WCED, 1987), they could easily be incorporated in the concept. Although the practical results are still relatively small, in nearly every policy document, intergenerational responsibility is accepted. Sustainability though, consists of more principles than the care for future generations. It considers the social and economical conditions of the generations that live now and brings the viewpoint from a local to a global level.

The water system view leads to an integrated policy towards environment, fysical planning, economic activities, nature, water sectors, etcetera.

### **4 Interactive water management**

Presently the water system is still the central theme in water management. It remains valid in the same way safety and the supply to water sectors do. In interactive water management however, the water policy agencies are in a continuous interactive dialogue, both with the watersystem and the society system (Saeijs, 1995). The interactive approach of the water manager is the main difference with the preceding stages.

An interactive approach is more than a way of thinking. It is an attitude, a way of treating the environment. Not only respecting the natural environment, but also having an open mind for the social environment. It is based on the fact that man is in a mutual relationship with his surroundings.

The interactive view can be found in two different relations:

1. interaction between the water manager on the one side and the factors of the total water system on the other side;
2. interaction between the water manager and the different actors in society.

Firstly, interaction between water managers and the water system. This can also be called the ecological or the adaptive environmental management approach. Government adapts its policy to the processes in ecosystems. The water manager tries to follow, at every time, the most recent developments in the ecological system. This view results from the awareness that every water management starts with the water system itself.

While for every decision and for every management, reliable data are necessary, a very important condition for succesful water management is the monitoring of indicators of what is going on in the natural systems. In the earlier phases, these data were gathered only at the moment a decision had to be made. So nothing happened untill the moment the information was really needed. Every time a new problem arose, a new data campaign had to be started.

In the interactive approach however, water managers continously gather data of many different fysical, chemical and biological (system) parameters, so they follow the

developments in the water system. The results are put in, preferably GIS-based, models, that consider all kinds of relations. The models are updated periodically, according to the latest evaluations. So, at every moment an overview of the state of the art can be made. Although this kind of interaction with the water system fits very well in the integrated approach, it has never had the main attention.

The same can be said about the interaction between water manager and society. The changes in this field are perhaps even larger. Compared to the traditional approach, the influence of citizens on decision making differs considerably. In interactive water management, the public can participate actively in the decision making process. The relation between government and other societal actors is much more horizontal. All main planning procedures are opened for all stakeholders. They will not only be heard, they are invited to think together with the government agencies for the best solutions. In the meantime, the first experiences with this kind of interactive planning (CKC, 1998) in the Netherlands, have been gained. For example the INFRALAB process of Rijkswaterstaat (the central water agency) and the IPEA method of the consulting firm DHV (Van Rooy, 1995; 1996; 1997).

The "open planning process" has also been used for the interactive development of the latest long term policy document of the Dutch central government (V&W, 1997). All citizens are invited to think, together with the government, about new developments in water management. A few hundred specialists were even interviewed individually by government agencies about their opinions on goals and means for coming years.

Unfortunately, this government document has the geographic area of the Netherlands as a starting point. And that is not the most suitable level for the Dutch water systems. Both water quality and water quantity are dependent on upstream countries. It would have been better to have a centralised strategic, long term policy for the total water system of which the Netherlands are part. These are the river basins of the Rhine, the Meuse, the Scheldt and the Eems. This idea of centralisation of policy at the level of the complete river is part of the river basin concept (Teclaff, 1996). This concept is stressed in many international publications, for example the Rio Declaration (UNCED, 1992). In recent years most international agreements adopted the river basin as the most suitable unit of water policy. At this level at least coordination is required, according to the ECE-convention of Helsinki (ECE, 1992), the convention on non-navigational uses of transboundary watercourses of the UN (UN, 1997) and the draft framework directive on water policy for the European Union (EU, 1997).

If we translate this approach to practical use, than an open interactive planning procedure should concern a complete river basin. For example, all inhabitants of the river Rhine basin would have the opportunity to participate in the long term developments of the complete river. The total plan contains the main contours for the river basin, from the mountains in the Alps to the place where it flows into the North Sea. Operationalisation would take place by sub agencies, according to the main lines in the overall water system plan.

