

**DEVELOPMENTS IN IRRIGATION FROM THE
PERSPECTIVE OF INTEGRATED WATER RESOURCE
MANAGEMENT**

An exploration of topics and institutions

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December 1999

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CONTENTS

1.	Introduction	2
2.	Water management and Sustainable Development	3
3.	Policies and practice of (irrigation) water management interventions in a historical context	6
4.	Irrigation water management within the framework of the development co-operation issue	9
5.	Points of departure of the Dutch DC policy with reference to irrigation and integrated water resource management	16
6.	Overview of selected organisations, institutions and networks in the field of irrigation and water management	18
	Literature	24

Annex 1: Facts and figures on water

Annex 2: Overview of selected organisations, institutions and networks
(page 1 – 92 annex)

1. Introduction

For some years now, the discussion on sustainable water resource management has occupied a prominent place on the international agenda of development issues. Besides organisations of water consumers and knowledge institutions specialised in water, governments, national and international policy organisations, development organisations, institutional networks and pressure groups give high priority to this topic. This relatively recent interest is remarkable. Not because it involves a new 'policy trend' that raises the interest of the world community through a snowball effect. On the contrary, it is remarkable because the topic has been included on the agenda only recently and has been neglected or postponed for so long. Only now, when the water crisis and water conflicts have become more generally visible and apparent – and are no longer exclusively restricted to marginal population groups in development countries – it is described as the big issue of the 21st Century. Only now, when possibilities to shift the consequences of the water crisis on to the poorest social sectors and local ecosystems are decreasing noticeably.

Recently, the conclusion that "water management is conflict management" has become part of the consensus of most national and international policymakers. Intensified water interests and increased water conflicts in the present crisis situation are directly connected. Generalised water shortage does not alter the fact that in general economically weaker groups have less means to defend their interests, "Water runs uphill to money".

The international debate and related policy modifications are based on the affirmation that the present policies at the international, national, and often local level are not adequate, causing growing problems and conflicts and threatening a sustainable future. The debate on desirable water management strategies and the discussions in the water management practice are intense. The running-in period to the Second World Water Forum in March 2000 shows that there is a supposed consensus on a 'world-water-view', but this consensus falls apart as soon as the level of abstractions and generalities is abandoned to focus on concrete objectives, policy strategies and implementing modes.

This document contains a short, general exploration of the water management issue with respect to irrigation, as this sector accounts for about 75% of the world consumption of fresh water. Special attention is dedicated to the (necessary) integrated approach of the development of irrigation within the framework of the management of catchments.¹ The successive areas for attention are the relation between water management and sustainable development, a general characterisation of policies and support of irrigation water management in a historical context, positioning of the (irrigation) water management issue within the framework of development co-operation, and the Dutch DC related to this subject. The document also includes a first exploration

¹ In this document, the Dutch term 'stroomgebied - catchment' will refer to the 'waterscheidingsgebied - watershed area' at the local, district and/or provincial level, in English, the term watershed area ('local') or (sub) catchment area ('district' or 'provincial' level; hydrological units do not always correspond to political – administrative borders) is often used, which are the levels at which SNV realises most activities. In literature, the term 'catchment' is also used at the national and international level, in English often '(river) basin'. In the exploration of institutional actors (annex 2) some attention will be given to this last level.

of the most relevant Dutch and international organisations and institutions that are active in the field of irrigation and integrated water resource management, as well as some important networks at the national and international level.²

2. Water Management and Sustainable Development

Although the presence of water in itself is no direct problem in most areas, water shortage is a fundamental and growing problem for large population groups and many ecosystems in the world. Besides the absolute lack of sufficient quantities of water, for many sectors of the population the lack of adequate quality water, the lack of water rights and access to the water available, and the lack of water when needed, is an enormous and life-threatening problem.³

In a parallel way to different ways of expression of water shortage, we observe that the existing management manners are often under great pressure. For example, this is caused by the increasing size of the population and growing consumption per capita, destruction of water regulating ecosystems, advancing farmland borders, water intensive crops focused on the market, expanding industries and in general, by new ways of and rules for water competition. Natural buffer capacities of local ecosystems and population groups – in order to absorb water shortage or excess – are being exceeded increasingly. Pollution of available water, depletion of groundwater reserves, erosion, farmland that becomes salty and is being destroyed, droughts and floods in one area, are often the consequence of man made water management practices. In addition to local causes, often broader social institutions and processes exert pressure on the available water and water quality. Therefore, sustainable development is blocked and made impossible more and more. This both with respect to ecological, institutional, socio-political and financial-economic and technological sustainability.

Because of the growing quality water shortage, problems are arising related to pollution of the different functions destined to water by different consumer groups or that are necessary for natural ecosystems. As a consequence, conflicts arise. Conflicts can arise in a certain consumer sector. With respect to irrigation, for example, the traditional conflict between head-enders (upper part of the system) and tail-enders (lower part of the system) is aggravated. But confrontations also increase between different interest groups of different consumer sectors in one region (irrigation, drinking water, industry, power, navigation, conservation, tourism, etc.). At the same time, sometimes conflicts arise between different catchments or nations. But these conflicts are not only related to conflicts of interests between different users who 'consume' water (the so called 'consumptive users', such as users in the irrigation and drinking water sector), also the so called 'non-consumptive users' (e.g. many industries, or power stations) have specific demands and wishes related to water supply. Moreover, even 'non-users' have

² This list includes a first, exploratory selection. A specific analysis with regard to the appropriateness of these institutions as partners for SNV does not form part of this study. Suggestions with respect to new initiatives to be developed jointly between SNV and its partners and possible options for co-operation North-South and South-South for water management topics have not been included explicitly in this document, but will be the subject of follow-up discussions in SNV. The same goes for the importance of the development of the institution's view on the water management topic, which should be the basis of those initiatives.

³ Excess of water is often the other side of the same picture. Deficient capacities to retain water and/or use water in an orderly manner on a certain place often leads to periodical flooding in other places.

to defend important interests in the water development they wish (e.g. building companies, politicians, donors). Hence, water conflicts are neither exclusively focused on the distribution of water between users (quantity, quality, time and place), nor are the conflicts limited to points of controversy on other water management rules (maintenance of water level, drainage, measures against flooding, etc.). There are interests that are often more far-reaching than the mere physical and organisational management of water.

Most water conflicts are local. Some are international.

Source: Volkskrant, 28 October 1999

Aggravation of the 'water crisis' does not only lead to a directly visible intensification of the connected conflicts. Most latent water conflicts are not expressed in public or do not openly explode, which is why the appearance of sustainable development and technological-productive progress often remains. This is the case in all those situations in which water is still accessible for the privileged social sectors, whereas weaker groups, who feel the worst consequences of water shortage do not have the possibility to raise their voice. Their problem is not heard and considered in negotiations on water management and distribution. The latter are often in a subordinate position within households (gender), in consumer organisations (tail-enders, poorest) or in the institutional – political environment (often indigenous or marginal population groups). Moreover, for some time it is often possible to shift the consequences of water shortage on to the environment, until the limit is reached.

