Living with Water

Ruimte voor Water|Waarden van Water

17 February 2003

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1 SUMMARY

Water management in the 21st century

The Netherlands has been shaped by ages of water level management and land reclamation. These activities have created the space required for our high standard of living. This was partly realized at the expense of space for water and thus of our country's resilience to react to changes. Climate changes and soil subsidence threaten the Netherlands' existence. There is more rainfall over shorter periods of time and the rainwater flows more quickly, because of lack of storage capacity in the soil, towards surface water. Heavy storms are endangering our coast. This dramatically increases the chances of flooding and other problems caused by water. Moreover, drainage of the low polders causes soil subsidence and thus an increased need for pumping capacity. However, in summer less precipitation and more evaporation will result in water depletion and salinization. Next to that, the water system is influenced by various claims on the available space and a changing use of this space. Less space is available for water storage. We have been forced to conclude that our technological approach to water management has reached its limits.

Water management problems are not limited to the Netherlands. The annual damage caused by floods and drought is gigantic and will further increase in the years to come. The recent floods in the southeast of Germany and in the Czech Republic, accounted for several billions of euros in damage, not counting the costs of immaterial damage. Worldwide crops fail on a large scale year after year, which has major human and economic consequences.

Looking at our own country it is clear that drastic changes in the Dutch water management are required: changing from *keeping the water out* to *accommodating the water.* The required changes lead to numerous questions and problems.
It is clear that these themes are not restricted to a technical approach; the interaction with other disciplines is considered to be of the utmost importance. This is related to the fact that water management, spatial planning and social processes are badly attuned so far. Although the attention clearly focussed on this aspect in recent years, it will be the central theme for research programmes such as LIVING WITH WATER.

The LIVING WITH WATER initiative

In September 2001 the initiating group RUIMTE VOOR WATER|WAARDEN VAN WATER (RVW|WVW) has submitted an Expression of Interest in order to obtain a subsidy for a programme to address the problems mentioned above. The proposal received an A rating. Subsequently the initiating group focussed on organizing the consortium [1] and writing this Knowledge Project Plan with the title LIVING WITH WATER. This title reflects the essence of the problems related to Space for water and Values of Water. It is about *a different way of living with water,* with a proper balance between the various claims on space, the needs of society and water management.

The mission of the programme LIVING WITH WATER has been formulated as follows:

Mobilizing, developing, focusing, embedding and making applicable the knowledge required to strengthen knowledge infrastructure in the Netherlands to attune in a sustainable manner LIVING WITH WATER *with spatial developments in support of safety, welfare and the economy in the 21st century*

Research topics within the Knowledge Project Plan

The research topics are linked to four, so called 'knowledge themes'. For each of the knowledge themes a scientific theme coordinator has been invited who will supervise the scientific level of the knowledge theme. Distinguished are the following themes:

[1] For the composition and the members of the consortium see Chapter 7 and Appendix 1.

1. Communication
The research topics focus on:
- The creation of support for new water management plans.
- The involvement of citizens and private companies in the changes in water management.
- The exchange of (new) developed knowledge between different actors in the water management practise.

Scientific coordinators: Prof. Ir. C. van Woerkum (Wageningen University & Research Centre)
Dr. J.M. Gutteling (Technical University Twente).

2. Valuation of water
The research topics focus on:
- The role of risk perception and the acceptance of risks of flooding and other problems caused by water and of 'space for water' measures.
- The valuation, appreciation and perception of water in our culture.
- An improved valuation of the public function of water and water management in economic and non-economic valuation terms (cost–benefit analysis and cost effectiveness of 'space for water' measures).

Scientific coordinators: Prof. dr. W. Hafkamp (Erasmus University).
Prof. dr. H. Verbruggen (Free University Amsterdam).

3. Management and Institutional arrangements
The research topics focus on:
- New administrative arrangements in a democratic society, tailored to water problems at various scale levels with various types of measures.
- Administrative - legal complications in case of cross-border water projects.
- New concepts for interactive decision making and the participation of citizens in decision making.

Scientific coordinator: Prof. dr. Th.A.J. Toonen (State University Limburg)

4. Functioning of water systems
The research topics focus on:
- The (multiple) effects on the water system, ecology, agriculture, economy, etc., induced by new water management measures.
- Design of innovative water-management scenarios, tailored to foreseen developments such as floods, draughts and land subsidence.
- The optimum and cost-effective construction of water-management measures in the complex infrastructure in the Netherlands.

Scientific coordinator: Prof. dr. ir. M. Stive (Technical University Delft).

The manner in which the key issues are delineated differs strongly per area. The programme LIVING WITH WATER distinguishes 5 area types:
- *Coast and sea*. Related to sustainable multiple use of space, the rising of the sea water level, salt water intrusion and the occurrence of heavier storms.
- *River area*. Related to the greater variety in discharges and the new policies of the EU Water Framework.
- *The low Netherlands*. Related to the regional water systems, partly characterized by higher groundwater levels and a need for water storage, and partly by lower water levels and a need for replenishment and redistribution.
- *The high Netherlands*. Related to lower (ground) water levels during dry periods and the need for storage facilities to prevent peak discharges.
- *Urban areas*. Related to qualitative and quantitative water problems, scarcity of space, shortage of spatial quality and the need for innovative concepts for sustainable and intensive/high quality use of space with water (storage).

The linking of knowledge themes and area types results in a matrix (see figure 1.1), representing the scope of the research programme.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

The scientific base for the programme

Within the programme projects are conducted innovatively, with the objective of connecting two lines of research:

1. *Innovative executive research*

Each of the projects with innovative executive research linked to practice will bring together a mixture of technical and socio-economic disciplines in order to develop and apply the knowledge required for sustainable and feasible solutions to bottlenecks in water management in collaboration with all stakeholders.

2. *Fundamental scientific research*

In order to be able to responsibly conduct such innovative practical projects, the available fundamental scientific knowledge is often inadequate. In these fields investments in fundamental research are required. This particularly involves knowledge regarding the functioning of water systems, the valuation of water, the control and the organization of innovations in water management and on the role of communication in a transition processes.

The scientific challenge of LIVING WITH WATER is focussed on interfacing different sciences such as natural science, economy, sociology etc. in a water-management setting. Scientists and practical water managers are collectively responsible for one final product. This work method is innovative as appears from the reactions of the many international contacts of the consortium members. People from other countries are very interested in the ICES/KIS formula.

The proposed Knowledge Project Plan is related to the European research programmes. A number of the consortium members are actively involved in major research programmes, like Catchmod, Interreg-projects and HARMONICOP. Meanwhile the broad outlines of the Sixth Framework Programme have become clear with two relevant themes:

- *Environment and sustainable development.*
- *Citizens and administration in a knowledge society.*

Part of the project proposals submitted for this programme clearly interface with these European themes. A number of them are applying for a subsidy partly from the programme at hand and partly from Brussels. In about 20% of the projects international collaboration is proposed.

The economic relevance

The question whether a Bsik subsidy is necessary can be answered by the following arguments:

- Integral knowledge development has to be stimulated in the traditional field of the compartmentalized water world.
- It is essential for mobilizing, focussing, strengthening and embedding socio-economic knowledge on water management. This knowledge has than to be linked with the technical knowledge.
- The knowledge requiring parties can be stimulated to jointly define their questions so that these can be answered cost effectively by the expertise providers.
- It will promote private partners to increase their R&D investments.
- It will stimulate parties to generate the required knowledge regarding long-term processes and to apply this to their projects.
- It is will assist to strengthen social awareness of the water issue as well as acceptance of the spatial and social changes required.
- The export possibilities are increased when activities are conducted that introduce Dutch stakeholders to the international market.
- The economic and societal interests have been increasing last 50 years tremendously to such a degree, that it is necessary to reduce the chance of a failing water system to keep the risks acceptable.

The ICES/KIS III contribution of € 26.8 million over a period of 4 years is only about 1 promille of the total costs of water management during that period. Improvement of the efficiency with 5% would mean a return of investment within 2 years.

The projects

Meanwhile the initiating group has assembled 50 project proposals (see Appendix 5), 19 of which qualify to be selected in the first round and a possible start up immediately after acceptance of the programme (see Appendix 6). These 19 projects reflect very well the scope of the programme with a good mix of innovative practical and fundamental research projects with a budget of about 40% of the anticipated programme budget. The rest of the budget can be used for the next tendering rounds, making it possible to address changing needs, opportunities and priorities.

Organizational structure

A large number of parties, parties requiring knowledge as well as knowledge providers, are represented in the consortium. The responsibilities of the various bodies can be described as follows:

Board
The board with responsibilities for control and realization of the mission and the strategic objectives, assignment and supervising the programme management, the "knowledge engine" and the WAR.

Programme management
The programme LIVING WITH WATER will be managed by a programme office. This office initiates, supervises and monitors the realization of research projects, including all accompanying operational aspects.

Knowledge engine
The knowledge engine develops monitors and innovates the knowledge agenda. They have an important task in signalling new research topics, selecting projects, supervising ongoing projects and the transfer of knowledge.

Scientific Advisory Council
The task of the scientific advisory council (WAR) is to monitor the scientific quality of the programme. When assessing research proposals and projects in the fundamental and strategic research programme, the WAR will be supported by NWO.

The names and CV's of the candidates for the different positions in board, programme management, WAR and knowledge engine are available upon request.

Proposals can be submitted biannually, followed by a careful procedure for selection and contracting. A supervisory committee, including a programme coordinator, representatives from the project consortium and members of the knowledge engine, will supervise ongoing projects. Quality assurance is an important element in the realization of projects, along with knowledge development and knowledge transfer. NWO will assist with assessments of fundamental research projects, reviews and mid-term and end evaluation.

Collaboration within and outside the consortium

Within the programme collaboration will occur in projects, platforms, supervising committees and communities of practice. The use of digital means of communication will be optimised in order to avoid travel time and traffic jams. Creative forms of art and music, games and interaction will be used to make collaboration attractive and successful.

There will be collaboration with a large number of parties and bodies in order to achieve synergy. To maximize synergy, the strategy is collaboration rather than demarcation and protection between programmes. In the new ICES/KIS III programme initial collaboration will be within the "8 for Space". In addition to that, links will be established with programmes like "Economic, social and cultural dynamics in the urbanized Netherlands", "3D Dynamic Sustainable Delta" and "Moving in Space".

Agreements have been made with the Innovatienetwerk Groene Ruimte and Agrocluster. At the interfaces of agriculture and nature and space for water, collaboration and harmonization will be organized.
Special arrangements have been made with the initiatives of Delft Cluster and Climate Changes Spatial Planning. In those areas where close co-operation can achieve additional (scientific) output, so called 'bridge programmes' have been defined. These bridge programmes include a further elaboration of key issues and the specific research questions. Three of these bridge programmes have been elaborated and three so-called bridge projects have been included in this proposal. These bridge projects are at a sufficient level to be submitted for approval immediately after the start of the programme
If possible, the bridge project model will also be used for the collaboration with other programmes (SRG2, ECON, etc).

Knowledge: dissemination and transfer

The dissemination of knowledge primarily occurs among the various parties involved in the projects. Within a project the information is exchanged via:

- The regular consultation structure of the core groups and the supervising committees.
- The web-based project site, accessible to all those taking part in the project.
- (Digital) sub-reports and progress reports.
- (Digital) final reports, fact sheets, presentations and articles, which will eventually be published at the digital platform of the programme.

Knowledge transfer with parties outside the project will have to be more explicitly arranged. Funds for this transfer will have to be set aside (about 4-5%) on project level and also on programme level. A knowledge transfer infrastructure will be set-up to handle the transfer of knowledge with:

- A digital platform for posting the interim reports and final reports of knowledge development projects, for internal communication, for discussions, etc.
- A number of communities of practice will be set up.
- A knowledge platform (the so-called Knowledge Integration Sessions, KIS) where every project will present its progress, problems and new ideas at least annually.
- A series of all sorts of creative activities (symposiums, training programmes, coaching sessions, games) to propagate the message from the projects and other activities.
- Publications in specialist and scientific journals, a newsletter with facts and the latest news.
- Contribution to (post-academial) training courses and workshops, to transfer the knowledge.

Since effective knowledge transfer is not easy, a number of knowledge transfer parties will be included in the consortium that will support this process with their educational and didactical know-how. Involving training institutes into the projects will stimulate embedding of the knowledge into education.

Finances: budget and coverage

Budget

- For the research projects the total amount is estimated at € 42,000,000.
- The total costs for programming, transfer of knowledge and communication amount to € 1,810,000. With a programme scope of 45.2 million euros, this is about 4%.
- The total costs for management and organization thus amount to € 1,390,000. With a programme scope of 45.2 million euros, this is 3%.
- The total budget needed for the programme is estimated to be € 45,200,000.
- The Bsik subsidy applied for is € 26,800,000, being 59%.