In fact, the International Rhine Commission already does some non binding planning for a large part of the river (from the Untersee to Rotterdam). But this concerns always sectors, like water quantity, ecology, migrating fish, and certain polluting substances. Hydrology and navigation even fall under other commissions.

This kind of developments not only depend on the ideas of water managers alone. As I stated before, the developments are very much connected to more general trends in society.

## **5 World wide trends**

When we look at the modernisation process of our society, we see some major changes taking place. The most eye-catching are globalisation, internationalisation and regionalisation. It is obvious that the disappearance of national borders is part of the current modernisation process. The interactive water management concept suits perfectly to this. But we can see other trends as well. For example, the "rentabilisation" of decision making. Everything has a price nowadays, and for every decision the financial profit seems to be the most important factor. Because common economic thinking does not imply the long term effects and the non-financial consequences, most environmental factors are not adequately taken into account.

Furthermore, there is a tendency that can be called the "horizontalisation of governance". It means that the command and control paradigm that allows the government agencies to

determine from an hierarchical position what citizens should do, is no longer the most popular. In modern society, citizens participate in the decision-making process in a more or less horizontal position compared to agencies.

Another trend is the "sustainabilisation" of society. It means that for every decision the long term and large scale effects have to be taken into account. It is a reaction to a tendency in modernisation to neglect the environment and the long term effects of human activities.

All these trends have impact on the ideas of how to manage waters. The question now is, how these trends influence the institutional arrangements of the water management.

## 6 Institutional arrangements

The latest concept of interactive water management consists of four basic components; the water system approach as a starting point, the river basin concept as a policy object, the interactive management and sustainable development. Combining these with the mentioned trends of modernisation, provides a good view of the institutional outlines of future water management. In table 1, the basic components are connected to some main institutional elements, like the types of organisation, policy and policy-instruments. The direction in which the water management will probably develop, now clearly becomes visible.

**Table 1.** Interactive institutional arrangements for water management.

Institutional arrangements in transboundary water management			
Main lines	Organisation	Policy	Instruments
Starting point = water system	Transboundary	border neglecting	river basin wide
Policy object = River basin	supra-national multidisciplinary	International integraton of planning	the one who profits and the one who pollutes have to pay
Style of management = Interactive	open & democratic	mutual & communicative	participation
Policy goal = Sustainability	long term, water system based	Strategical	collective

Because of its central position, some extra attention should be given to the interactive way of management. For better understanding, the horizontal management concept can be confronted with the vertical concept. This leads to the polarisation of table 2.

**Table 2.** Comparing concepts of governance; based on Geerlings (1997)

Indicator	Vertically	Horizontally
level of analysis	legal power vs. obedient citizen	Network of actors
perspective	central government	Interactive relations between actors
organisation	centralised	Decentralised
relations	hierarchical	Interdependent
indicator for succes of policy	realisation policy goal	Consensus
indicator for failure of policy	failure in realisation policy goal	Conflict
optimal result	obedience	Win-win situation
style of governance	dirigistic & rigid	Pluralistic & Dynamic

We can see the horizontalisation in the new agreement for the River Rhine. After some years of experience, the Rhine states formally decided that interaction with stakeholders by means of participation in the International Commission for Protection of the Rhine (ICPR, 1998) must be common practice. Bottom-up participation of inhabitants can be found in the work of the International Joint Commission between Canada and the USA (IJC, 1996; 1997; 1998; Dworsky et al., 1995). Actually, the 25 year old Great Lakes Water Quality Agreement can be considered as succesful. It was brought up by the requests of the people who lived in the Great Lake area, which was severely polluted in the early seventies. Although the water still is not completely clean, water quality improved considerably.