On top of the fact that latent or overt conflicts are becoming more intensive, they are often of another nature and appearance. The reason is that new actors enter the arena (e.g. urbanisation or industry on indigenous farmlands), new technology is used (e.g. powerful pumps for the groundwater level to drop, or tunnels to transport water to neighbouring catchments), new policy instruments are applied (e.g. privatisation of water supply services) and/or new legal standards for distribution are introduced (e.g. marketing of privatised water rights). Locally existing institutes (rules and organisations) for mediation and conflict solutions in the field of water management are often no longer satisfactory or are simply overrun, and in many countries there are no legal-institutional structures to deal with or control these (new) conflicts in an effective and just way. The right of economically or politically strong actors has existed for ages, but is becoming stronger in many areas, because of the developing water crisis with its new rules.

Therefore, the shared concept that the development of sustainable water management both with respect to the system and the catchment can not be achieved using adequate technology only is growing in significance. It is also necessary to create and reinforce adequate, effective and just institutional management frameworks. For the water management to be integrated, all consumer sectors and different water management levels (from households to systems and catchments) should be represented in those institutional frameworks. Also less powerful actors should be in a position to negotiate in this framework. A legal framework, policy formulation and policy implementation – at the national level – should support and legitimise this requirement of local policy frameworks (sometimes with the need to establish international rules and platforms). In

most situations, practice is still far from theory. On the one hand, this is because practice is obstinate and not easily changeable through changes in policies and legal statutes. On the other hand, this is explained because of the enormous interests (both from various water consumer groups and 'external' interest groups and institutions) related to the access, regulation and development of water. The lack of agreement with respect to concrete policy strategies and implementing instruments is another important reason. Often, opinions on the effectiveness and justice of formulated possible solutions differ widely.

3. Policies and practice of (irrigation) water management interventions in a historical context

In this section, the recent history on policies and implementation of irrigation water management interventions will be shortly reviewed, and placed in the context of 'integrated water resource management'. Obviously, support of irrigation systems by the government or other 'external' institutions is a process that was already present in the early farming history. Some historically rich based an important part of their power on domination of irrigated farming through the social relationships irrigation practices require. Regulation and monitoring of the distribution of joys and burdens in irrigation turned out to be an important weapon. Also during the colonial period, in many conquered lands control of the government over the production process of the local population was reinforced. Often, each coloniser tried to introduce his own 'school' with respect to irrigation technology and management style - and the norms and rules connected with those. The inheritance of those schools still plays an important part in many developing countries, and it is often possible to directly recognise the former coloniser and his specific objectives based on the remaining technology. Below, we will shortly discuss some of the most important points of view on which irrigation interventions were based during the 'development era' (as from the fifties).⁴

Fifties and sixties: A technocratic approach, in which the development of irrigation was considered as technical support for the design and execution of infrastructure in large-scale irrigation systems. Colonial systems had to be maintained or rehabilitated, and new large scale systems were reorganised according to western technology, which was considered to be superior. Water management was exclusively concentrated on the operation and maintenance of this technical infrastructure. Locally existing technology and management logic were denied.

The most important formal objective was national economic growth, and often preparation for industrialisation and 'incorporation' of rural areas in the national economy. An informal objective of national governments in many cases consisted in the reproduction of government control and legitimacy of the state in the (young) nation. The dominant idea was that the advantages of the development irrigation would automatically find their way to all population groups when the irrigation systems, and therefore the national economy, were successful. In general, the attention from external support and policy – implicitly or explicitly – was focused on specific groups of farmers

⁴ Obviously, this classification is very general. The history of policies and intervention practices varies in every country and in every national or international institution, and application of the present policy views and intervention strategies in practice are often a local-historical reflection and combination of different trends and schools that dominated irrigation in the recent past. Moreover, in general the 'principal trends' in the same period arouse a strong reaction from critical undercurrents we can not discuss here.

with specific technological needs and capacities: companies that were supposed to be models for other families.

Seventies: Many of the interventions mentioned above failed, and in many cases the irrigation systems operated deficiently. It was also clear that the development of irrigation enhanced unequal distribution and social differentiation. As a reaction, on the one hand more attention was given to the management of the existing large scale systems, on the other hand more attention was given to the unequal distribution of 'benefits and burdens' in irrigation systems. New management methods were supposed to be the answer to organisational problems in governmental systems, and more attention was paid to system management when new systems were built. In real practice, the attention of concrete irrigation projects was often focused on 'on-farm' development of irrigation and training, without there being a coherent relationship with the development of integrated system management. For the latter aspect, it was common practice to set up a 'paper' consumer organisation, without discussing the institutional environment and/or governmental irrigation management.

At the same time as the 'basic needs approach' and target group approach in development co-operation, more attention was paid to the development of small scale irrigation systems, adapted technology and reinforcement of already existing 'indigenous' irrigation systems. The modernisation approach and related superiority of western irrigation technology were increasingly denounced by critical subcurrents, and in many countries Non Governmental Organisations started to support the process of (often small scale) development of irrigation. For the greater part, the rising participatory approaches did not agree well with the civil-technical basis and requirements of irrigation projects. The multidisciplinary approach, insofar as the importance of this approach was recognised, did not automatically lead to an interdisciplinary or integrated approach. In general, many irrigation projects were planned and executed as isolated activities. They were not related to other social and economic problems and activities of the population (especially not to activities of women). Very rarely, the consequences of the system were considered in a broader socio-geographical context.

Eighties: The developments mentioned before in the irrigation sector continue, but the main stream is characterised by the Structural Adjustment Policies (specific interpretation for irrigation) that played and still play an important role in many countries within development strategies. 'Turn-over', 'Irrigation Management Transfer', or the privatisation of the administration and/or infrastructure of state controlled irrigation systems to consumer organisations or other private institutions, is being prioritised. This remains unchanged up to now. The untransparent and bureaucratic management, the low cost-benefit ratio, the limited efficiency for water consumption and empty treasury are named among the most important reasons to transfer the systems to consumer organisations. Consumer organisations are expected to make the management more efficient and effective, although the need to make the system 'manageable' through organisational and infrastructure adjustments was and is not always taken into account during the transfer. In the debate in the international irrigation world, more attention is paid to the creation and reinforcement of consumer organisations, rehabilitation of infrastructure and adapted legislation. Since the eighties, the vague term 'participatory water management', and even 'self-governance' has been widely disseminated and is no longer reserved to the initiatives of non-governmental organisations only. The role of women in irrigation practices is increasingly recognised, although at present there are very few concrete projects and programmes that substantially pay attention to gender related problems, needs and potential in the irrigation sector.

Nineties: Besides the topic of privatisation or transfer of government controlled irrigation systems and other water related provision of services, the topic of privatisation of water rights and (far reaching) possibilities to commercialise water also emerges. Many policymaking bodies consider the market as the best mechanism to achieve that both water consumption and the provision of water related services would be more effective and efficient. Often, this has serious implications for the restructuring of the national water legislation in the corresponding countries ('getting the prices right'). The policy debate with regard to liberalisation is more and more a world debate ('globalisation'), as well as the protests and counterproposals. The latter in particular are aimed at the sharp edges of the privatisation model⁵, which are more and more visible in practice. Other trends are aimed at the universal pretensions of the privatisation concept itself.⁶ Many institutions consider the exchange of state monopolies for private monopolies in the field of water supply services to be a real danger, in view of the nature of water supply systems ('users can not go to another supplier').