Table 1.1 Summary of the programme costs (in € for 4 years excl. VAT)

1. Research	42,000,000
2. Programming, transfer of knowledge and communication	1,810,000
3. Management & organization	1,390,000
Total (excl. VAT)	**45,200,000**

Coverage

For the programme LIVING WITH WATER the stakeholders have submitted at print of this plan commitments for the total amount of more than € 16,000,000 (see Appendix 1). Besides. many other stakeholders have committed themselves to provide the co-financing of projects under condition of an adequate set-up of those projects. The rest of the co-financing will be generated from the stakeholders during the execution of the programme in order to respond to new priorities and opportunities in the market.

2 BACKGROUND

2.1 The rationale of the knowledge project

The Netherlands has been shaped by ages of water level management and land reclamation. These activities have created the space required for our high standard of living. However, we have been forced to conclude that our technological approach to water management has reached its limits. Climate changes and soil subsidence threaten the Netherlands' existence. The country is getting wetter in winter. This dramatically increases the chances of flooding and other problems caused by water. In summer less precipitation and more evaporation will result in water depletion and salinization. Moreover, the water system is influenced by various claims on the available space and a changing use of this space.

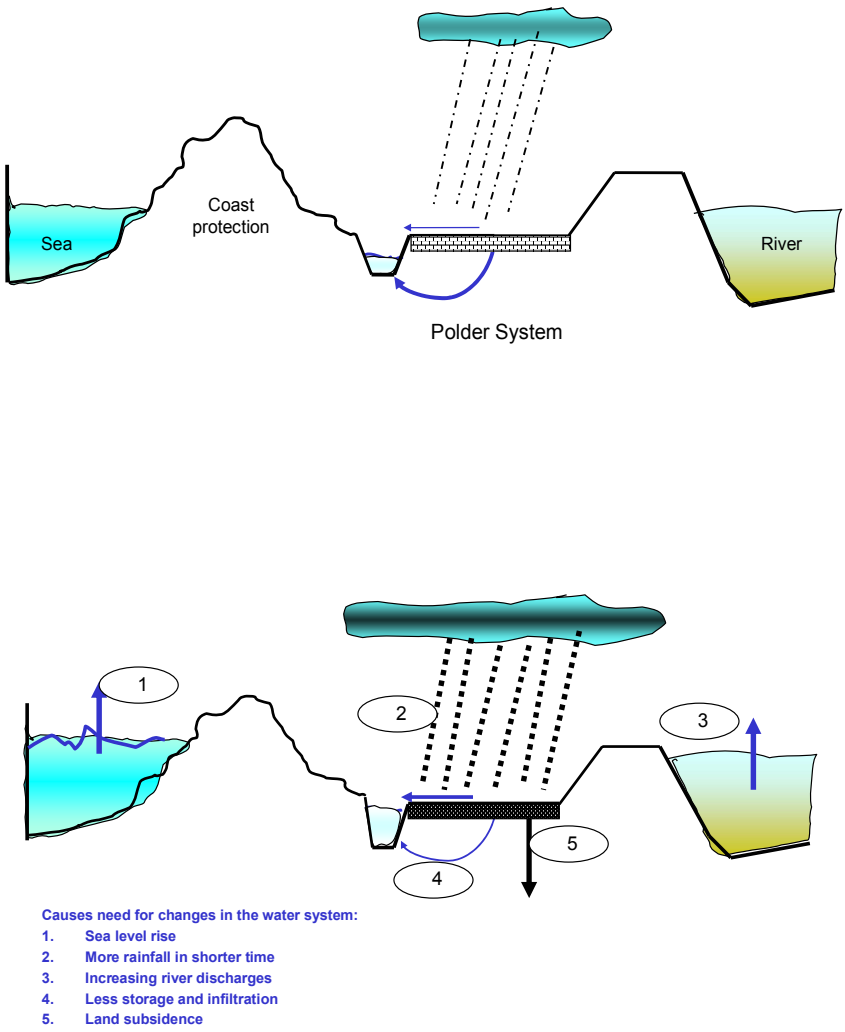

Figure 2.1 . Developments for the Water System

Drastic changes in the Dutch water management are required: from *keeping the water out* to *accommodating the water.* The required changes lead to numerous questions and problems. The programming report '*Over Stromen'* (NRLO, RMNO, ATW, 2000) includes an exploration of the knowledge and innovation tasks in the field of water management in the Netherlands. According to these advisory councils the approach has to be changed drastically and new knowledge and insights will have to be gained, particularly in the relations between water management and social environment.

The exploration also states that the following themes have to be given priority:

- The perception of water.
- The valuation of water.
- Participatory planning in water management.
- Inter-administrative management of water and space.

These themes with a predominantly socio-economic character cannot (yet) be absorbed by the present knowledge infrastructure, or at least to a much lesser extent than (new) technical knowledge can.

In its point of view in response to the '*Over Stromen'* report, the government states the following:

"In order to be able to adequately address the new knowledge themes, the water-related knowledge infrastructure will have to be adapted. This adaptation, which is considered to be essential, fits in with the government's vision and keeps track with a number of major developments the knowledge infrastructure is facing in a broad sense. On the one hand this change involves social developments (such as the changing relationships between authorities, administrators and citizens) and on the other hand this involves internationalization (increasing international competition and international co-operation).

Moreover, specifically in relation to the world of knowledge, a strong tendency can be observed towards inter-disciplinary and trans-disciplinary aspects of knowledge development, which is partly in reaction to the increasingly complex societal demands.

In this context the government vision includes having the water-related knowledge infrastructure focus more strongly on collaboration within and beyond disciplinary boundaries, on further fine-tuning of the parties requiring and providing knowledge and on filling gaps in the current knowledge."

In view of the characteristics of the current work domain realization of this task requires the following subjects:

- Bottlenecks and tasks will have to be addressed by *multiple* stakeholders in a *new and innovative* way in order to realize the stated goals.
- Some organizational and concentrating activities are desired, because both the requiring and the providing sides are extensive and scattered. A *programmed* approach may lead to the *required cohesion*.
- Fields of knowledge that are so new that no existing network is yet available, require a *strengthening of the knowledge infrastructure* in order to realize an exchange of knowledge between projects.

The Government point of view 'Anders Omgaan Met Water', in response to the Water Policy in the 21st century (WB21), discusses the new knowledge themes. The Government specifically links realization of the set objectives to ICES/KIS III initiative.

"The ministries involved will make room for the new knowledge themes within the existing research programmes. This may include knowledge themes such as the perception of floods and 'wet feet', the valuation of water, multiple use of space for water, insurance against water damage, etc. Inter-departmental consultations will be held when investigations into these new knowledge themes begin. A good example is the current preparation of ICES/KIS III, in which a large number of the above mentioned knowledge themes will be involved."

In September 2001 the initiating group RUIMTE VOOR WATER|WAARDEN VAN WATER (Space for water |Values of Water) has submitted an Expression of Interest in order to obtain a subsidy for a programme including the elements mentioned above, from the ICES/KIS III investment stimulus. This involves a coherent knowledge investment programme, which focuses on the development of the above mentioned knowledge and innovation tasks for LIVING WITH WATER.

This spring the government defined its position. Water and Space have been selected as main policy points for ICES/KIS III. The proposal RUIMTE VOOR WATER|WAARDEN VAN WATER received an A-rating. Subsequently the initiating group focussed on writing this Knowledge Project Plan with the title LIVING WITH WATER. This title reflects the essence of the problems related to Space for Water and Values of Water.

2.2 The relationship between the knowledge project and the activities of the members of the knowledge consortium

The objective of this programme is to realize a new way of water management as discussed in policy memorandums such as '*Anders Omgaan Met Water'* (WB21), 'De '*Vijfde Nota Ruimtelijke Ordening*' (the Fifth Memorandum on Spatial Planning) and '*Over Stromen'*. The core business of the parties participating in the consortium is water management, though each has its own knowledge requirements and skills. In this context it can be stated that both knowledge and perception are scattered among national and regional water managers, and between water managers on the one hand and administrators, politicians, social organizations and citizens on the other. Obviously many forms of collaboration exist. However, the unique feature of the ICES/KIS programme is that collaboration takes place on a project base with shared responsibilities for a collective result that fits in a coherent programme. The programme will function as a engine for the collaboration between the compartmentalized parties. The various parties have to be introduced within a strengthened network to enable an effective interface with the various fields of knowledge, knowledge requiring parties and knowledge developments.
Thus a broad consortium[1] has been composed, characterized by four properties (for acronyms and abbreviations see Appendix 1):

1. The knowledge *requiring* parties will act as pioneers within the consortium. This group consists of the organizations that will have to implement the new water management. In addition to the authorities (such as *'Rijkswaterstaat*', RIZA and RIKZ, water boards, provinces and municipalities) this group includes organized interest groups (such as ANWB and the Stichting Natuur en Milieu), water and field managers (Staatsbosbeheer, Provinciale Landschappen, Stichting Natuurmonumenten), project developers and financiers. They will indicate the requirements regarding water management in the 21st century.
2. The entire knowledge *chain*, ranging from universities to executive construction companies is well represented in the consortium. Collaboration among these groups ensures the development and circulation of knowledge from theory to the field, but will also lead to (applied) scientific research that better addresses the practical questions from the field.
3. The consortium includes specialists from the fields of *natural and socio-economic* sciences, since apart from the technical aspects the issues involve major socio-economic components. Because knowledge transfer is a major aspect of the investment package, the consortium also includes a number of organizations that specifically focus on this aspect.
4. The consortium is open in nature. Other parties are invited to participate.

In the present consortium spatial planning, the construction industry, and the socio-economic studies in particular, are relatively poorly represented. It appears that the 'water world' does not have sufficient relations with these fields at present. A great deal of attention is paid to this aspect in the programme design. Moreover the objective of further developing these collaborative relations is one of the arguments for initiating such a programme with an ICES/KIS stimulus. Therefore a great effort last months has been taken to invite these groups to join the consortium and to formulate project proposals with resulting in about 5 additional project proposals from socio-economic research groups (see Appendix 5, 6 and 7).

2.3 Strategy, context and objectives

The mission of the programme LIVING WITH WATER has been formulated as follows:

Mobilizing, developing, focusing, embedding and making applicable the knowledge required to strengthen knowledge infrastructure in the Netherlands to attune in a sustainable manner LIVING WITH WATER *with spatial developments in support of safety, welfare and the economy in the 21st century*

[2] For the composition and the members of the consortium see Chapter 7 and Appendix 1.

This mission includes a number of aspects that provide direction for the programme.

- LIVING WITH WATER is a wide notion in which the aspects of safety, multiple use of space with room for water, the perception of water and the economic value of water play a role. Moreover the perception of water plays a role in developments in the use of space, as well as the *economy* and the cost effectiveness of measures that are deemed necessary.
- *Mobilization* of knowledge is desired because the available knowledge is scattered and the knowledge input from the socio-economic studies in particular, is insufficiently integrated into water management.
- *Development* of new knowledge in the correct context is desired in view of the special new tasks in the years to come.
- *Focusing* knowledge has several dimensions. On the one hand a conscientious fine-tuning of the various disciplines with the objective of achieving a better final result and on the other hand a strengthening knowledge infrastructure.
- *Embedding* knowledge and making the knowledge *applicable*. This cannot be realized without knowledge transfer, the exchange of knowledge within and among the projects, within the programme and with stakeholders outside the programme.

This leads to the following two objectives:

1. *Strengthening* the knowledge infrastructure with the objective of *building bridges* and enabling *a flow of knowledge* among the many parties involved. Knowledge development by private parties is linked up with knowledge development in the public sector. Thus scientific knowledge is linked to the operational and material knowledge of the relevant stakeholders in society.

2. *Development and fine-tuning of the socio-economic knowledge* regarding the Water and Space themes in collaboration with the technical natural scientific knowledge already available or to be further developed. This will allow for improved underpinning of social and administrative decisions. Moreover, trends in social needs for open communication and spatial quality will be anticipated, as well as changing administrative decision-making processes and spatial economic developments.

In order to realize this mission and these objectives a programme is proposed based on the following general strategy:

- Set up a coherent programme of projects based on a sound inventory of knowledge requirements and possible solutions for the dominant bottlenecks in water management.
- Initiate and award project proposals in such a way that the entire scope of the programme is eventually covered.
- Start the projects gradually within a period of three years, so that the changing needs of the society and the market can be adequately taken into account, and so that the available capacity of all the stakeholders can be handled in a responsible way.
- A balanced mixture of the necessary disciplines (socio-economic and natural sciences) and stakeholders (knowledge requiring parties and expertise providers, ranging from fundamental scientists to people from the practice) for every project, as well as contractual obligations regarding collaboration and transfer of knowledge.
- Initiating definition studies, often smaller and more risky projects, in which new forms of collaboration or new concepts can be tested for their feasibility.
- A coherent knowledge transfer programme that, in addition to a consistent programme of projects, initiates and stimulates network and knowledge transfer activities, communities of practice, training, workshops, web sites, etc.
- An open network/consortium, supported by a pro-active and stimulating programme office.