The use of horizontal policy instruments was quite new in the seventies, but the experiences of the IJC were positive. Nowadays in nearly all projects of the IJC, workshops and hearings are organised. Further every projectgroup consists partly of citizen members. The proce-dure starts with a meeting of the agencies and the different interest groups, like industry agriculture, recreation, nature, navigation etc. Then, public hearings are held. The information is collected in reports to the IJC commissioners.

Their final recommendations are combined with the technical reports with facts from special study boards. Positions of stakeholders are often noted in seperated reports as well.

Since the beginning of the nineties, comparable working methods can be found at the border area of Mexico and the USA (IBWC, 1996; 1998). Here the International Boundary and Water Commission (IBWC) is the water agency, but since 1994 the Border Environment Coordination Commission (BECC) plays an important role. This bilateral agency is a result from the NAFTA agreement and it certifies suitable projects for funding by the NADBank. The projects are suggested by inhabitants, communities and stakeholders of the border area (BECC, 1997). The procedure starts with the the checking by BECC on several criteria: technical, social, industrial waste, maintenance, and the principal that the user has to pay. The procedure for the approval is very transparent. All projects emerge bottom-up, but the central government stimulates community involvement with subsidies to local organisations for preparing project proposals. It is also possible that applicants for a grant obtain technical help. The total budget is 8 billion dollars.

These changes in governance can be seen as a paradigm shift. In the words of the General Secretary of the US-section of the IBWC, Manuel Ybarra, it leads to a "new era". After the start in the early nineties, it now has been fully implemented in the IBWC-work. In 1992 a Public Affairs Officer has been installed, since official policy includes publication of all information. Nowadays every project is accompanied by workshops and hearings with different stakeholders. Sometimes these stakeholders can have much influence. The new era implies that projects have become much more complicated, and many more agencies are involved in the work of the IBWC.

## 7 Future developments

As far as the interaction with society is concerned, it seems that the first elements of interactive water management already come into practice in the transboundary water management in Northern America and Western Europe.

Most other elements however, can not be found in practice, so the way to interactive water management on an international level is still long. But it might be helpful to see in advance which steps are probably on the way.

**Table 3.** Phases in implementation of interactive water management by a central river basin organisation.

INTEREST	TASK FOR THE CENTRAL ORGANISATION
Primary	a. policy plan on a strategic level for the total river basin
Technical cooperation	b. public information and data
	c. hearing of interest groups
	d. budget for ordering research (by other organisations)
	e. disposal of own household budget
	f. coordination of monitoring methods
	g. evaluation of policy implementation
	h. warning in situations of alarm
	i. negotiating role in international conflicts
secondary	a. strategic management plan on a regional level, based on parts of the river basin
interactive policy	b. interactive exchange of information
	c. open planning procedure
	d. own research and training
	e. own budget
	f. similarity in monitoring of system parameters (fysical, chemical and biological factors)
	g. continuous check of policy implementation
	h. preset procedure for alarm situations
	i. preset procedure for international conflicts
Tertiairy	a. all strategic water management competences on a central river basin level
supra-national	b. all operational water management competences on the level of a sub basins
interactive water	c. power of enforcement
management of river basins	d. court for decisions in conflict situations

As a possible trajectory, table 3 shows three steps. The first step is focused on intensive cooperation between water managers of the different countries. The most innovative river basin commissions are in this phase or make preparations to be there. The second step, which until now has not been made, focuses on integration of all elements of water management between the different countries. There is also interaction between the international water managers and the river system as well as between the managers and the society. The third step contains the situation of supra-national watermanagement of the complete river basin in the far future.

## 8 Conclusion

It is clear that historical developments, actual trends in society and experiences with current watermanagement influence the concept of water management. For the coming years, interaction can be considered as a new keyword.

Interaction can be found in the mutual relationship between the water managers and the

water systems they want to influence. And interaction can be found in the horizontal way agencies try to influence society. In other words: in integrated water management, citizens are given the possibility to express their opinion, but in interactive water management, people think together with the watermanagers, about the most desired developments. The question remains whether, and when, the actual developments will lead to a consequent translation of watersystem management on a supra-national level.

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