The development in the past decades of a vision and policy with regard to water management in catchments is largely parallel to the development of a vision in the irrigation sector. This means that in this sector too development is focused firstly on technical and disciplinary activities of water management, isolated from their broader context (e.g. separate irrigation, drinking water, power supply, or forestry projects). Subsequently, a more integrated catchment policy was pursued. Since the seventies, the framework of concepts with respect to integrated water management (IWRM - integrated water resource management) appeared, but only in the last decade, for example during the UNCED Conference in R o de Janeiro (1992) this topic was prioritised for the first time in international policy discussions. It was adopted as one of the central topics to bind the international community in its striving for sustainability in the local, national and international sphere (Agenda 21). In the same year, the Dublin Principles were formulated and ratified internationally. Those should lead to filling in the policy:

- Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment;
- Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels;
- Women play a central part in the provision, management, and safeguarding of water;
- Water has an economic value in all its competing uses, and should be recognised as an economic good (ICWE, 1992).

In the development of policies over the years, more and more attention is paid to intersectoral relationships and interinstitutional co-operation in water management in catchments, as well as to programmes for consciousness raising and institutional capacity building. In a parallel way, there is an evolution in projects and programmes in catchment interventions from top-down strategies to participatory process approaches; and from state intervention to 'enabling legal frameworks', market regulation and/or non-governmental support.

⁵ For example: 'public-private partnerships' with so called 'client approaches' are more and more in the foreground as models for the development of irrigation systems and water management. In many countries, multi or bilateral social investment funds are introduced in the water sector to absorb the serious consequences of liberalisation for the poorest.

⁶ For example: 'effective water management requires co-operation and not competition as a basic principle'. Or: the danger of water accumulation to be enhanced with privileged groups.

In the policies of most bilateral DC agencies, this gave rise to a mix based on the evolutions mentioned above and the overall pillars of 'economic growth with fair distribution' (combat poverty), 'democratisation' and 'social and ecological sustainability':

- Water is an outstanding means to enhance economic growth, but the 'trickle-down' myth is replaced by target group approaches and gender policies.
- Decentralisation and local governance are translated into irrigation management transfer, capacity building and empowerment of local institutions within the perspective of water management.
- Social and ecological sustainability are translated into 'integrated water resource management' (IWRM),

advocating the replacement of isolated water projects by integrated projects with a multidisciplinary approach, which are often focused on the creation/reinforcement of decentralised management institutions in which different water consumption sectors and interest groups with respect to catchments co-operate with local governments and negotiate a sustainable and ecologically solid water management.⁷

As already stated, practice is often very different from policies and theory. Frequently, conformity is limited to an abstract level, and often there is no personal and financial capacity, concrete strategies and instruments, and/or the legal possibility and political will to apply them. Up to now, many plans only exist on paper. Besides, many policymakers and specialised knowledge institutions are elaborating new top-down models to restructure water rights and water services, adapted to the new vocabulary of Participatory Development and Integrated Water Resource Management. But it is remarkable how little these new models are based on knowledge and the specific views, needs and problems of water consumers in daily life.

4. Irrigation water management within the framework of the development co-operation issue

Besides the importance and strengths of irrigation, in the sections mentioned above the principal problems and other sides of the coin have been explained briefly. The recurring central water management issues within the issue of development co-operation can be summarised as follows:

- a. On the one hand: the often worsening water availability situation and the corresponding co-operation issues many areas have to cope with.
 - Growing water shortage, both in terms of quantity and quality, in correlation with disastrous consequences for the socio-productive environment of poor population groups and local ecosystems;

⁷ Institutional co-operation is not only considered to be an important water management strategy at system, catchment or national level. Also at multilateral level, there are more and more structures for co-operation, although those are often of a different nature. Typical initiatives are the World Water Council (international policy think-tank, especially focused on political influencing / consciousness raising) and the Global Water Partnership (especially focused on the application of policy instruments). Moreover, more and more attention is paid to international and regional water networks, often within the framework of enhanced integrated water management.

- Reduced possibilities of locally existing water management systems to respond to this shortage (or excess) in a sustainable manner, and denial of locally existing management structures and solutions;
- Growing inequality and injustice with regard to the distribution of benefits and disadvantages of water resource management;
- Increased water conflicts;
- The lack of an adequate institutional environment to deal with and control water management issues in an integrated way.

b. On the other hand: the issue regarding how development interventions can adequately react to the water management issues mentioned above so as to contribute to sustainable solutions. Not infrequently, water management interventions with support from development co-operation formed part of the problem. For example, in many cases constructed irrigation systems turned out not to function properly, not to be in accordance with the wishes of consumer groups, to enhance extremely unequal distribution or create water shortage in other places. Development co-operation initiatives from national policymakers and legal reformers turned out to be counterproductive for the marginal population groups in many cases.

The problems of and perspectives for the development of irrigation water management systems in a certain situation are closely linked to a series of 'characteristics of water' that are expressed within the social and technological context within which water is used. Below, we will mention some (non-depleting) basic characteristics that all interact.

Water is a fundamental source of life: The vital importance of water for mankind and the ecosystem, together with the exhaustibility and vulnerability of this natural resource and increasing conflicts caused by the distribution of water in terms of quantity and quality, causes 'water' to be a key topic within the development issue. It is an important challenge for development co-operation policies focused on social justice and ecological sustainability in self-managed living and production environments. Irrigation water is for many farmer families a basic condition to survive with dignity, and in many respects it makes life 'livable' in the countryside.

Extension of irrigated land in developing countries between 1960 and 1980 has led to a growth percentage of between 50 and 60% of the local production. Unlike any other input, irrigation water has the potential in many of the poorest areas to increase, intensify, diversify and/or guarantee production. With irrigation, on average crops yield twice as much as crops that depend on rainwater. Because of the population growth, the world food issue could not be answered, without intensification of irrigation as a partly solution. In many places in the world, local irrigation systems guarantee a secure and humane living environment, avoiding obligatory migration, urbanisation and impoverishment. Also, they are often the foundation of strong local organisational structures that in turn are the stepping stone for further socio-economic development. They also offer possibilities to support local ecosystems and their natural diversity. Sometimes, negative information on the development of irrigation gains the upper hand, but should not lead to throwing away the baby with the bath water.

Water has a wide range of functions and uses: Because water has a wide variety of functions and uses, in which the demand does not follow availability, water conflicts can be extremely intense. Within the same function or between different functions there is interaction and competition, which grow according to the shortage growing or the compatibility of functions and uses decreasing. Therefore, an analysis of interests, the definition of priorities, concertation and distribution are central aspects of the integrated water resource management.

Water connects and creates permanent dependency: In hydrological units, sources of water (rivers, groundwater, surface water, etc.) are directly connected. Because of the streaming quality of water and the limited (or abundant) usable quantity, water users are directly and strongly interdependent: often, the use, pollution, storage, or lack of water retaining capacity on a certain place, have important consequences for the users and ecosystems in other places (e.g. downstream) or at another moment (future). Development interventions can influence this dependency negatively or positively. The interdependency of different sources, users and functions requires an integrated approach that correctly analyses and responds to these dependency relations. Instead of isolated technical or social intervention approaches, the social, economic, institutional and technical aspects of water management should be linked.

In the catchment of the Nyanyadzi River in Zimbabwe many channels are drained from the river, controlled by groups of small farmers who often do not have legal but only 'local' rights. Regularly, there are big conflicts with families who do have official rights, most of them in the downstream state system. In its attempt to decentralise the national water administration, the government created 'catchment councils' in which users have to co-ordinate water management. This offers new perspectives for participatory water management, but also raises difficult questions: Who are the rightful members? Who should be the leaders? Should official or informal structures be respected? And especially: involvement of 'top-enders' is crucial, but how can their interest be aroused? Activities with direct advantages for these groups are essential. In experimental centres in the top-end, farmer proposals with respect to soils and water conservation are tested: interesting 'win-win options' (Bolding & Nyagwande 1998).