In view of the objective of demonstrating the scope of the programme, assessing the commitment of the stakeholders and making it possible for the programme to get off to a flying start, the initiating group has not only formulated more comprehensive knowledge parameters and 'terms of reference', but also called for project proposals. These have been included in Chapter 6 and the Appendices 5, 6 and 7. The proposals vary from mere project ideas to virtually fully elaborated project plans. All projects have been assessed by the initiating group and fit in with the mission of the LIVING WITH WATER programme. About 19 of the well-elaborated plans, the so-called *bait projects*, will be used in this business plan to illustrate the nature and the type of the research within the programme. Together these projects cover the entire scope of the programme. Moreover, the financial commitment for these projects has (almost) been arranged.

They are expected to be among the first projects to be submitted for approval. The first round of selected proposals will involve about 40% of the requested budget. In the course of the programme other projects, those currently not fully elaborated as well as completely new project ideas, will be added. This strategy is designed to leave open the possibility for accommodating new developments, social and market demands as well as parties currently not participating in the consortium.

3 KNOWLEDGE PROJECT: PROBLEM DEFINITION

3.1 Problem definition

> From the proceedings of the Water Knowledge Conference on 14 th of June 2001 in Rotterdam:
>
> Important conclusions regarding the knowledge needs for the short as well as the long-term involve the necessity of broadening and connecting the various fields of knowledge.
>
> Or as stated in one of the propositions by Ale van de Hoek (Ministry of Transport and Public Works):
> 'The water world needs other knowledge; the other world needs water knowledge' (93% partially or fully agreed).
>
> The reaction of the audience to the propositions of Tjeerd de Boer (NIROV) also showed that strengthening the relationship between the field of water and spatial planning in particular deserves a lot of attention. This is primarily a challenge for the (administrative) practice, though in view of the complexity of the entire issue, the knowledge world will also have to pay attention to this through new innovative concepts.
>
> In addition to water and spatial planning, knowledge in the field of 'man and administration' requires equal attention.

At the end of the 20th century we were forced to face the conclusion that the technological approach to water management had reached its limits. The Netherlands' existence is endangered by the consequences of climate changes and soil subsidence. The climate changes cause more precipitation in shorter periods of time with longer dry periods in between. The climate changes imply a rise in the sea level and necessitate measures to be taken along the coast. As a consequence of the increasing density of construction in our country, the increased amount of precipitation enters the discharge facilities at a faster rate and is less often stored in the soil and in open water. Both in the rivers and in the polders high water problems are increasing in winter. To allow for agricultural activities the polders are drained, which causes the soil to subside and to settle, which in its turn again hampers the infiltration of water.
In summer more water depletion occurs. This causes quality deterioration and a significant increase in salinization.

More space is required to temporarily keep or store the water, and the coast will have to 'grow along' with the sea water level. Water as a regulating principle will have to be better taken into account in the designing of areas. At the same time there is an increasing demand for new and/or other types of activities, such as urbanization, nature and recreation. That in turn is a reason to look for space for several functions in the estuaries and in the North Sea. All these developments result in complex arrangement and design tasks. Innovative combinations of 'water functions' and other functions (living, working, recreation, nature and agriculture) are required (multiple use of space). Local customization is required for the actual realization.

At the same time social desires and demands regarding water systems are increasing. People want better protection against flooding and other water-related problems, the more so since the interests and investments are much larger than, say 50 years ago. Moreover, people want to combine functions in water management, which leads to additional demands.

The quest for 'space for water', acceptable for citizens, trade and industry and authorities leads to a series of knowledge issues that cannot specifically be classified as belonging to the core-business of one of the parties involved. These issues can only be resolved by intensive collaboration between the policy implementing parties in the compartmentalized water world and the spatial planning world, and of the people requiring knowledge and the expertise providers. Thus the combined efforts of policy, research and executive organizations and social stakeholders are required to tackle the problem.

Water management problems are not limited to the Netherlands. Countries such as England, France, Germany, Poland, the Czech Republic, Italy, Japan, the US, Argentina, Mozambique and Bangladesh and many other low-lying and polder areas also need new water management and are familiar with the problems described above.

Multi-national investors such as the World Bank, the European Bank for Reconstruction and Development (EBRD), the Asian Development Bank (ADB) and the African Development Bank (AfDB) are also looking for better methods to resolve the problems resulting from climate changes, sea level rising and soil subsidence.

3.2 Research topics

The major research topics that will have to be addressed by the ICES/KIS programme are connected to the four themes that occupy a central position in the water management of the 21st century, namely communication, valuation, institutional arrangements and water systems (see Figure 3.1). These themes have been derived from the many policy memorandums that appeared in recent years.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

Communication

The research topics focus on:

- The creation of support for new water management plans.
- The involvement of citizens and private companies in the changes in water management.
- The exchange of (new) developed knowledge between different actors in the water management practise.

Valuation

One important aspect in the planning and consideration is the human valuation of water in various respects:

- Economic value. water supply for agriculture, energy supply and companies, living on water and water recreation.
- Ecological value. bio-diversity, gradients, ecological main structure, the scale of particular areas.
- Social value. ranging from problems caused by water, risks and feelings of danger to cultural and emotional values (perceptive value of water in landscapes and living areas).

So far little is known about the value of water. As a result of different, sometimes even contradictory assessments regarding these issues the decision-making process regularly stagnates and planning as well as implementation are delayed.
The desired spatial arrangement depends on the material as well as the immaterial valuation of water. And that valuation differs strongly as a result of the changing social context, because of demographic, social-cultural, economic, administrative and technological developments. The research topics related to this theme can be summarized as follows:

- The role of risk perception and the acceptance of risks of flooding and other problems caused by water and of 'space for water' measures.
- The valuation, appreciation and perception of water in our culture.
- An improved valuation of the public function of water and water management in economic and non-economic valuation terms (cost–benefit analysis and cost effectiveness of 'space for water' measures)?

Management and institutional arrangements

In order to realize the new water management within the LIVING WITH WATER programme, attention has to be paid to steering water management in general and to the projects to be realized in particular. The people involved in water management, spatial planning, project preparation and decision-making processes will have to anticipate the changing social context. The completion of the EU - Water Framework Directive, provincial catchment area visions and the water test, in combination with the need for water managers to increasingly elaborate and realize arrangement plans and management strategies in consultation with other stakeholders involved will lead to different design and decision-making processes. Conversely the need of spatial planners to increasingly collaborate with water managers in the initial planning stage will lead to

changes in the steering process. Perhaps this will also result in more public-private collaborations and in design-construct-operate contracts.

The new capabilities of the information and communication technology will also create other control opportunities in the fields of water management and spatial planning. The organizations involved will want to adapt their structure and their ways of working and financing. Explorations and experiments in this respect can be accommodated within this theme.

This leads to in the following research topics:

- What adaptations are required in the institutional arrangements regarding water and the related spatial management? This involves responsibilities, tasks and the division of tasks in the administrative field at the levels of national, provincial and municipal authorities, water boards and other stakeholders.
- Who will finance the adaptations and how, on what basis. Adaptation of responsibilities and financing contracts, the role of private parties and authorities?
- How can we ensure that water will be a priority in the agenda of all parties, so that they can play the game as full partners?
- How do you incorporate a long-term vision into the short-term way of thinking of politics, trade and industry and the citizens?
- How do you make a social, financial and economic costs-benefit analysis and incorporate this into considerations made in the (political) administrative process. Water interests are best served with a long-term approach in which the economic aspects have to be explicitly specified. Mapping the long-term costs and the benefits, in particular, is essential for a sustainable analysis. Moreover, a solution will have to be found for the dilemma of the parties with changing interests that have not been involved in the action for too long a period of time.
- How do you create a decision-making process in which the interest of water is weighed against other interests in a balanced way. Integral action lowers the profile of the necessity of water management.
- In what way do legal-administrative and spatial planning aspects play a role in a water-oriented planning and policy process?
- In what way can water managers obtain the competencies required for an integral process?
- Where do water managers draw the line regarding participation?
- What can the Dutch water management learn from experiences abroad as regards integral water management, and how?

Functioning of water systems
This involves a large number of issues that strongly vary per area type. In global terms the research topics can be summarized as:

- The (multiple) effects on the water system, ecology, agriculture, economy, etc., induced by new water management measures.
- Design of innovative water-management scenarios, tailored to foreseen developments such as floods, draughts and land subsidence.
- The optimum and cost-effective construction of water-management measures in the complex infrastructure in the Netherlands.

The required knowledge will be obtained by developing new knowledge based on questions from knowledge users/the practice or based on social issues. Thus scientific knowledge is linked to the operational and material knowledge of the relevant social stakeholders.

The water-related problems vary per region and depend of the type of soil, the (geo-) hydrological conditions, the use of space, etc. Thus a distinction is made between the following area types:

- *Coast and sea*. Related to the rising of the sea water level and the occurrence of heavier storms.
- *River area*. Related to the greater variety in discharges to the water systems.
- *The low Netherlands*. Related to the regional water systems in the polders, partly characterized by higher (ground) water levels and a need for water storage, and partly by lower water levels and a need for replenishment and redistribution.
- *The high Netherlands*. Related to higher sandy areas with lower groundwater levels during dry periods and the need for storage facilities to prevent peak discharge towards surface water systems.
- *Urban areas*. Related to qualitative and quantitative water problems, scarcity of space, shortage of spatial quality and the need for innovative concepts for sustainable and intensive/high quality use of space with water (storage).

Combining the four themes and the five area types results in the matrix shown below, which indicates the work field for the LIVING WITH WATER programme (see figure 3.2).
Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

An essential aspect of the design of the programme is that the combination of activities will have to cover the entire scope of themes and area types. This aspect was specifically considered in the selection of the first series of projects. An additional condition is that projects have to pay as much attention as possible to a mixture of the themes mentioned. This condition was added to ensure that a proper mixture of technical, natural and socio-economic studies is applied.

These research topics have been translated into an extensive series of research questions per area type by a large number of stakeholders from the knowledge requiring and the knowledge providing side in a number of workshops. These questions are the terms of reference and thus the 'back bone' of this research programme. The extensive problem definitions per area type and the related research questions are presented in Appendix 3.

4 SCIENTIFIC RELEVANCE

4.1 Innovation-aspects

The desired innovations in water knowledge

The programming report '*Over Stromen'* (NRLO, RMNO, AWT, 2000), as well as many other policy reports dealing with water, outlines the knowledge and innovation tasks in the field of water management in the Netherlands. These innovation tasks arise from the culture change in the Dutch water policy from '*keeping the water out'* to '*accommodating water'*. The current knowledge and knowledge infrastructure in the field of water, do not meet the requirements for this change. It has been concluded that water research is dominated by a technical and natural scientific orientation. Thus the conclusion of the '*Over Stromen'* report is that knowledge development in the field of water also requires a culture change that is in line with the changes in the water policy. If these changes are not implemented, this will hamper the implementation of the new water policy in the Netherlands.

The LIVING WITH WATER programme will implement the two lines of research, so that knowledge on the valuation, communication and organization can be introduced in the 'Space for water' projects. Without this input the Netherlands is not capable of adapting the water management to future developments such as climate changes and a more intense use of space. Thus the knowledge development in the LIVING WITH WATER programme does not primarily focus on gaining in-depth knowledge in one or more disciplines, but rather on integration of knowledge fields, specifically the technical-scientific and the socio-economic disciplines. Being able to integrate these various fields of knowledge is a scientific challenge as such. The fundamental research conducted within the programme also focuses on methods and techniques for knowledge integration on behalf of interactive planning and decision-making processes. This partly fills the existing knowledge gaps at the various disciplines. Thus the programme has selected the following two lines of investigation:

1. Developing knowledge in innovative practical projects.
Each of these projects will bring together a mixture of technical, natural and socio-economic disciplines in order to develop and apply the knowledge required for sustainable and feasible solutions to bottlenecks in water management in collaboration with all stakeholders. In this type of practical projects time and again natural scientific issues related to the desired adaptations in water systems come up, as do socio-economic issues involving valuation, management and communication regarding these issues. Basically these projects will involve at least two but if possible all four knowledge themes in mutual coherence and the knowledge providers, such as universities and R&D organisations, will intensively collaborate with knowledge requiring parties such as representative of society, authorities and trade and industry. In addition to 'knowledge integration', the 'dissemination of knowledge' is also an important element in innovative practical projects: the application of knowledge in planning and decision-making processes. Within ICES/KIS II programmes experience with innovative practical projects has been gained at a reasonable scale.

2. Fundamental scientific knowledge development
In order to be able to responsibly conduct innovative practical projects, the available fundamental scientific knowledge is inadequate in a number of situations. For these situations an investment in in-depth research by universities and/or R&D organisations is required. This particularly involves in-depth knowledge regarding the functioning of water systems, the valuation and perception of water, the control and the organization of innovations in water management and the role of communication in these transition processes. Highly qualified coordinator from the world of science will function as scientific coordinator for each knowledge theme to ensure adequate control and quality assurance of this scientific research (see section 4.3). NWO will be involved in the selection, monitoring and evaluation of the fundamental scientific knowledge development

Knowledge export

At the international level the Netherlands stands out for its high level of organization in water management and its advanced way of thinking in terms of networks. The polder model is in our blood. The Netherlands has a pioneering function in water management. Investments in further improvement and especially in expanding the interaction between knowledge, policy and stakeholders, imply a strengthening of the pioneering role of the Netherlands in this respect. The '*Over Stromen'* report states that the export prospects for the knowledge amassed in the Dutch innovative practical projects and the accompanying fundamental scientific research are good.