Water has a constructive and destructive nature: Water can create social links and facilitate a safe, productive, agro-ecological living environment, but it can also destroy this. The interdependence characteristic of water mentioned before entails that not infrequently the creative nature of water use in one place can have direct destructive consequences in another place. The challenge consists in finding conciliatory solutions, and changing the destructive powers of water in creative powers.

The value and shortage of water are socially defined: Because of the different sources of water, different functions of water and use of water by actors with different objectives and a different background (class, gender, ethnicity, religion, etc.) the value assigned to water often varies per consumer group and situation. In some cases, the assigned value could be market-economic, whereas this would be disastrous in other cases. Often, it is impossible to interchange the different 'values of water' just like that. The perception actors have on shortage and efficiency is directly related to the functions of water and social definition of the value of water. The perception of shortage and value are often time dependent (season). A differentiated analysis that considers the different social, economic and ecological values of water in an integrated manner is needed. Universal rating concepts or merely volumetric 'supply-demand' comparisons deny the complexity of the water issue.

In Chile, a privatisation model was introduced that focuses mainly on the market. Not only water supply services (such as irrigation management) but also water rights have been privatised drastically. And, for example, the law does not prioritise drinking water over industrial water use: the market has to define the 'real value' and the highest bidder has priority. Speculation and monopolisation of water rights by large mining and power companies have enormous consequences for water management especially by marginal Indian villages and small farmers, who were often not able to defend their rights. Collective irrigation systems are sometimes disordered through the individualisation of water rights, and monopolisation of the power of decision by well-to-do groups (Hendriks 1998; Castro 2000).

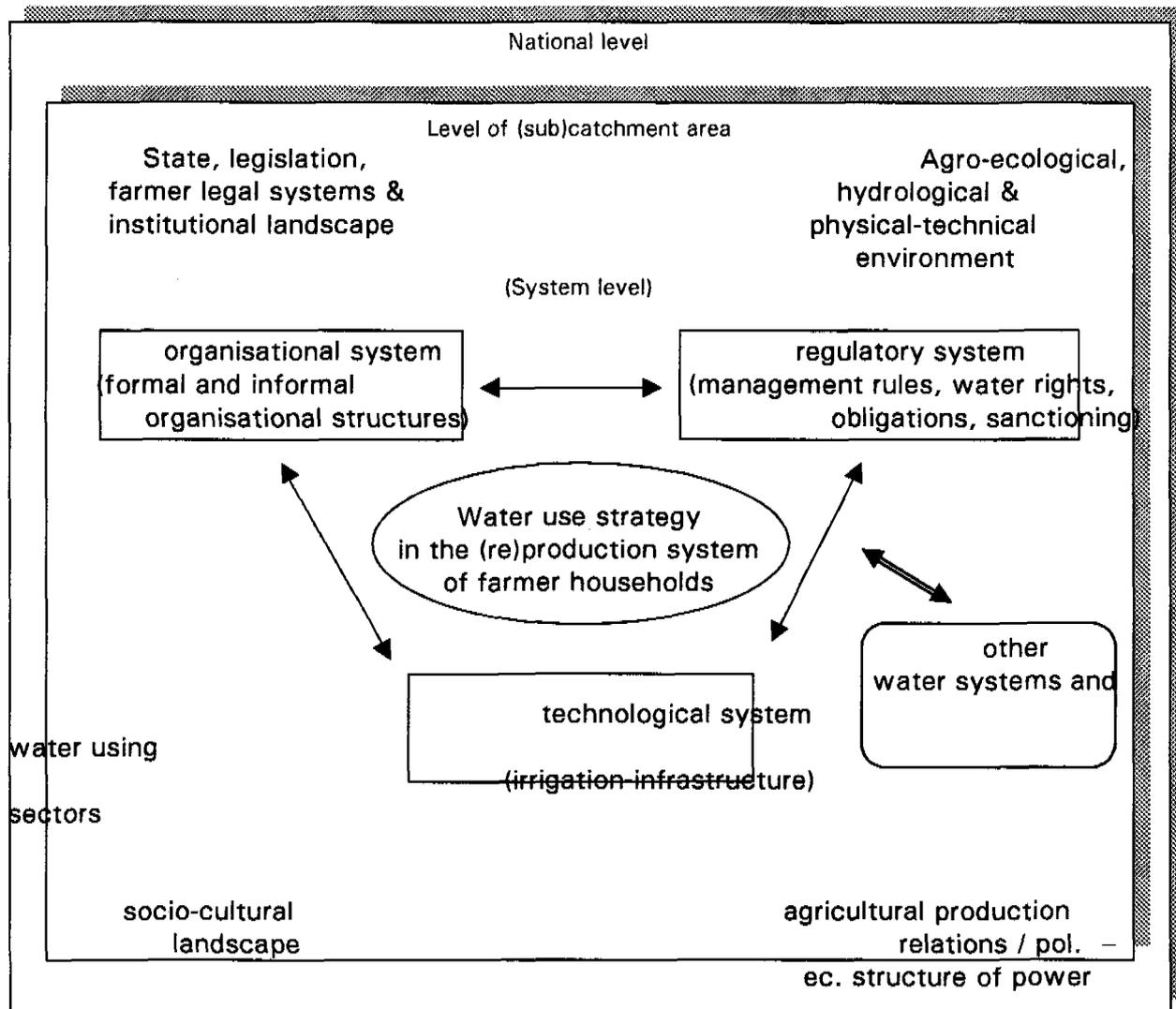
Water has economic potential: The economic potential of water is enormous. In general, increased productivity and productive security with respect to irrigation water drastically surpass every other input or management measure in (rain dependent) agriculture. Also in other consumer sectors, water has often an enormous economic potential (industry, power supply, etc.). The economic potential is also expressed in the generating capacity of ecosystems, and secondary productive activities that are possible if the availability for life and survival is no longer a restrictive factor: water development is economic development in a direct and indirect sense. Economic interests, in particular in situations of shortage, is also one of the central factors for which there are intensive struggles for water. The existing and growing unequal distribution of water rights, actual access to water and water provision services in favour of socio-economically privileged groups is the other side of the coin. Policies and intervention strategies could have a reinforcing role in this context, but they could also try to avoid social differentiation through water development.

Water is a social and political power: The characteristics mentioned above converge on the fact that water represents considerable social and political power in many situations. This could be a suppressing power, demanding institutional and legal frameworks to control this power. But it could also be a generating and emancipating power. Water management is inherent in co-operation, interdependency, and in most cases – for example, irrigation systems - it requires permanent collective action to guarantee supply. Strong organisations are often necessary, also to respond to the variable, unpredictable nature of both water and its natural and institutional environment. Individuals can not control those systems. This implies the possibility for topics related to collective social action and empowerment of organisations to be prominent within the context of water resource management. This could also have important secondary effects on the improved position of water user groups outside the direct domain of the water sector.

Irrigation organisations in countries such as Colombia, India and Ecuador, sometimes consisting of small farmers and indigenous people, sometimes organised on the basis of their water consumer identity, have increasingly observed that water-‘bottlenecks’ are not to be found only at the level of the system, but also in broader social areas. Therefore, on top of internal organisational empowerment, horizontal links (partnerships with other consumer organisations) and vertical strategic partnerships (federations, networks, etc.) are very important. For them, the incorporation of these strategies in permanent collective irrigation actions at base level – also safeguarding the social and productive basis – implies the possibility to work on effective ‘empowerment’, ‘countervailing power’ and space for negotiation.

The topics mentioned above clearly show that water management is more than merely an attempt to control the factor water (control of the physical process, technical manipulation of water). It is also related to control of the behaviour of persons and organisations (organisational control). Besides, it is strongly related to socio-economic and political control of social groups and processes and the having or acquiring of control over the distribution of rights and responsibilities (Mollinga, 1998). In the diagram below, the frameworks within which the development of irrigation water management takes place are outlined.

International level



The development of irrigation within the framework of integrated water resource management should not limit the 'integrated' nature to hydrological levels on which water developments take place and should be related. A multi or interdisciplinary approach is not satisfactory either. Sustainable and just water development also requires integration of the different dimensions of the social (irrigation) water issue mentioned before.

The development of a national policy, the formulation of an appropriate legal framework and the creation of a national administration in which the development of irrigation is not merely considered to be the development of infrastructure, are extremely important for integrated water management. At this level, development co-operation could perform an important supportive role. Without a coherent vision, national policy and supportive measures, management transfer, decentralisation and state interventions in irrigation systems will usually lead to an unjustified disintegration of the national irrigation potential.

With regard to concrete activities within the framework of development interventions to support local irrigation systems, it is possible to further distinguish the principal activities the water consumer organisations should undertake. An integrated approach analyses and interrelates these 'groups of activities' (e.g. see Uphoff 1986; Mollinga 1998; Boelens & Davila 1998):

- ✓ Management activities related to management of the factor 'water' (such as acquisition, storage, assignation, distribution, provision and possible drainage),

The way in which water rights are defined and distributed in local farmer irrigation practices often varies per system, and often sharply contrasts with the uniform way in which the national government formulates and assigns water rights. Yoder and Martin (1998) outline how a water rights system took shape in an irrigation system at the foot of the Nepalese Himalayas in the course of some decades. Water rights had to be gained by means of labour or other investments, but could be negotiated between communities and families afterwards. If the negotiations failed, and if there was no outcome that reflected local 'justice', sometimes, a new canal was built that runs next to an already existing channel over a long distance. The logic of these solutions and local rules are often not understood by the intervening technicians, in this case the Nepalese government, and often external (for example, national) rules and organisational structures are imposed that might seriously undermine the sustainability of local irrigation and legal systems.

- ✓ Management activities related to management of the factor 'infrastructure' (design, construction, operation, maintenance and adaptation),

Water shortage in the Andes region, the often small water levels villages have to deal with and the steep hills that are susceptible to erosion and that are irrigated have lead to the design of many small scale irrigation systems supported by SNV with adapted – sometimes experimental – sprinkler systems. These systems adequately use the available quantity of water. In many cases, this offers the possibility to expand the irrigated farmland and the number of beneficiary families.

- ✓ Management activities related to management of the factor 'internal organisation' (such as planning and decision-making, conflict management, management and use of resources, co-ordination and communication, monitoring and evaluation),

Empowerment of the user organisation in farmer controlled systems is not only a matter of training and information, or of the introduction of the correct organisation chart to control technical infrastructure. Experiences in interactive irrigation development projects such as PATA (Pakistan), TIP (Tanzania) and Licto (Ecuador) show that the participatory approach and empowerment of user organisations occurs simultaneously and in interaction with the design and execution of the infrastructure system and the regulatory system (management rules, rights and obligations). Support by means of collective, interactive actions, investigation and communication strategies are very important in this respect.

- ✓ Management activities related to management of the agro-ecological potential (for example, crop improvement and crop diversification, soil and water conservation, integrated disease control, etc.).

Increased food production was the main objective of the Mahaweli Ganga Irrigation Project in Sri Lanka. A couple of years after completion of the system, research in one of the irrigation sectors showed that, in spite of an improved overall rice production, chronic malnourishment especially in women and children had increased and, in terms of percentage, was the highest in Sri Lanka: 38,5% versus 6,6% nationally. Reason: women could no longer cultivate their diversified set of foodstuffs, as the farmland was destined to irrigated rice crops. This was largely the domain of men, who also controlled the profits of these cash crops. This was at the expense of financial resources for the household and a varied diet (Schrijvers 1986; Zwarteveen 1994).

- ✓ Management activities related to the positioning in a broader institutional framework (relation with legislation and market, concertation with other water users in the catchment area, networking in the institutional context, negotiation and partnership capacity, etc.).

In order to be able to defend its interests the water user organisation should operate outside the immediate borders of its own system. Negotiation, co-operation, and concertation with other institutional actors is crucial for survival, empowerment and for a fair and integrated water management outside the system level. A couple of institutions, for example SNV and the University of Wageningen, are analysing how this process could be supported through a participatory water management programme at the inter Andes level. Action-research and capacity-building in the catchment areas for the benefit of understanding local water management and water rights, reinforcement of participatory interventions, co-ordination between management organisations and improvement of the legal-administrative framework are important challenges. The exchange between the participating catchments and countries can imply an important surplus value, both for water management in the Andes and for organisations and institutions outside the Andes region.

Each one of these groups of activities within the context of the development of irrigation is directly and specifically related to other groups, and with the possibilities and obstacles for the integrated management of water in catchment areas.⁸ The way in which this relationship is expressed varies for every situation.

For the elaboration of an effective development policy and sustainable water intervention strategy, it is essential for the supporting development bodies to develop their own vision in the field of water resource management. The concrete policy and/or intervention mix, the combinations of the information required, capacities, partners, contacts, applicable instruments, means, activities to be undertaken, and the levels at which they operate (e.g. local, (sub)catchment and/or national) do not only depend on the local water issue and the interests expressed by the persons involved. They should also result from a vision on water management on behalf of the intervening development entities. A thorough vision, with political and institutional points of view on the water conflict and water distribution issue, makes it possible to combine the

⁸ At a more general level of analysis and policymaking, a distinction can be made between different institutional basic functions of water management. The realisation of these functions is usually divided among different actors (Ubels & Wevers 1996):

- ✓ functions related to policymaking and strategic planning
- ✓ functions related to regulation and use of water
- ✓ operational functions

different pieces mentioned above of the water management puzzle. Such a vision on water management and conflicts of interests makes it possible to relate local water management practices to the development issue, and translate them into effective intervention strategies.⁹

5. Points of departure of the Dutch DC policy with reference to irrigation and integrated water resource management

For some years now, the Dutch DC policy has advocated an integrated water resource management. This means that for policymaking on water management the following aspects should be taken into consideration: all ecological aspects related to the natural resource water, the interests of different consumers involved (consumptive and non-consumptive users), the relevant policy frameworks and all relevant institutional levels (international, national, provincial, local, household and intra-household level). The development of irrigation should be considered within this framework, just like other water-related activities. The Dutch policy related to support for the development of an integrated water management is embedded in the starting points of the Dutch DC policy: "**poverty alleviation** through the sustainable enhancement of livelihoods, the enhancement of **equity** (including **gender equity**) and **sustainable ecosystems maintenance**" (NEDA 1998a).