4.2 Scope

The knowledge project LIVING WITH WATER is designed to remove the imbalance in knowledge development between technical, natural and socio-economic disciplines in the fields of water and spatial planning by investing in inter-disciplinary projects and the related development of fundamental scientific knowledge. The integration of these various disciplines, that is integrating them into the existing water practice, is the central issue, not gaining in-depth, discipline-specific knowledge. The development of fundamental knowledge accentuates knowledge development in socio-economic disciplines, focussed on valuation, communication and direction in spatial adaptation of water systems.

Moreover, the technical and natural scientific knowledge must also be fortified in order to gain more insight in the functioning of water systems and the benefits and the necessity of adaptations in these systems. However, research projects that only focus on these topics do not fit in the programme. These can be conducted in the scope of other programmes such as the Delft Cluster. Clear and practical agreements have been made regarding this. Where required and where possible collaboration will be sought with the Delft Cluster, Climate Changes Spatial Planning, the Innovatienetwerk Groene Ruimte en Agrocluster as well as other programmes, preferably in so-called bridge projects (see section 7.4).

4.3 Knowledge and/or competencies to be developed

A number of workshops have been organized with representatives from all stakeholders in the field in order to gain insight into the knowledge and competence to be developed. An inventory has been made of the knowledge need of the knowledge users in the field of use of water and space via six thematical workshops. Subsequently this inventory was discussed with knowledge providers in a concluding workshop. The results of recent knowledge conferences of participating parties, such as the 'Knowledge Conference Water' and the 'Knowledge Symposium Water', organized by the ministries of V&W and LNV respectively, have also been used. During a scientific workshop Space for Water | Values of Water held in December 2002, the primary knowledge questions from the side of fundamental scientific research were collected, tested and further substantiated. The results have been collected per knowledge theme in the form of lists of research topics and the related research questions for knowledge and competence development.
The future developments as outlined above can be generalized into four main themes:

- Changes in the functions of water (such as a transition from agriculture to nature).
- Changes in the water system (such as salinization).
- The occurrence of emergency situations in the short term (such as a flood).
- The occurrence of emergency situations in the long term (such as soil subsidence).

People with a technical scientific background will immediately look for technical solutions. However, to begin with a more philosophical question should be answered, namely what our attitude towards these changes should be. Is it feasible to make extreme efforts to keep the Netherlands above the water level at all costs? And what are the consequences of these processes? A more theoretical approach to these long-term issues is definitely desirable before short-term solutions are contemplated. Research into these questions fit within the fundamental scientific research programme.

Solutions to these problems will be sought in combinations of four different knowledge themes:

1. Communication.
2. Valuation of water.
3. Management and institutional arrangements.
4. Functioning of water systems.

The survey below sketches the accentuation within these knowledge themes:

a) Knowledge regarding the application of ***communication*** as a means for obtaining social support for 'space for water' measures, but also as a means for using the available creativity of the stakeholders in the projects. The question of how citizens and companies can be involved in changes in water management is of major importance for the realization of a new water policy. How can the communication be organized to create support for the plans? What role can be played by perception investigations, citizen participation, etc. in the process of redesigning a sustainable Netherlands? The knowledge and the experience of water managers and water users will have to be harmonized. Communication is essential in this process.

b) Knowledge regarding the ***valuation and perception*** of water, taking into account the changing social visions regarding spatial quality and a growing realization that freshwater is becoming scarce. A determination of the valuation of water is required for weighing options and interests regarding the allocation of water and space. This is where the question emerges of how the value of the public function of water and water management in economic and public valuation terms can be improved. How is water appreciated in our culture? What role does water play in the assessment of the quality of the living environment, and what is the role of risk perception? In what way can a positive valuation of water be capitalized and how can an integral weighing of material and immaterial values be underpinned and applied? What part of the costs related to spatial water measures can in all fairness be diverted to the market and what part can/has to remain in the hands of the various authorities?

c) Knowledge regarding new ***institutional arrangements*** of processes of change in the field of 'space for water', such as new forms of public-private collaboration and new administrative arrangements. Without the collaboration of many parties outside the water world it is impossible to accomplish the change from '*keeping the water out'* to *'accommodating water'*. The challenge is to bring together the many parties involved in planning processes in new alliances and to look for interests that can be jointly developed and subsequently recorded in new administrative arrangements. This requires research into the question of what adaptations are required in the institutional arrangements regarding water and the related spatial management. This implies analyzing the tasks and the division of tasks in the administrative field at the levels of national, provincial and municipal authorities and water boards. This also implies responsibilities, compensation for services, legislation governing property, adapting responsibilities, financing contracts and the role of private parties and authorities.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

d) Knowledge regarding the ***functioning of water systems***, in relation to its use, focussed on the nature, the benefit and the necessity as well as on the effects and the effectiveness of adaptations in the arrangement and the use of water systems. In this respect the knowledge development mainly focuses on obtaining more insight in water management processes resulting from the effects of climate changes, such as the increasing sea water level and soil subsidence, in coherence with a changing use of space. This will include questions regarding the required adaptations in the arrangement and the management of water systems in the next 30-50 years. This involves innovative solutions that on the one hand enable changes in the use of space and on the other hand it involves innovative solutions that fight the negative consequences of a more intensive use of space and climate changes. Therefore will have to render more insight into the opportunities and the threats posed by changes in design and management of water systems for nature as well as for the use of water and land. Is it possible to combine water storage with nature, agriculture, living and working, recreation and sustainable production of freshwater and energy? If so, under what conditions and in what form?

And is it possible to fight salinization and soil subsidence by adaptations to the water system that will lead to functional changes? So far expectations are high, but a rock-solid underpinning for the combination possibilities of water storage and these functions is still lacking. This underpinning is essential for actually obtaining a socially and politically supported development of the 'Space for water' policy.

The 'field of knowledge' to be developed can be schematically represented as follows.

As represented in the figure above the knowledge development will primarily consist of integration of the various disciplines focussed on the developments to be distinguished. However, a number of central subjects can be distinguished per knowledge theme. In the scope of the preparations for this Knowledge Project Plan an inventory of these subjects was made by the world of science. They will be discussed below.

Communication

- Suitable means of communication and strategies for implementing "LIVING WITH WATER" measures.
- Suitable methods for obtaining support from various stakeholders (citizens, administrators, etc.).
- Effective forms of transferring knowledge within projects, from projects to the outside world (learning curve) and from the outside world to the projects (among other things with regard to transferring the knowledge amassed in LIVING WITH WATER.

Scientific coordinators: Prof. Ir. C. van Woerkum (Wageningen University & Research Centre)
Dr. J.M. Gutteling (Technical University Twente).

Valuation of water

- Implementation of methods for risk perception and the acceptance of risks in relation to anticipated developments in water management measures.
- Possibilities of monetary and non-monetary methods of valuation in relation to water management.
- A social cost – benefit analysis of 'space for water' measures.

Scientific coordinators: Prof. dr. W. Hafkamp (Erasmus University)
Prof. dr. H. Verbruggen (Free University Amsterdam).

Management and institutional arrangements

- Innovative administrative arrangements tailored to the approach to water problems at various scale levels (in space and in time) with various types of measures.
- New concepts for interactive decision-making processes and citizen participation within a democratic decision-making process.
- Administrative - legal models for cross-border water projects.

Scientific coordinator: Prof. dr. Th.A.J. Toonen (State University Limburg).

Functioning and use of water systems

- (Multiple)effects of new water management concepts on the water system.
- Development of innovative water management scenarios focussed on anticipated developments such as flooding, dehydration, salinization, soil subsidence, etc.
- The potential of a water system in various different water management settings.

Scientific coordinator: Prof. dr. ir. M. Stive (Technical University Delft).

More details regarding the subjects mentioned above in combination with the area types can be found in Appendix 3.
A special aspect of the inventory of scientific coordinator is that it appeared to be rather difficult to find 'all-round water managers' who could be appointed as such in a country like the Netherlands. In sub-fields more than enough names could be mentioned, but a professor with the capacities to cover all aspects of the field of our programme was not easy to mention. Thus the ambition of the programme is to have at least one and preferably more professors with the proper integral profile for this task in the academic world at the end of the programme.

4.4 Scientific approach and work method

Delta competency

The further development of the 'Delta competencies' in the field of water and space occupy a central position in the knowledge project. Indissolubly connected with this, is the knowledge stimulus into four knowledge segments of water research, described in section 1.3, that is required to apply the trans-disciplinary Delta competencies to innovative practical projects in a scientifically responsible manner.

These Delta competencies are developed by an adequate mixture of natural and socio-economic sciences. This involves:
Mobilizing, developing, focussing and embedding socio-economic disciplines (economy, sociology, psychology, communication sciences, public administration, planning) and natural science disciplines to prepare and conduct research in innovative practical projects using consortia of knowledge developers and knowledge users.

The approach and the work method can be elaborated on the basis of the 2 lines of investigation distinguished earlier.

Line 1: Innovative executive research

'Investment projects related to the implementation of infrastructure, such as WB21 projects and projects of regional water managers, provinces and other stakeholders, will start soon. This involves empirical research, to be conducted in the scope of a broad consortium under the motto *'learning by doing'*. In this line knowledge development and innovation are directly combined with the knowledge requirements for implementation projects. On the one hand this leads to a translation of the results of more theoretical research into the complex reality of implementation projects. New approaches are immediately tested in practice ('learning from area implementations'). And an inventory of the factors for success and failure, which may differ per project, is drawn up. 'Incorporating' these pilot projects, which would otherwise have been conducted separately, creates an additional value for these projects because of the harmonization of the methods and the exchange of knowledge within the programme. On the other hand, the knowledge questions and innovation tasks that emerge from these infrastructural implementation projects may initiate new, demand-driven and fundamental research (line 2).

This line also includes developing and testing integral, more interactive planning, design and implementation methods for water management and spatial planning. This involves research into technical-scientific methods, such as calibrating and validating decision-making support systems, GIS applications and integral monitoring programmes in the scope of open planning processes. But it definitely also involves the organization of social and administrative (decision-making) processes. Finally this line of investigation will include fieldwork to gain insight into the various forms of valuation (perception, cultural, emotional, economic, ecological) of water and water management that influence the spatial arrangement.

Line 2: Fundamental scientific research

This line will focus primarily on the development of inter-disciplinary knowledge as a basis for more integral, practical research (line 1). This implies integrating technical scientific research with gaining more in-depth knowledge regarding and specifically focussing on social scientific disciplines such as economy, sociology, psychology, communication sciences, public administration and planning. Finding an adequate way to integrate these disciplines as such is a science that necessitates research. So, this line will also include the development of concepts, methods and technologies aimed at bridging the gap between design disciplines and technical-scientific knowledge on the one hand and on social, administrative, legal and economic (socio-economic) knowledge in the field of planning, management and valuation of water and space on the other hand.

Quality assurance and Evaluation

In the selection and monitoring of the fundamental research projects NWO will be involved. To accomplish this NWO will be invited to conduct the following activities together with the WAR:

- Assessment of proposals of the fundamental research projects.
- A midterm and evaluation of the scientific progress and results of the programme.
- Contribution to a final evaluation of the programme in 2007.

Moreover, a lot of attention will be paid to the transfer of knowledge (see chapters 7 and 8). The quality of the research during the implementation of projects is assured by setting up supervisory committees and communities of practice. Both the knowledge requiring parties and the knowledge providers participate in these committees.

4.5 Specific problems and demands regarding the application of knowledge

The worlds of science and practice are far apart. This definitely is true for the 'water' theme as well. Scientists are not used to conducting research aimed at practical problems. They are 'judged' based on Ph.D. theses, peer reviews, publications and the respect of their colleagues. The practical water managers on the other hand are facing problems that have to be resolved within a period of two to three years and in which time, money and accountability, internally as well as to administrators, politicians and citizens are the criteria. In addition to these parties there are quite a number of other stakeholders, all with their own interests and requirements. Every ICES/KIS III programme faces this field of tension. On the one hand, the knowledge development has to be at a sufficient level. On the other hand the knowledge requiring side and/or the end users make demands regarding the practical applicability in exchange for their co-financing. This is a major dichotomy in the water world, since traditionally the innovative capacity in this field of application has not been very significant. They have kept the Netherlands dry for years, so why should things suddenly have to change.