In order to develop policy and intervention strategies with respect to integrated water management, NEDA (1998a) mentions the following central elements:

- a. Looking for an equilibrium in water needs of different user groups / sectors in situations of water shortage;
- b. Formulating management possibilities in which the advantages for different interest groups are optimum, while the quality and sustainability of the natural resource and the ecosystem are being safeguarded;
- c. Developing a management type in which the quality and quantity of water for other (downstream) users and places is not affected;
- d. Minimising the effects of the uncertain and variable nature of water;
- e. Applying or developing the most adequate management systems that facilitate an integrated water resource management.

Two key areas are distinguished with regard to DC activities:

- the creation and empowerment of institutional capacities to actually achieve an integrated water management, and
- support for adequate compliance with different water user functions.

Within the framework of capacity-building support should be given to reinforcement of local water management institutions. At the same time, the state organisation for water management should be restructured: its role should be less executive and more *facilitating and regulatory* and it should focus more on *monitoring and arbitration*. Dutch

⁹ The vision on water management can vary in different development agencies, as well as the way in which water management issues and concepts are welded together within the actual analytical framework and are translated into a concrete intervention policy. Without this vision the activities will often lack coherence, effectiveness and sustainability and unintentionally they will be counterproductive for certain groups. Also the terms connected with the conceptual frameworks of 'integrated water resource management' or 'participatory water development' stay on the air.

DC activities will support the decentralisation of governmental authority in the field of water resource management. Topics related to consciousness, research and development of technology and information systems will be prioritised, as well as the empowerment of institutional networks and think-tanks in the field of integrated water management.

Support for a variety of water user functions should not be given in an isolated way, but within the framework of a broader, more sustainable institutional context. Water for domestic use for urban and rural groups of poor people has absolute priority (drinking water, water purification, sanitation, etc.). Besides, the topic of food security and security of the socio-productive environment is a central aspect (e.g. irrigation water management, fisheries, water related food sources). A third aspect that is emphasised is the conservation and management of ecosystems, and a fourth the risk and disaster aspect of water (e.g. danger of flooding and natural disasters) (NEDA 1998a).

With regard to the field of irrigation: this water use function is considered as an important area for special attention in the Dutch DC policy (NEDA 1998b), as irrigated agriculture performs a key task in the food security issue. 'Sustainable irrigated agriculture' is the central topic as the development of irrigation often has strong disadvantages: land degradation and land becoming salty, ecological degeneration, extraction of groundwater, water related diseases, social differentiation and conflicts, etc. Therefore, Dutch support will only be provided if different irrigation related sustainability conditions are being considered: there are criteria both for social (e.g. gender), institutional, ecological, technical, financial and economic sustainability. Among other things, this means that those projects that can avoid a negative impact on the environment and guarantee long term benefits for poor population groups, both for men and women, will be supported by NEDA. Anyway, according to NEDA, support for the development of irrigation is only justifiable in case food production and food security can not be achieved sufficiently by means of supporting rain dependent agriculture.

In order to develop or improve sustainable irrigated agriculture, the following priority problem fields should be supported:

- improvement of water management, from the industrial level
- increase of sustainability and efficiency of existing irrigation systems
- development of small scale local systems
- integration of irrigated agriculture within the broader issue of water resource management

The important areas for attention that are mentioned are:

- development of a coherent, integrated and decentralised national policy in the corresponding developing countries;
- participation of user groups in all phases of the irrigation development process; participation of local communal institutions, NGOs and women's groups if possible; participatory water management (if possible, both with regard to organisation and finances); generation of property rights by means of investments by user groups;
- avoiding harmful effects for the environment; enhance activities that contribute in a positive sense to agricultural production and the ecological context;
- reinforcement of supportive services for irrigation water user groups (training, inputs, marketing, etc.)

Research and training programmes on sustainable irrigated agriculture will also be prioritised. Finally, NEDA thinks it is very important to improve donor co-ordination,

aimed at supporting sustainable irrigated agriculture and integrated water management (NEDA 1998b).

6. Overview of selected organisations, institutions and networks in the field of irrigation and water management

As a part of the exploratory analysis, a first selection was made of important national and international organisations, institutions and networks that operate in the field of water management. This selection is detailed in Annex 2. The table below presents the selected organisations and institutions. They are national and international institutions specialised in or involved in the topic of irrigation and water resource management in developing countries, as well as representative organisations for water management and use in the Netherlands. This presentation of institutions is based on information provided by the institutions themselves.

Selection – The organisations described below were chosen on the basis of the following considerations:

- The organisations actively operate in the field of integrated water management, irrigation, watershed management, river basin management, etc. Organisations that mainly focus on 'Drinking Water and Sanitation' have not been included in this analysis.
- Organisations that are specialised, prominent and/or otherwise unavoidable in the analysed field / field of policy.
- The water boards (*Waterschap*) have been described because they are in charge of the integrated water management in the Netherlands.
- SNV itself has not been included as it does not fall within the scope of the assignment.
- Complementary criterion: the organisations are active in SNV countries.

Subdivision – The analysed organisations have been subdivided according to:

- home base: in the Netherlands (national) or outside the Netherlands (international). This is not related to their working area. Many national organisations are also active outside the Netherlands.
- key activities / principal objective, 5 of which have been named:
 1. the execution of water management activities, programmes and projects, the development and supply / sale of products
 2. the exchange of expertise, research (results), methodologies and other knowledge with and within professional groups
 3. the exchange of knowledge, experience, ways of action, etc. with respect to a politically formulated goal, policy influencing or within the framework of a single activity
 4. education, research and training
 5. pursuit of profit(most organisations score on more than one criterion; the less defining ones have been placed between brackets in the overview (X)).

	Programme, project, product or management	Exchange, network of professionals	Politics, lobby, single network	Education, training, research	Commercial
International					
IWRA		X	(X)		
WWC			X		
ICID		X			
IIED	(X)		X		
IPTRID	(X)	X			
IFPRI	(X)		(X)	X	
GWP		(X)	X		
World Bank	X				
IADB	X				
AFRICAN DB	X				
ASIAN DB	X				
FAO	X				
INPIM	(X)	X	X		
IWMI	(X)			X	
IHP-Unesco	(X)	X		X	
ICOLD		X			
INBO			X		
Académie de l'Eau			X		
Cemagref	X				
Cirad	X				
IATP			X		
ECLAC	X			X	
WRI			X	X	
National					
IRC	X			X	
IHE DELFT	(X)			X	
ITC/WRES	(X)			X	
WUR				X	
DLO SC	(X)			X	
IAC	(X)	(X)		X	
KIT	X			X	
ILRI	X	(X)		X	
NWP			X		
NOVIB	X				
Hivos	X				
ICCO					
SAWA	X				X
ETC	X				X
IWACO/HAS-KONING	X				X
DHV	X				X
Euroconsult	X				X
Water Management in the Netherlands					
Water boards	X				
STOWA	X				

Table 1: selected organisations, institutions and networks.

Conclusions with respect to the exploration of institutions

International

- The most prominent programme and project executors are the FAO, World Bank and the Interamerican, African and Asian Development Bank.
- Specialised organisations that execute projects (especially research projects) and/or are active in policy influencing or lobbying (INPIM and IFPRI) seem to be more interesting for SNV than those organisations that (almost) exclusively operate in the field of interprofesional exchange (IWRA, IPTRID, ICID).
- GWP and WWC are networks that have been on the rise during the last couple of years and the central aim of which is (international) policymaking.
- IHP of UNESCO is a large network for the exchange of knowledge. From the Netherlands, mainly technical disciplines (e.g. Delft) are present in this network .

National

- In general, specialised Dutch organisations and companies enjoy a good reputation in the professional 'water world'. This is shown through the many links with the analysed international organisations and the large amount of contacts.
- The key activities of most analysed organisations are: education, training and research. All of these organisations carry out investigations outside the Netherlands: some give advice, realise missions and evaluations or otherwise sell their knowledge / product. ILRI, IHE Delft, ITC/WRES, KIT and IRC are the educational / research organisations with the clearest (semi-commercial) project department (programmes, projects, services and products).

Dutch water management organisations

- The water boards manage water in the Netherlands. This management is related to protection against water (dikes), control of the water level (quantity of water) and the guaranteeing of the quality of water. Together with STOWA, the supportive organisation for, among others, the water boards, they are active only in the Netherlands. Contrary to waterworks (VWN, Vewin), during elaboration of the inventory, no links with water management organisations or professionals in the South have been detected.

The principal evolutions in the field of water management in the Netherlands are included in the following boxes¹⁰.

¹⁰ Taken and revised from 'Waterbeheer in Nederland 1999 – Water Resource Management in the Netherlands 1999', of the Commission for Integrated Water Management (Commissie Integraal Waterbeheer – CIW). The CIW is the administrative consultative structure for concertation of policies and the execution of the integrated water management. The Interprovincial Consultative Structure, the Water Board Association, the Association of Dutch Municipalities and the Ministries of Transport and Communications, Public Housing, Town and Country Planning and Environmental Policies and Agriculture, Conservation and Fisheries participate in this structure.

Water resource management in the Netherlands; box 1: important topics

At present, safety, pollution and contamination (emissions and bottoms of water) and drought are important topics in water resource management in the Netherlands.

Drought, the problem

Drought is not the consequence of a series of dry years, but of too much and too quick draining of soils. In water management, drought means that 'structurally there is too little adequate quality water for an area the principal or secondary function of which is nature'. According to this definition, approximately 6.000 km², more or less 1/7 of the Netherlands suffers from drought. Drought is one of the main causes of degradation of large natural areas in our country. Recovery of dried out areas does not only require measures in the nature reserve itself, but in many cases also in surrounding areas with other functions, for example agriculture. This requires an integrated approach that should be elaborated for and focused on specific areas. According to national objectives, dried out areas with a nature function should be decreased by 25 per cent in 2000 and 40 per cent by the year 2010, in comparison with reference year 1985. The drought map of 1998 shows that almost 410 km² of recovery projects have been carried out. Projects that have been executed in part or are still being executed cover 720 km² and 430 km²., respectively, amounting to 1.560 km², which represents approximately 25 per cent of the dried out areas that were listed in 1998 (6.050 km²).

Drought, the approach

Drainage and draining of rural areas, especially for agriculture, are the cause of drought for almost 60 per cent (italicisation (italics RB/BH)). Approximately 30 per cent is caused by the extraction of groundwater. The other 10 per cent has different causes. Combating drought is done for example by moving or ending the extraction of groundwater, taking measures within the framework of land use and measures taken by water boards and conservationist organisations. Some examples:

According to a prognosis of the Association for Water Works Operators (VEWIN) water works are increasingly successful to transfer to surface water as raw material for preparing tap water. This is why it is possible to stabilise or even push back the ground water exploitation. Other types of groundwater use can be restricted as well, for example the use of groundwater for sprinkling.

In nine of all twelve provinces agreements have been subscribed with different parties involved, in which combating drought is one of the topics. Some of these agreements are declarations of intent, some are agreements covering entire provinces or regions. Topics, such as 'sprinkling to size' and 'optimum water management in agriculture' are also included in agreements.

In half of the provinces damages caused by drought in agriculture are the subject of policies. Some of the spearheads are: avoiding damages caused by drought, combating drought and simultaneous pushing back of damages caused by drought, sprinkling, planning of sprinkling and (fresh) water conservation.

At the end of 1998, the Centre for Agriculture and Environment, in collaboration with the National Research Programme for Drought published a brochure, titled: 'farmers with water', in which some possibilities are described for farmers to tackle drought and damages caused by drought.

Through different modalities, the state subsidises the fight against drought. Some important initiatives are: land use, regulation of contributions for Environmental Policies focused on Specific Regions, the Survival Plan for Woods and Nature and the regulation of contributions for the fight against drought in specific regions (GEBEVE).

Within the framework of the GEBEVE regulation, projects focused on the fight against drought are subsidised for a maximum of 50 per cent of the starting-up expenses. If it is not possible to avoid damages to neighbouring farmland because of technical adjustments, in some situations 50 per cent of a single compensation for the corresponding farm is subsidised as well. As of the year 2001, subsidies for the fight against drought will form part of a new interdepartmental regulation of contributions for policies focused on specific regions. With this new interdepartmental regulation of contributions, 20 to 24 millions of guilders will be available per year for subsidising the fight against drought focused on specific areas. This regulation destines a total amount of approximately 100 millions of guilders a year to an integrated approach focused on regions of different (environmental) topics, one of which is drought (CIW 1999)

Water resource management in the Netherlands; box 2: new spearhead 'Water and space'

During the last years, more space for water and more elastic water systems are being advocated. The development of a vision on the spatial aspects of water management is strongly influenced by the correcting influence of water itself. Water did not get the space it needed, so it took that space. In 1993 and 1995 it became clear for everybody that water, stuck between dykes, in case of peaks in fluvial drainage has only one way to go: upwards! In the autumn of 1998, it was clear that in the lower parts of our country the storage capacity of water systems in polders and polder outlets is too small and can not be depended on for drainage to other waters. These events are the forerunner of what we can expect as a result of a rise in the sea level, sinking soils and increasing peaks in rainwater drainage. Apart from the safety aspect, the idea that water should have a stronger organising action for the spatial organisation of the Netherlands is gaining ground. It should be seriously considered in all situations in which the use of space is being discussed: the design of the structure of economic activities, in urban development and regional planning, the development of concepts for logistical connections in the future of conveyance of goods and passengers and, last but not least, for maintaining and renewing our landscape and cultural identity.

Catchment management

Water systems need space to safely absorb their own dynamics. Some of the measures that should be taken to safely cope with the whims of nature are: widening the flow-through-profile of river beds, organisation of temporary flooding areas, extension of storage possibilities, introduction of flexible water level management. Both in river areas and the big inland waterways and on the coast it is possible to invest in safety by reserving space for more natural and therefore more flexible river banks. In this approach, strong measures are only applied as final measures. Especially for rivers, it is an absolute 'must' to depart from the catchment approach, because it is one closed system, in which the supply of water in one area and the drainage of water in another area, national and international, are related. Moreover, catchments are natural units that are apt for integrated management and administration, both in the national (water boards) and international sphere.

Natural storage and buffering

What goes for drainage of excessive water also goes for the supply of fresh water. The need for fresh water, for example for agriculture, should not depend on or should depend very little on water supplies in other areas. That starting point can be achieved to a great extent by conserving groundwater of the region itself or water in overdimensioned water systems or flooding areas. Another solution consists in reducing the need for fresh water by changing the function of a certain area. For example, we can ask ourselves whether it is sensible to continue draining salty water to crops that are susceptible to salt, such as iceberg lettuce and bulbs. Drinking water collection by means of extracting groundwater should, especially in those areas where groundwater is scarce and that are threatened by drought, be moved. In urban areas, rain water should be disconnected from the system of sewers. Water in the cities should be incorporated in the catchment area it forms part of without any restrictions.