A second problem is bridging the culture differences between the traditionally technology-oriented 'water researchers' and the essential input of socio-economic scientists. The LIVING WITH WATER programme will pay a lot of attention to this aspect, among other things by organizing various Communities of Practice, in which brainstorming sessions and workshops of all participants will ensure the required energy and interaction. In addition a lot of attention will also be paid to an adequate organization of the activities, including an understanding for and of the traditions and the culture of the various stakeholders and a thorough insight into their interests, constraints and criteria. Within the projects a mixture of disciplines will be working together and they will collectively be responsible for the final product. Last but not least the exchange of knowledge will be stimulated considerably and innovatively. Innovative methodologies for communication and knowledge transfer geared to the stakeholders' perception of their environment will contribute to bridging the gap between the worlds of science and of practice. The programme will deal with this dichotomy by conducting dedicated innovative practical projects, in which all the different stakeholders are encouraged to collaborate.

4.6 Relation with the European research programme

4.6.1 Fifth Framework Programme

Europe is closing in on the Dutch water management. The Water Framework Directive requires a new approach to catchment areas and a major effort is made to meet these demands. During the next few years experience will be gained with the guidance's developed by the EU for the implementation of the Water Framework Directive. The Netherlands will participate in a pilot project for the Westerschelde. This project also includes aspects of participatory decision-making processes, which leaves the possibilities for linking up with the LIVING WITH WATER programme wide open. Dutch universities and R&D organisations are active on many fronts in the European context, specifically in the Fifth Framework programme. The LIVING WITH WATER can link up with a number of the current projects, such as EUROPEAT, WELCOME and HARMONICOP. The latter programme in particular bridges the gap between technical scientific and socio-economic disciplines and thus links up well with the ambitions of the LIVING WITH WATER programme.

The EU project HARMONICOP (Harmonizing Collaborative Planning) has as its main objective to increase the understanding of participatory river basin management in Europe. Currently it is in its phase of implementation. It aims to generate practically useful information about social learning in river basin management and support the implementation of the public participation provisions of the Water Framework Directive (WFD). The innovative aspect of the project can be summarised as follows:

1. It will be the first to give a comprehensive overview and analysis of the state of the art in participatory RBMP in Europe, using a social-learning perspective.
2. It will be the first to address the scale issue in PP and RBMP in a systematic way.
3. It will be the first to approach information and information tools as a means for social learning in participatory RBMP.
4. It will be the first to do all this while considering the different national contexts - cultural, geographical, institutional and legal.
5. The proposed research will specifically deal with the challenges posed by the WFD.

The research consortium consists of 15 institutes. It combines expertise from nine different countries and many different disciplines and approaches. A broad selection of EU countries is included from all parts of the EU: Belgium, France, Germany, Italy, the Netherlands (WL/Delft Hydraulics and RIZA), Spain and the United Kingdom (England and Wales and Scotland). They include upstream and downstream countries, countries with mostly self-contained river basins, water-rich and water-poor countries. They have widely varying institutional systems for water management, and together they represent the major "national cultures" in Europe ("Roman", "Central-European" and "Anglo-Saxon/ Scandinavian"). Moreover, two non-EU countries are represented: Switzerland, the upstream country for major European rivers, and Hungary, a candidate EU Member State with a different historical and economic background.

The WELCOME project, with TNO/MEP as the contact, is another. This project specifically deals with the interaction between soil and water contamination. EUROPEAT, with Alterra as project/consortium leader, is a project in the scope of the EU programme 'Quality of Life'. This project aims to gain more insight into the processes that determine the rate and the extent of soil subsidence, oxidation, nutrient release and the emission of greenhouse gasses, in order to improve the prediction of the effects of changes in the water management.

Fifty per cent of the research in the scope of the EU is financed from Brussels. The other 50% will have to come from national budgets and subsidy programmes such as the ICES/KIS programme. For universities and major technological institutions this construction is an important basis for working at the European level and thus for stimulating the export position of our knowledge. The Dutch stakeholders that are active in the Fifth Framework Programme can use their network and their references as a basis for active participation in the Sixth Framework Programme.

4.6.2 The Sixth Framework Programme

The Sixth European Framework Programme for Research and Technology Development 2002-2006 started in December 2002. As regards the LIVING WITH WATER programme two themes are especially important:

1. *Environment and sustainable development* - human activities have an impact on the environment. Sustainable management of the quality of life in Europe has expressly entered the EU agenda.
2. *Citizens and administration in a knowledge society* - the emergence of the knowledge society affects the mutual relations between European citizens as well as the relation between citizens and administration.

Within the programme various instruments are available for the stimulation of Research and Development:
New instruments:

- Integrated Projects.
- Network of Excellence.
- Article 169.
- Collective Research.

Existing tools:

- Specific Targeted Research Projects (STREPS).
- CRAFT.
- Concerted Actions.
- Human Resources & Mobility.
- Specific Support Actions.

It is expected that a link between the LIVING WITH WATER programme and projects to be submitted in the scope of the Sixth Framework Programme will be possible. The new instruments IP and NoE and the STREPS in particular, offer possibilities.
The majority of project proposals (see Appendix 5) fit in the scope of the Sixth Framework Programme. Some of them will be submitted via the available channels.
Appendix 4 includes the factual interfaces for the themes *Environment and sustainable development* and *Citizens and administration in a knowledge society.*

5 ECONOMIC AND SOCIAL RELEVANCE

5.1 Connecting to social issues

Now, exactly 50 years after the disastrous flooding of the south-western part of the Netherlands it is not very hard to put the social issue of water back on the agenda again. The recent discussions regarding emergency overflow areas and the high water levels in the river Meuse are the topic of newspaper articles that appear almost daily. Water will occupy an even more important position in the future spatial arrangement of the Netherlands (see also section 2.3 and chapter 3). Climate development and soil subsidence result in policy requirements regarding safety and flood prevention. In addition, water depletion, soil subsidence, salinization and the protection of freshwater reserves are problems that require attention. It is clear that spatial planning measures for tackling water problems will far more often offer a solution to problems caused by water (CPB document, 2001, page 65). Meanwhile water - in combination with spatial development - now occupies a prominent position on the political and administrative agenda. '*Water is in turmoil*'. This will be apparent from the series of recommendations, policy resolutions and decisions that have appeared during the last few months. At the national level examples include the recommendations of the *'Commissie Waterbeheer 21e Eeuw'*, the *'Vijfde Nota Ruimtelijke Ordening'*, the *'Derde Kustnota'*, the European Water Framework Directive and *'Over Stromen',* the report written by NRLO, AWT and RMNO. Similar developments can be seen at provinces and water boards. Memorandums such as '*Provincies maken ruimte voor water*', '*Van ordenen naar ontwikkelen'* and '*Bruisend water'*, the '*Kustvisies*' of the Provinces of Noord-Holland and Zuid-Holland and projects like *'ABC Delfland'* and *'Water Later'*, are evidence of the changing objectives and a changing approach to water management.

Below you will find a description of the social issues relevant to this programme, as recorded in the various memorandums. This also includes a description of the shortcomings in the infrastructure. The objective of the LIVING WITH WATER programme is to tackle the gaps in the knowledge infrastructure.

The *Commissie Waterbeheer 21e Eeuw, (WB21)* has ascertained that the present water management infrastructure is not adequate to cope with the anticipated climate changes, the rising of the sea water level, soil subsidence and the changing use of space and land in the Netherlands. The Committee advises a different approach: 'more space for water', which means no further loss of space but retaining or buffering the water, including water issues in the considerations regarding spatial planning, extra space for water storage and multiple use of this space - including on the water. Within the small circle of water managers and some public organizations that are directly involved, the necessity of another approach to water policy is recognized. But in the broader circle of politics, administration and society the water issue is hardly recognized at all. This is related to safety, water-related problems and damage, the space required for water, the lack of control and direction as well as to the necessity for financial investments in a new policy (WB21, page 21). All this implies that a new, integrated way of thinking, planning and acting regarding new water management in the Netherlands is required. Solutions will only be created through intensive collaboration among all parties involved. This requires a fundamentally different approach to water management. At the beginning of the 21st century the knowledge required to change this approach is still in its infancy.

In the *'Vijfde Nota Ruimtelijke Ordening' ('VIJNO')*, water, in this case the various water systems in our country, is considered to be one of the fundamental bases for spatial development. Perspectives for a combination of existing and new forms of use are being pursued. An adequate assessment of the various ways in which water is valued (economic, cultural, as part of the landscape, etc.) is essential for weighing options and interests regarding the allocation of water and space. For space and the multiple use of space in coastal areas, please refer to the '*Derde Kustnota'; Traditie, Trends en Toekomst'*.

In the scope of the EU-framework directive ecological and social objectives must be coherently elaborated into integral spatial management plans, including an important role for the price of water for various application objectives. This price, to be used as a steering or allocation mechanism, can only be established when one knows how people rate the economic and the ecological value of water for the various application purposes, as well as how they rate the social and emotional value of water (such as safety, perception, living environment, culture).

The NRLO-AWR-RMNO recommendation *'Over Stromen'* indicates that water is valued in many different ways. Apart from the functional application value there is a perceptive value (the value of living or recreating along or on the water) and a future value (the value of a healthy and functional water system). In a memorandum to the parliament that appeared last year, the Rathenau Institute refers to 'the blue gold' that can be capitalized on.

International bodies such as the World Water Forum, FAO, the International Hydrological Programme of UNESCO and international professional organizations such as IAHS, advocate a different approach to the values of water and a different approach to the future global water crisis as a result of climate changes.

In reality this implies that we will have to look for alternative solutions to basic requirements such as safety, quality of life, suitability for habitation and sustainability. In other words not just looking for traditional technical and technological solutions, but a more diligent quest for solutions that advocate a natural place for and a natural handling of water in spatial planning.

These policy memorandums show that we will have to change the way we live with water, taking into account that:

- All the different ways of valuating water will have to be **integrated** ('*Over Stromen'*, EU framework directive and '*Vijno*').
- **More parties** must be involved in the control and more interests must be weighed (WB21, EU framework directive, '*Vijno*' and *'Over Stromen'*).
- The **communication** regarding the risks and the importance of water (policy) must be improved.

In the '*Over Stromen'* exploration, AWT, NRLO and RMNO state that the arrangement and the work method of the knowledge infrastructure must be adapted. According to these councils a change in approach is required in order to gain new knowledge and insights, specifically regarding the relationship between water management and the social environment. The exploration also draws the conclusion that the proposed prioritized themes («perception of water», «valuation of water», «participatory planning in water management» and «inter-administrative management of water and space»), themes with a predominantly socio-economic character, cannot (yet) be absorbed by the current knowledge infrastructure, or at least can only be absorbed to a much lesser extent than (new) technical knowledge can.

In response to the '*Over Stromen'* report, the government states the following:
"In order to be able to adequately address the new knowledge themes the water-related knowledge infrastructure will have to be adapted. This adaptation, which is considered to be essential, fits in with the government's vision, also in view of a number of major developments the knowledge infrastructure is facing in a broad sense. On the one hand this involves social developments (such as the changing relationships between authorities, administrators and citizens) and on the other hand this involves internationalization (increasing international competition and international co-operation). Moreover, specifically in relation to the world of knowledge, a strong tendency can be observed towards inter-disciplinary and trans-disciplinary aspects of knowledge development, which is partly in reaction to the increasingly complex societal demands. In this context the government vision includes having the water-related knowledge infrastructure focus more strongly on collaboration within and beyond disciplinary boundaries, on further harmonizing the parties requiring and those providing knowledge and on filling in the gaps in the current knowledge."

At an earlier stage, in its point of view regarding WB21, the government already established a relation between the implementation of new policy initiatives and ICES/KIS III:
"Innovation of knowledge and the knowledge infrastructure is a condition for adequately and responsibly creating a new water policy. Development of new knowledge and technology in the field of 'traditional' aspects of water policy, such as safety and water quality, continues to be necessary. In addition social developments and the broadening of the water policy also require new knowledge. This involves knowledge in the fields of socio-economic sciences, spatial planning and public administration, which, apart from the technological solutions, allows for exploration of social and administrative aspects as well as assessment of the social support for possible solutions in advance.

R&D organisations must prepare for new research topics. Collaboration among the institutes and forming alliances are essential in order to meet this demand. The ministries involved will make room for the new research themes within the existing research programmes. This may include subjects such as the perception of floods and 'wet feet', the valuation of water, multiple use of space for water, insurance against water damage, etc. Inter-departmental consultations will be held when research into these new research themes. A good example is the current preparation of ICES/KIS III*, in which a large number of the above mentioned research knowledge themes will be involved."*

The policy memorandums and recommendations described above induced the government, the '*Unie van Waterschappen'*, IPO and VNG to agree upon a national administrative agreement on water in 2002. Regarding the knowledge component, the initial agreement states the following:

"A link will be established with ongoing pilot projects in order to gain experience with the new water policy and to develop and share innovative knowledge. In order to accomplish this, the knowledge services of the ministries of VROM and LNV and 'Rijkswaterstaat' (specifically RIZA, RIKZ and DWW) and STOWA will closely collaborate with all parties in order to stimulate the development and the dissemination of knowledge. To achieve this, the parties will set up a knowledge network for the development and the dissemination of knowledge between the national and other authorities. The network consists of employees of all parties posted to the network, and will use the capacity of the knowledge services and the research institutes for its work.
During the period in which the initial agreement is implemented, decisions will be made regarding the investigations needed in the process and the R&D organisations and bureaus that will be commissioned to conduct these investigations. In addition to making knowledge available via a helpdesk and symposia, the knowledge requirements from the regions will be the input for the (national) research programmes.