Water nature

Water carries the water nature: even more, water is the first necessity of life of the entire nature. Water nature needs space. A real robust nature should have minimum dimensions to give vegetation and animal species the chance to survive independently. In what other places in our country can we still find those extensive and non fragmented areas if not on, in and alongside the water?

At least as important as the large scale characteristics are the unperturbed connections between natural reserves. River bank areas, brooks, canals and lakes are extremely adequate for that purpose. The condition is that there should be enough space for the development of a variety of riverbank vegetation..

Multiple use of space

The multiple use of space is necessary because of a lack of space, but also because this offers a variety of opportunities. When the water storage capacity of an area is extended by reserving (farm)land for temporary storage of water, different ways of use are possible in a simultaneous or consecutive way. Water storage is perfectly compatible with the development of water nature. The extensive management of grasslands is compatible with recreation, agrarian nature and landscape management, water storage, the production of drinking water, etc. (CIW 1999).

Water resource management in the Netherlands; box 3: organisational renewal

Water policies are no longer isolated policies. They are closely connected with the environmental policy, conservation policy and environmental policies. Concertation and co-operation with these policy fields is necessary. At provincial level, more and more initiatives are being taken to achieve integrated planning. Objectives are achieved through the generic execution focused on specific areas.

Joint financing is being worked on for policies focused on specific areas on the basis of policy visions. Within the framework of the VROM project *Ontschotten en Ontstapelen*, different streams of subsidies have been combined. Financing itself will be defined in so called area contracts. Co-operation between municipalities and water boards is increasing, for example in the field of water in the cities, in which both have administrative responsibilities. The creation of all-in water boards, with tasks in the field of water management, dams and dykes and purification continue. *The expenses for water management will be borne directly by companies, institutions and households* (italics BH). A controlled development of the burden of expenses is aimed at. If necessary, financing will come from general means.

The Association of Water Boards has created a Commission for the Investigation of Financing Structures (Togtema Commission) to analyse how the financing of water board responsibilities should be structured in the future. The Interprovincial Consultative Structure (IPO) will start an investigation in 1999 with respect to the administrative composition of water boards.

In April of 1998, the Togtema Commission issued an intermediate report. The key aspect of this report is a drastic proposal to make a distinction between water system management and purification management. It is proposed to finance all tasks related to water system management from one water system levy and the expenses for purification management from a purification levy. Halfway 1998 this intermediate report was amply discussed. The reactions have caused a series of issues to be revised more thoroughly. The final report of the commission is expected by half 1999 (CIW 1999).

The IPO investigation will explore what will be the most desirable composition in the future of the water boards. Some of the important aspects in this respect are: the development with respect to the future financing structure of the water boards, an evaluation of the water board elections, co-operation in the water chain, coherence between water and environmental planning and regulations of the European Union. The investigation will be concluded in the year 2000.

Literature

- Boelens, R. & G. Dávila, 1998. *Searching for equity. Conceptions of Justice and Equity in peasant irrigation*. Van Gorcum Publishers, Assen.
- Bolding, A. & L. Nyagwande, 1998. *Challenges of organising catchment councils*. ILEIA Newsletter vol. 14, no. 1, July 1998.
- Castro, M., 2000 (forthcoming). 'Indigenous water rights and official law in Chile.' In: *Water rights and Empowerment*. Boelens & Hoogendam (eds.).
- CEPAL, 1998. *Ordenamiento político-institucional para la gestión del agua*, CEPAL, Santiago, Chile.
- Dourojeanni, A., 1992. *Políticas de gestión integral de aguas y políticas económicas*. CEPAL, Santiago, Chile.
- ECLAC (CEPAL), 1994. *Sharing responsibility for river basin management*. Santiago, Chile.
- Gleick, P.H., 1998. *The world's water 1998 – 1999: The biennial report on freshwater*. Island Press, Washinton, D.C..
- Harpham, T., & L. Anelay, 1999. 'After roads and dams: what role for engineers in the poverty reduction strategies of bilateral development agencies?', In: *Journal of International Development* 11, p. 811 – 823.
- Hendriks, J., 1998. 'Water as private property. Notes on the case of Chile'. In: Boelens & Dávila, *Searching for equity. Conceptions of Justice and Equity in peasant irrigation*. Van Gorcum, Assen.
- ICWE, 1992. *The Dublin Statement and Report of the Conference*. International Conference on Water and the Environment, Dublin, Ireland.
- Jones, I.J. , 1995. *The World Bank and Irrigation*. World Bank, Washington, D.C.
- Meinzen-Dick, R. 1996. *Policy trends in farmer participation*. Paper for the Workshop on Institutional Reform in Indian Irrigation, November 1996, NCAER-IFPRI, New Delhi.
- Ministerie van Buitenlandse Zaken/ Minister voor Ontwikkelingssamenwerking, 1990. *Een wereld van verschil. Nieuwe kaders voor ontwikkelingssamenwerking in de jaren negentig*. SDU Uitgeverij, Den Haag.
- Mollinga, P., 1998. *On the water front*. PhD thesis, Wageningen Agricultural University.
- Netherlands Ministry of Foreign Affairs, 1995. *Aid in Progress: Development Cooperation and the Review of the Dutch Foreign Policy*. Ministry of Foreign Affairs -DGIS, The Hague
- NEDA, 1998a. *Water for the Future. Integrated Water Resource Management: Policy Priorities for Netherlands Development Assistance*. Diphooorn, B. (ed.), Ministry of Foreign Affairs, NEDA, The Hague.
- NEDA 1998b. *Sustainable Irrigated Agriculture. Policy and Best Practice Document no. 1*, Roelofs, K. (ed.), Ministry of Foreign Affairs, NEDA, Den Haag.
- Rees, J.A., 1998. *Regulation and private participation in the water and sanitation sector*. TAC paper no.1, Global Water Partnership, Stockholm.
- Schrijvers, J., 1986. 'Blueprint for undernutrition'. In: *Mothers for life: motherhood and marginalization in the North Central Province of Sri Lanka*, Eburon, Delft.
- Solanes, M. & F. Gonzalez-Villareal, 1999, *The Dublin Principles for water as reflected in a comparative assessment of institutional and legal arrangements for Integrated Water Resource Management*, TAC paper no.3, Global Water Partnership, Stockholm.
- Ubels, J. & A. Wevers, 1996. Assistance to capacity building for integrated water management: a comparison of Netherlands support to water sectors in 6 countries, Ministry of Foreign Affairs, DGIS, The Hague / OECD-DAC, Rome.
- UNCED, 1992. *Agenda 21. Chapter 18, Freshwater*. United Nations Publications.

- Uphoff, N., 1986. *Improving international irrigation with farmer participation. Getting the process right*. Studies in Water Policy and Management no. 11, Westview Press, Boulder and London.
- Yoder, R., & E. Martin, 1998. 'Water rights and equity issues. A case from Nepal'. In: Boelens & Dávila, *Searching for equity. Conceptions of Justice and Equity in peasant irrigation*. Van Gorcum, Assen.
- Zwarteveen, M. 1994. *Gender Issues, Water Issues*. IIMI, Colombo.
- Zwarteveen, M., 1999. *Trends in Participatory Water Management. A review of the literature*. IWACO.