Based on the information stated above, we conclude that parties in the knowledge world still are not collaborating well enough to come up with suitable solutions to the problems related to water. It is essential that the economic, ecological and nature interests are fully involved in a modern, integral water policy and that knowledge is developed at the interface of contents and process.
By mobilizing, developing and focussing the required knowledge, the LIVING WITH WATER programme addresses the following concrete problems in the knowledge infrastructure:

- The technical scientific R&D organisations insufficiently collaborate with socio-economic knowledge institutions.
- Knowledge requiring parties insufficiently collaborate on formulating knowledge questions (because of their compartmentalized structure), so that the effort to find integral solutions that significantly contribute to society is limited.
- Collaboration within water management is hampered by the fact that knowledge organizations are compartmentalized (national versus regional for example).
- Fundamental knowledge does not sufficiently reach the research oriented to practical applications, and practical demands do not sufficiently direct the course of the development of fundamental knowledge.
- Knowledge development focuses too much on the short-term, too little attention is paid to long-term solutions.
- The different ways in which water is valued must be made explicitly clear and must be communicated to all the interested parties in order to properly channel water management.

Such a strengthened knowledge infrastructure results in improved communication between knowledge providers and knowledge requiring parties regarding the valuation, the weighing and steering of water and water-related problems.

5.2 Why a Bsik contribution is essential

A specific investment stimulus, alongside the existing financing mechanisms, will fill the gaps in the research agenda as stated in the previous section (5.1) and will improve the dissemination of knowledge. The reasons the knowledge programme will not get adequately off the ground without the Bsik contribution are stated below.

1. Stimulation of integral knowledge development
Establishing and extending a knowledge network for integral water management under the umbrella of an ICES/KIS framework is required to stimulate collaboration between technical-scientific and socio-economic knowledge organisations. The Bsik stimulus is essential for strengthening and embedding the socio-economic knowledge regarding water management.

Without the Bsik contribution these currently separate worlds will not converge so that the integration of these fields of knowledge will not get off the ground. The individual parties cannot afford the required investments and will never be able to afford them on their own. This requires a national initiative and a 'lubricant', to get the cogs running more smoothly.

2. Integral knowledge requirements
The Bsik contribution stimulates various knowledge requiring parties to jointly define their questions so that problems can be tackled integrally. Currently no single party feels responsible (or is responsible) for the knowledge development for the required integral approach to water management.

3. Collaboration and knowledge transfer in water management
Various parties in the field of water management will be brought together by the stimulus provided by this programme. Experience gained in local initiatives can be exchanged and applied at another location. However, without money from the Bsik contribution to 'connect and accelerate' the compartmentalized water world will never be able to (re-)allocate the required public and private contributions and to 'circulate' the knowledge. At present no other budgets are available for realizing the desired changes in culture, organization and work method. By collaborating the participating companies and R&D organisations inernalize the mutual knowledge spill over; this brings the R&D incentives closer to the socially desired incentives. In addition the knowledge will circulate easier within the field.

4. Combining fundamental and strategic research
This programme will stimulate channelling the applied fundamental research in the field of water management on the basis of practical demands. The current financing of fundamental and strategic research does not lead to a sufficient level of integration. Moreover, a stimulus from the ICES/KIS III funds is also required to stimulate the R&D at construction firms and design and engineering agencies. However, a joint learning process will only get off the ground under the auspices of a major national programme that can be an important node in the water management network.

5. Long-term versus short-term
The current water management is not always at its best because a short time-span is involved. For example, the costs of keeping dry a deep polder that is only used for grassland will in the long-term be much higher than the benefits related to crop yields derived from that land. Currently, stakeholders and shareholders are not sufficiently stimulated to take this longer time-span into consideration. Via the LIVING WITH WATER programme the Bsik contribution will stimulate parties to generate the required knowledge regarding long-term processes and to apply this to their projects.

6. Water management control
The Bsik contribution is required to strengthen social awareness of the water issue as well as acceptance of the spatial and social changes required. It will be clear that such processes also originate from a number of stakeholders, such as the '*Unie van Waterschappen'* and '*Rijkswaterstaat'*. But a more powerful voice from a platform of stakeholders will have far more impact. More knowledge regarding the material and the immaterial values of water and communication are essential for obtaining social and administrative support for changes on behalf of a new water policy.

7. Export opportunities
A modern and integral water policy offers export opportunities, since other low-lying areas will also embark on a new course. Poland, France and England, as well as the United States, Japan, and Bangladesh are also developing in this direction. Without the Bsik contribution, the Netherlands will not in time have the required knowledge available to export its knowledge of integral water management. Exporting this integral knowledge is not the core business of any of the stakeholders, which means that the private benefits are smaller than the social benefits of investments in knowledge development.

5.3 The selected approach as opposed to the alternatives

Alternative: the national authorities do nothing extra.
Since the proposed knowledge development and dissemination is not included in the core business of any of the stakeholders, it threatens to fall between the cracks, even though this knowledge is definitely required to substantiate the new water management. So the current situation, including the shortcomings that have been pointed out, will remain as it is.

Without the described investments in knowledge development the preparation of integral projects will not (completely) get off the ground, or it will take far too long, which means that the new water management will not be substantiated. In that case we will wait until really major problems occur in water management, at which time there will not be enough time to reap the benefits of innovation. This in turn implies that the government will impose ad hoc measures. The political theme of safety becomes 'fluid' in nature. Without a contribution from the national government many innovative projects threaten to get mired down in the implementation phase as a result of the lack of support originating from process as well as from strategic bottlenecks and shortcomings. Not investing in knowledge development will lead to an inefficient design and decision-making process, inefficient solutions, ignored opportunities and even to unsuccessful projects. At the international level eliminating this ICES/KIS investment will lead to the Netherlands being considerably behind in the export of knowledge regarding the approach to high and low water problems, catchment area visions and the multiple use of space.

Alternative: stimulate companies to make the investments
The integral water management pursued in the LIVING WITH WATER programme is clearly in the public domain. Developing the required knowledge cannot be left to the market in view of the failure of the market in this respect. The private return on the R&D investments for companies if they have to pay for the knowledge development themselves is far too low, whereas the social return on these investments is much higher. This is a matter of market failure.[1] If companies are stimulated to invest in R&D through the use of subsidies (such as WBSO) the proposed integral knowledge development will also fail. Companies will continue to focus on private benefits and will definitely not invest in sharing the knowledge obtained. For the socially desirable knowledge spill over undermines the private return on R&D investments. Experiences within ICES/KIS II have already proven that the programme must ensure that companies sufficiently share their knowledge during the implementation of the programme.

Alternative: the national authorities stimulate knowledge development by increasing the scientific budget
Universities as such cannot bear the costs of the proposed knowledge development, since mobilizing and focussing already developed knowledge at the requesting parties, companies and knowledge institutions are an essential aspect of the proposed knowledge development. The long-term character of university research often hampers linking up with the short-term questions from the practice. There is a significant risk that there will be no link between the knowledge developed and the field.

Alternative: subsidize individual projects
Subsidizing individual projects implies that the coherence of the knowledge structure will be lost. This coherence is essential for building on previous experience, for sharing knowledge and for setting up communities of practice. In that case the question remains whether strengthening the infrastructure, attuning the knowledge development, and integrating arts, natural science and socio-economic sciences will be realized in the long term.

Alternative: establish a new institution for integral water management.
An institute to be newly established will probably be able to realize the desired knowledge structure. Only the costs will be much higher because the knowledge already available at other institutions cannot be fully used.

Currently there is no alternative to the proposed bundling of creative forces and implementation capacity in the Netherlands.

5.4 Measurable economic and social results

The economic and social results of the LIVING WITH WATER programme are expressed in the social effects of the projects conducted within the programme. Within these projects extra attention is paid to integral valuation, adequate guidance and broad communication. The eventual solutions will contribute to an improvement of the quality of the living environment (social benefits) and to effective and efficient planning and implementation (social cost and damage reduction). This will be further specified below.

The knowledge required to establish the economic, ecological, social-cultural and historic values of water will become available via this programme. These are made comparable and manageable so that the decision-making and planning processes in water management improve.

Thus the policy allows for a better selection of the socially optimal solution. Moreover it enables a better weighing of short-term and long-term solutions.

The developed knowledge regarding these values will also be used to adapt the research programme in such a way that the social benefits of the programme will be maximized.

With the developed knowledge regarding the various values of water and the interaction of this value and the use of land, it will be easier to assess the appreciation of multiple use of space involving water (such as wet nature and recreation), so that it will be easier to include multiple use of space in the decision-making process. This leads to an efficient use of space and higher quality spatial solutions. Because of the collaboration between knowledge providers and knowledge requiring parties no more energy is wasted looking for partial solutions, and an integral approach may lead to advantages of synergy. The knowledge to be developed regarding values is quantitative and can be communicated so that misunderstandings in the consultation and decision-making processes can be minimized and project damages can be reduced. This reduces the risk of project failure and thus a loss of investment costs.

Establishing a body responsible for developing and expanding the knowledge infrastructure results in experience that can be used in similar projects, thus preventing invention of the wheel twice. This leads to savings in terms of time and costs because it prevents 'duplicate research' and duplicate investments.

The investment package will lead to a more efficient and less scattered knowledge infrastructure in which the knowledge gaps between theory and practice, between policy and realization, between technical scientific knowledge institutions and socio-economic knowledge institutions have been stopped. This collaboration will partly prevent organizations from working disjointedly, and will improve the flow of theoretical knowledge to the practice. This will result in solutions being created faster and in more efficient use of the capacity of knowledge organizations, which leads to better results (more output at the same costs or less costs for similar output). The collaboration saves time and money.

In the current situation water is handled professionally in the Netherlands, but the interaction between water and society leaves a lot to be desired. The Living with Water programme contributes to improving this interaction. On the one hand this implies that the knowledge level and the involvement of the social stakeholders – including citizens and companies – increase, which shortens the throughput time of projects and diminishes the chances of failure. Currently too many projects get stuck in the planning phase and will never be implemented. On the other hand this implies that water managers get more feeling for the social interplay and improve the harmonization of their efforts. The values of water are better mapped and operations are demand-driven rather than steered by supply. The results are customized so that less drastic measures are required, which in turn results in cost savings. Moreover water projects face less 'nimbys'.
An improved integration of water and society increases the possibilities of obtaining administrative support for water projects and strengthens the Dutch reputation of being able to realize good water systems under complex conditions. Now the complexity is not only determined by the physical conditions but also by the possibilities and the constraints offered by society. Social constraints are a challenging aspect of adequate water management.
This means a cost reduction for society, among other things because of less damage due to planning. Shorter throughput times for projects lead to earlier returns on investments, increased cost-effectiveness and a smaller borrowing requirement for the government.

The programme will result in a better insight into and a better perception of the risks involved in various solutions to flooding and other water related problems. The gained insights will make it possible to reduce the costs of water-related problems. Since citizens will be aware of the relevant knowledge regarding water management and the risks involved, they can adapt their behaviour. This will lead to less damage and a reduction of damage claims, because these will be shifted to the authorities less often. The damage by flooding and other water-related problems in regional water systems amounted to € 450 million in the relatively wet year 1998.

The programme will also lead to implementation of a large number of investment projects in national and regional water management. The project implementation will be 'smarter' because of the increased knowledge. This will make the implementation of the new water management more effective and efficient.

The costs of the LIVING WITH WATER programme are relatively low as compared to the costs involved in integral water management for the next years. Dutch water management involves large amounts of money. The annual costs of water management in the Netherlands amount to € 5.7 billion, € 1.2 billion of which is involved in preventing too much or too little water, and € 4.5 billion for the use of water. This is almost 2% of the Gross National Product[3] or almost € 365/person per year. The investment package will lead to an increase in social and economic benefits of water management, as well as to savings on the annual expenses.

Committee WB21 states that the main system will require an estimated additional budget of approximately € 180 million/year over the next 50 years, for spatial as well as technical measures. The extra investments in the regional water systems amount to more than € 45 million/year, together than € 225 million/year additional costs. In all, WB21 estimates that the 'space for water' measures required to cope with the water problems in the first half of this century will amount to about € 12 billion totally. It is the committee's opinion that the extra investments in water policy development and strengthening the knowledge infrastructure will lead to major social and economic benefits over the long term. [4]

Since the investments in infrastructural measures will continue anyway, the LIVING WITH WATER knowledge development programme reduces the risk of mistakes or sub-optimal solutions. Mobilizing more knowledge regarding a new approach to integral water management enables faster substantiation and effectiveness of this approach. The investment stimulus at hand will contribute to finding cost-effective solutions and social support for the required adaptations in water management. Moreover, the investments will lead to more sustainable water management as well as to a higher level of safety regarding flooding and other water-related problems. This may lead to the conclusion that the investments in knowledge development via this programme are only a fraction of the costs (and benefits) of integral water management. The Bsik contribution of € 26.8 million over a period of 4 years is only about 0.1% of the total costs of water management during that period. Improvement of the efficiency with 5% would mean a return of investment within 2 years.

Export

Exporting knowledge and advice will become much easier because of the extensive applicability of the developed knowledge. The trust of foreign parties can be obtained because the methods have been applied in our own country. We can offer practical examples. Besides, if we work within EU projects we can receive a 50% subsidy, provided major integral projects will be implemented. ICES/KIS II experiences have shown that the Netherlands will function as an example in the scope of international knowledge transfer, which is also a useful aspect of the investment programme.

Risks

In the proposed programme many different parties from various disciplines and fields of knowledge will collaborate on finding and implementing new solutions to problems regarding water management. Naturally, this new approach also involves risks, which will be discussed in this section.

There is a risk that one of the intended participants may not function well within the programme. This risk is covered by the fact that the programme has been divided into different projects. Only a part of the programme (about 40%) will be allocated initially. This offers the possibility of using the experience gained in the initial projects and changing the composition of the project team before starting subsequent projects. Moreover, the projects will be awarded with clear go/no go criteria per sub-project. These will be based on

[3] Source: CBS data GNP 1998 = 355 billion euros
[4] WB21.page 110

the quality of the project team and the relevance of the interim results. In terms of the scientific side of the knowledge programme, the functioning of the participants will be monitored by programme management and the knowledge engine.

Another risk is that the intended integration of technical, natural and socio-economic sciences will not be realized adequately. This is a limited risk because this integration is a 'conditio sine qua non' for the financing of the projects in the scope of this programme. Attractive projects with too few aspects for integration will be assisted by the (multi-disciplinary) programme management in an effort to meet this requirement.

A third risk is that the knowledge is not adequately embedded in the field. This problem has been anticipated by the constraint that a knowledge requiring party must be represented in every project. The projects are also selected for their innovative project organization, in order to prevent both knowledge providers and knowledge requiring parties from basing their work on a rigid client-customer relationship, but focus on a controllable mutual process of learning. In addition a professor of communication studies has been included in the 'WAR' who will also act as a 'scientific coordinator' in all communication oriented projects. He/She will have to contribute to an efficient circuit of knowledge exchange. New concepts in the fields of work method and knowledge exchange must be created to prevent wasting a too high percentage of the capacity on running around in circles, endless discussions without any results.

A fourth risk is that the developed knowledge leaches abroad. The direct benefits of the LIVING WITH WATER investment package will probably consist to a limited extent of patents and tangible products. In practice, the risk that knowledge will leach appears to be very small. Few well-qualified water experts have been 'bought' from Dutch water knowledge institutions. Dutch expertise is far more often exported via consulting agencies. The Netherlands is more prone to attracting foreigners to work in the 'water world'. This is supported by the presence of a number of academic training institutions in the field of water (such as IHE and Technical University in Delft). This programme ensures that the Netherlands will retain this appeal. It is important to make sure that knowledge leaks away in a controlled manner with the objective of getting more in return.

A fifth risk is that not enough qualified people can be found to contribute to the realization of the programme. This could lead to higher salaries. This is a real risk, since innovative projects are often staffed by innovative people who always have a busy schedule. Thus this requires selecting good project managers, partly from different subject fields, who are capable of running the projects efficiently. Then the experts can do what they are good at. Furthermore, this risk is anticipated by the fact that the programme is designed to attract people who are primarily specialized in fields other than water (such as valuation, control or communication). Because of this programme more qualified people will become available for the work on new forms of integral water management.

A sixth risk is that policy priorities will change prematurely. This programme embeds the knowledge development for integral water management. The water issues are too important to be removed from the political agenda. The fact that knowledge requiring parties participate in projects and provide part of the finances allows for a change in priorities within the integral water management.

5.5 Essential steps to be taken after completion of the knowledge project

The investment package applied for covers the period 2003 –2007. One uncertain factor in this time frame is the speed at which the projects will get started. Previous ICES/KIS II programmes have demonstrated that particularly during the conclusion period a major effort has to be made to tie up the projects, including all the reports and knowledge transfer activities. Therefore the period 2007 to 2010 will be devoted to completing the projects and the knowledge transfer in particular.
Moreover the instruments developed within the programme will have to be adequately housed at the end of the programme. This involves the management of databases, expert systems, models, knowledge documents and manuals. This will have to be recognized on a timely basis and stipulated in contracts.

6 KNOWLEDGE PROJECT: IMPLEMENTATION

6.1 Structure of the knowledge project

The scope of the entire programme can be structured with the help of the matrix shown in figure 3.2. A distinction is made based on 5 area types that are characteristic of Dutch water management. The assessment of developments and problems regarding the use of space in relation to water management is determined by the conceptual model of the area. In this model the subsurface and the water system with all their short-term and long-term processes play a role in relation to the social processes. Four knowledge themes play a role in the vertical direction, namely communication, valuation, management and water systems. This matrix is the base for the essential research topics in Chapter 3 and the derived research questions as elaborated in Appendix 3. Together these form the terms of reference for the programme. In their own way each of the activities and projects in the programme cover a part of the matrix. In order to clarify how this works the so-called bait projects have been positioned in the matrix.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

The case-oriented innovative practical projects, generally fall within a certain area type and can be found in the columns . The various area types are associated with certain water organisations who can be invited to participate in the programme and to take care of a part of the co-financing. Within the projects a mix of disciplines will work on the various knowledge themes. The fundamental scientific projects (such as those numbered 3, 7, 11 and 49) extend cross-wise and can be linked to one or more case-oriented practical projects. One or more knowledge themes linked to certain disciplines will be the central issues. In this way research into the desirability and the scope of citizen participation can be conducted within various practical projects and for various area types. Obviously this is also valid for the valuation of water in the participatory planning processes. The projects 'Feast' (46), 'Space for administrative arrangements' (47) and 'Meanings of Water' (50) can be used as an example. These projects pay attention to the current and the future legal-administrative, organizational-administrative arrangements of water management and meaning and perception of water (Living with water), respectively. This implies an investigation within practical projects of the bottlenecks encountered in the effort to create more space for water. Subsequently recommendations will be made regarding new legal and administrative arrangements on the basis of these bottlenecks. The linkup with practical projects and the involvement of water managers ensure that the possible solutions will indeed be feasible, be it on the longer term.

This creates a framework with the innovative practical projects in the vertical direction, linked up with the fundamental scientific projects as 'architraves' in the horizontal direction. The 'knowledge engine' and the programme management make sure that the relevant research questions will all be covered by the projects. Where coverage is lacking, projects will be initiated.

New developments require an adjustment in the terms of reference. For this reason a new annual programme will be established every year. Projects can be obtained by open tendering procedures. When an open tendering procedure does not result in one or more high level proposals personal invitations or definition studies will be issued.

In order to illustrate the framework discussed above a number of projects will be proposed for selection to the first series of projects to be implemented, the so-called 'bait-projects'. The survey below concisely indicates the essence of the projects selected so far. Please refer to Appendices 5 and 6 for a more detailed description and assessment.

Table 6.1 Overview of selected bait projects

Project number	**Title**	**Consortium leader**	**Consortium members See Appendix 5**
3	Storage at the source	TNO/NITG	Province of Noord Brabant; Water board Mark en Weerijs; University of Utrecht; Alterra; Natuurmonumenten
This project investigates the contribution of upstream water storage to the discharge behaviour of regional rivers in average sized (cross border) catchment areas. This includes an analysis of the feasibility, the costs and benefits, the consequences for spatial planning and the social support.			
6	Gouwe Wiericke West	Province of Zuid Holland	5 Municipalities; Hoogheemraadschap Rijnland; Water board W&W; WLTO
For the Gouwe Wiericke West peat-meadow area an interactive planning process is expected to lead to a formulation of solutions for a sustainable approach to water management and agriculture, retaining and developing the natural values, strengthening the recreational/tourist possibilities of the area as well as strengthening the characteristic peat-meadow area landscape. The pilot area will also serve as an experimental garden for more theme-oriented projects in the knowledge programme, such as projects 'What about the peat areas?'(24) and 'Limitations to citizen participation' (7).			
7	Limitations to citizen participation?	RIZA	
The objective of this project is to map the desirability and the feasibility of citizen participation. The established limits will be compared to the wishes and limitations of the water management organization. This may possibly lead to adaptations in the organization and the work method used for the innovative water management. This project offers possibilities for connections with various area types			
11	Interactive Implementation	Tauw	Province of Groningen Cities of Groningen & Deventer; Water boards De Veluwe and Groot Salland; Twente University
Interactive implementation implies a new work method for the planning and implementation of plans. In essence this implies that the plans will be implemented simultaneously and not sequentially. Policy, planning, design and management processes will be conducted in parallel. The advantage of this work method is that this will increase the support from the various participants.			
12	Participative planning and cost- efficiency with the desired with (ground) water level in the North of the Netherlands	TNO/NITG	Provinces of Drente, Overijssel and Groningen; Water boards Groot Salland, Reest en Wieden, Veld en Vecht, Hunze en Aa, Noorderzijlvest; Haskoning, Tauw
The objective is to facilitate interactive planning for the transition from the present situation to a desired groundwater and surface water regime (GGOR). The most important tool in this respect is a user-friendly database with which a fast overview of all kinds of scenarios can be obtained. Moreover, a weighing methodology will be further developed, taking into account not only technical aspects, but moreover the socio-economical aspects.			

14	Spatial planning and water systems in the Regge and Dinkel area	TNO/NITG	Province of Overijssel; Water board Regge en Dinkel; VITENS; RIZA, WL/Delft Hydraulics
Spatial planning in Pleistocene areas is the central theme of this project. The objective is to find an optimal arrangement for the use of the soil and the configuration of the landscape. That will lead to an optimal substantiation of safety, resilience and natural values of the water system. Water as an organizing principle forms the basis for this project.			
15**	Sustainable multiple use of space at sea	RIKZ	TNO-NITG, WL/Delft Hydraulics RIVO; TNO/MEP; Twente University ICIS, Alkyon/H2iD
The 'Sustainable multiple use of space of the sea' project investigates the possibilities to innovatively and sustainable use the space available in the coastal area and at the North Sea in the Dutch Exclusive Economic Zone (EEZ). The most important research questions focus on the possibilities and the consequences of multiple use of the coastal area and the North Sea and on integral assessment frameworks, including methodologies and instruments. This project qualifies to be a bridge project in collaboration with Delft Cluster and Climate Changes Spatial Planning (see Chapter 7.4)			
16	Perspectives in integral water management	University of Utrecht	RWS Directie ZH RWS Directie Oost; ICIS Maastricht; NITG, RIZA WL/Delft Hydraulics, KNMI; Carthago Consult.
The main objective of this project is to analyze various water management strategies in relation to varying future climate and social conditions, in order to be able to identify robust water management strategies			
19**	Knowledge project Floating City	DURA Vermeer	TUD; WL/Delft Hydraulics; Geodelft; Oosterhuis Architecten; Middelkoop; Advin, Haskoning; OTB, EIB, Ecorys
The Knowledge group Floating City has expressed the intention of creating the first wet city in the Netherlands in the Haarlemmermeer or its immediate environments. To accomplish this practical experience with such a new form of construction and urbanization is essential in addition to the theoretical knowledge to be amassed. The most important points of attention in the project proposal focus on construction in an urban area where space is scarce, with the additional objective of creating sufficient room for water. This project qualifies to be a bridge project in collaboration with Delft Cluster, Climate Changes Spatial Planning and SRG (see Chapter 7.4).			
21	Instruments for trans-national catchment area management	Cap Gemini Ernst & Young	Twente University; Infram
This proposal involves research into the bottlenecks and barriers in international catchment area management and the way in which these can be solved. The project aims to develop a process approach intended to initiate trans-national collaboration in this field.			
22	Salinization problems in the low Netherlands	Vrije Universiteit	'Rijkswaterstaat', Provinces of Noord-Holland, Zuid-Holland and Zeeland; Hoogheemraadschap Rijnland KIWA; TNO/NITG TUD; Witteveen & Bos
The objective of this project is to increase the knowledge regarding processes that lead to salinization as a result of long periods of drought. This will be done by analyzing the effects on the groundwater system due to human activity, climate change and subsidence. Eventually solutions will be proposed that enable the salinization effects to be managed and to be included in the planning processes.			
24	What about the peat areas?	Alterra	MinisteriesVROM, LNV, V&W DGW, Provinces of Noord Holland, Utrecht and Zuid Holland, numerous waterboards, RIZA RIVM, WUR, IVM/VU, CLM
The objective is to gain insight into the long-term effects of various dehydration strategies on the landscape, water management, nature and the environment in the peat areas located in the western part of the Netherlands in relation to the water management conditions. The effects of the scenarios will be evaluated coherently in terms of sustainability and the social costs and benefits.			

33	Water economics	RIZA	CBS; EUR; IVM; RIVM; LEI; NEI;
The main objective of this project proposal is to develop and make operational an integral economy model. The model describes the interactions between water and economy at various relevant scale levels (regional, national and international catchment area). The relations between water and economy will become visible so that the value of water for the regional and national economy becomes clear. Integral planning processes, including those for the long term, will benefit from such a model.			
36	Water management in extreme situations for Vecht/Zwarte water	Province of Overijssel	RWS DON; RWS DIJG; RIZA; Various provinces; Various water boards; Twente University; DHV;
The objective of this project is to create a catchment area-wide organizational structure of decision-making protocols supported by technical tools, the purpose of which is to prevent extreme precipitation situations or water shortages from causing problems. The selection of the location for arrangement measures will be weighed both in economic and in social terms on the basis of a decision-support system.			
38	Sustainable and water conscious construction in Almere Hout	Almere/DHV	RWS-BWD; RIZA Water boards Zuiderzeeland; Wageningen- University; IHE
Almere Hout combines sustainable construction and water management. This project will provide tools for projects that integrally combine sustainable construction and development with water systems and water management. The (water conscious) development of Almere Hout serves as a pilot project for further research. This project offers good possibilities for implementation in combination with project 19.			
39**	Living with rivers	WL/Delft Hydraulics	RIZA; RWS DON; DZH; DWW; Alterra;
This project aims to achieve a coherent vision on high water risk control and spatial development (including landscape and nature) in the river area and an elaboration of this vision in a number of local/regional 'operational prototypes'. This project is selected as a bridge project with the research programme Delft Cluster and Climate Changes Spatial Planning.			
49	Towards new forms of governance	VU	IVM, RUG
The program aims to design a framework for the transition to a more participatory form of water management in the Netherlands. The emphasis will be on the social dynamics in the transition process caused by the multiple stakeholders, and, on the processes through which participation and transparency can be assured. The success of the process depends on the regulatory conditions on the one hand, and the access to relevant technical information and modelling tools on the other hand. The project will therefore also address these issues and locates them in the international context.			
50	Meanings of Water	Expertise Centrum Landschapsbeleving	Alterra, WUR, RIZA
The proposed project aims at studying the positive and negative meanings of water at an individual and a collective level. In particular, the project will focus on situations where individual meanings conflict with collective meanings. In these situations, insight into the personal and cultural determinants of different meanings of water is crucial to find effective solutions that combine the interests of individuals and communities			

Note: The projects marked with ** are proposed to be 'Bridge projects (see chapter 7.4)

6.2 Phasing of activities and milestones

After acceptance, the programme will run for a period of about 4 years. It is scheduled to start in the fall of 2003. However, the initiating group has been busy making the necessary arrangements for a flying start. Experience shows this is essential. The phasing of the project looks as follows:

Table 6.2 Planning of activities and milestones

Phasing	Activities	Milestones	Test criteria
Preparatory phase			
Phase 0 EOI and Knowledge Project Plan	Compose EOI	EOI Assessment mid 2002	ICES/KIS criteria
	Inventory knowledge requirements and knowledge provision, project proposals and consortia formation	2002	
	Organize Initiating group and the basis for the programme	2002	
	Creating the programme and the Knowledge Project Plan	Submit Knowledge Project Plan on 17-02-03	
Phase 1 Programme preparation	Prepare articles of association for the foundation	Definitive articles of association June 2003	Contracting Ministry and Senter
	Organizational preparations Further elaboration of the programme		
	Assessment of the plan by ICES/KIS	July 2003	ICES/KIS criteria
	Contract preparations with the ICES/KIS organization and the contracting ministry	Contracting September 2003	Contracting criteria Ministry and Senter
	Establish the articles of association and the regulations memorandum of association	September 2003	Contracting criteria Ministry and Senter
	Establish the foundation with board and programme management	September 2003	
	Decide upon first year programme	October 2003	Assessment by WAR, knowledge engine and Board
Phase 2 Programme start year 1	Select an initial series of projects, including first round of fundamental research projects	October 2003	Assessment by knowledge engine , WAR and NOW, and Board
	Project implementation	Start December 2003	
	Selection second series of projects	February 2004	Assessment by knowledge engine and board
	Decide upon second year programme	October 2004	Assessment by WAR, knowledge engine and Board
	Select an third series of projects, including second round of fundamental research projects	October 2004	Assessment by knowledge engine , WAR and NOW, and Board

Phase 3 Realization year 2	Selection fourth series of projects	February 2005	Assessment by knowledge engine and board
	Project implementation	May 2005	Mid term evaluation by scientific panel led by NWO
	Decide upon third year programme	October 2005	Assessment by WAR and board
	Selection fifth series of projects	October 2005	Assessment by knowledge engine and board
Phase 4 Realization year 3	See year 2		
	Decide upon final and conclusive year programme		Assessment by knowledge engine and WAR
Phase 5 Completion	See year 3		
	Preparation programme conclusion	December 2006	
	Conclusion and evaluation of the programme	March 2007	Evaluation by all relevant parties

The realization of the programme will use the CUR's (CUR is the hoisting organisation for the programme) tried and tested programming and administrative procedures, organizational and legal elements and basic documents regarding project submission procedures, contracting, project proposal formats, basic project plans, etc. These will be adapted to the new ICES/KIS regulations and to the wishes of the contracting Ministry. SENTER is familiar with the details on the basis of the experience with the ICES/KIS I and II programmes.

6.3 Organizational risks

The investment package applied for covers the period end 2003 –beginning 2007. The period 2007 to 2010 will involve the completion of the projects and the knowledge transfer in particular. So the investment package is a one-time stimulus to facilitate the required knowledge development for new water management.

The supervision of the projects will use basic project plans, contracts, including go/no go criteria based on results that can be tested, progress reports, interim results and final reports. The realization of the projects and the spending of the funds will be carefully monitored. It is a well-known fact that projects, and thus the entire programme, will start slowly because so many parties are involved and because of the complicated financial constructions.

The fundamental scientific programme is particularly vulnerable, since Ph.D. students are (or were) hard to find. The supervisory capacity has been found, but the financial means will also have to be reserved. This requires extra attention and possibly innovative structures that enable solutions to these bottlenecks.
The proposal does not assume that special attention and additional measures will have to be taken to prevent loss of time in this respect. However, should this occur, it might be necessary to extend the component involved over a period longer than up to 2007.

6.4 Where do research activities interface with (pre-competitive) development activities?

The required knowledge will be obtained by developing new knowledge based on questions from knowledge users/the practice or based on social issues. Thus scientific knowledge is linked to the operational and material knowledge of the relevant social stakeholders.
In the explanation to the Bsik contribution arrangement, pre-competitive development activities are mainly associated with industrial and commercial objectives. The LIVING WITH WATER research programme primarily focuses on the public domain, since space and water management are part of the public sector in the Netherlands. Thus the majority of the research can primarily be characterized as research without any industrial or commercial objectives. As has been stated earlier, where economic effects are expected these will mainly be secondary effects. Thus the pre-competitive development activities will generally be small.

The expertise will be provided mainly by R&D organisations and universities, each of which will cover its own sub-domain with its own strengths. By joining this programme they invest in innovation, which will only strengthen their position in the (international) market. Opening up the programme to all stakeholders and giving an opportunity to anyone with good ideas via open tendering procedures prevents undue preference for specific parties.

The research related to innovative construction concepts may be an exception to this.

7 CONSORTIUM: COMPOSITION AND COLLABORATION

7.1 Composition of the consortium

Mobilizing and focussing knowledge will only succeed if many parties are committed and collaborate. Thus it is extremely important that all different roles (stakeholders) are evenly represented.
A number of parties that are active in water management have initiated the setup of this Knowledge Project Plan. The members of this initiating group, the parties submitting this proposal, are listed in Appendix 1. They organized a number of meetings and symposia where all stakeholders had the opportunity to exchange project ideas and proposals. That is also where the project consortia came into being, in areas where other collaborations did not already exist. These project consortia have recently been very busy making the first series of project proposals (Appendices 5, 6 and 7). The project proposals have been coming in since November (in all about 50).
As soon as the programme starts, other parties will also be invited to participate. The entire consortium will have to consist of a balanced representation of the following stakeholders:

Table 7.1 The Assessment by knowledge engine and board consortium

For abbreviations and acronyms see Appendix 1

Knowledge demanding parties:	**Knowledge providing parties**
Public Organisations: • Water boards (United in the 'Unie van Waterschappen' and STOWA) • Municipalities (united in VNG) • Provinces (united in IPO) • Ministerie V&W (plus 'Rijkswaterstaat')* • Ministerie LNV* • DLG • Ministerie van VROM (RPD en DGM RMNO) NGO's: • ANWB • Natuurmonumenten • Stichting Natuur en Milieu • Wereldnatuurfonds • VEWIN • LTO-Nederland Financial and Estate Developping organisations: • Rabobank • Bouwfonds • Nederlandse Waterschapsbank	Universities: • TUD, WUR, RUL, VU, KUN, TUT, KUB, UvU, UvA, EUR • RBA-Center for River Basin Administration Research institutes: • DWW Bouwdienst RWS , RIKZ, RIZA, RIVO • Alterra, IVM, KIWA, LEI, NEI • RIVM • TNO-NITG, TNO-Inro, TNO-MEP • WL|Delft Hydraulics Consultancy firms (united in ONRI): • Arcadis; DHV, Grontmij, Royal Haskoning, Tauw, Infram, Witteveen en Bos Bouwbedrijven (united in AVBB and VBKO): • Amstelland • Dura Vermeer • Heijmans
Knowledge transfer organisations	**Knowledge organising organisations**
• IHE • *'Stichting Wateropleidingen'* • PAON	• STOWA; NIROV, • Innovatienetwerk Groene Ruimte en Agrocluster • Water-Front • CUR

The **knowledge requiring parties** within the consortium will benefit from concrete knowledge on the implementation of a new water policy. They will have new creative and innovative solutions at their disposal and a thorough underpinning of the usefulness and the necessity of the new approach.

The **knowledge developing parties** have the advantage that their work is directed by the social demand. The application possibilities of theoretical concepts and methods can immediately be tested in practice. Moreover, knowledge 'flows' better from knowledge development to application. The R&D departments of construction companies and consultancy agencies will have improved access to the knowledge available at institutions and universities, whereas the fundamental research programmes will be better focussed on the knowledge requirements of water managers. Moreover, the collaboration between technical, natural and social sciences will be improved.

The **knowledge transfer parties** in the consortium will actively disseminate the knowledge at home and abroad, which will strengthen their position as a point of transfer. The dissemination of knowledge abroad will be connected to market development for Dutch companies and engineering agencies.

The knowledge organizing parties will form an alliance in order to effectively and efficiently realize the programme. This will provide one-stop access for anyone looking for information. The mutual harmonization of their activities will be improved by the alliance.

The programme is primarily intended to obtain the required knowledge development for the Dutch field and to strengthen the knowledge infrastructure. But this cannot be considered separate from the knowledge development at the European level, such as the relation to the implementation of the EU Water Framework Directive. The developed knowledge can also be used elsewhere in the world. Therefore intensive communication regarding the developed knowledge with parties abroad is required, to be conducted in a network of international contacts that has to be further developed as well as in commercial planning, design and implementation projects.

7.2 Availability of qualified people

A large number of knowledge parties are represented in the LIVING WITH WATER initiative. The parties in the consortia can thus submit their specific questions to an ample number of knowledge providers. Consequently no new people have to be recruited to participate in the programme on the currently still rather tight labour market. But in order to enable the connection with socio-economic disciplines, the 'water people' will be asked to focus on these disciplines, whereas the people with a socio-economic background will be asked to study the problems related to water management. Meanwhile a number of steps have been taken to involve research groups from the socio-economic disciplines in the programme as well. They received a special invitation to submit project proposals, so that eventually contacts can be established between the research groups.

A list and CV's of scientific research coordinators has been included in the proposal (see Appendix 2). The major participating parties can provide at least three to four outstanding CVs in the various fields. This involves the research leaders of the Erasmus University, the Free University of Amsterdam and the Delft University of Technology, Alterra, WL/Delft Hydraulics, TNO, RIZA, RIKZ and RIVM. The consultancy agencies as well as other parties also employ a number of research leaders. They are especially capable of bridging the gap between science and practice..

In strategic knowledge development an extra effort will be required from R&D departments of design and engineering agencies and of construction companies. This is in addition to the knowledge they amass from experience in applying the new insights at the implementation of concrete projects. This could lead to a limited increase in the number of knowledge workers in the organization involved. A limited increase in staff will also be required for the number of Ph.D. students to be involved in finding solutions to more theoretical and methodological knowledge questions (specifically for desk studies and in field research) at universities and R&D organisations.

The need for qualified project leaders is a specific point of attention. They must have a feeling for fundamental science as well as for how operations actually work in practice. The work of these 'bridge builders' is not easy. In this respect a contribution is expected from the engineering and consultancy agencies that often employ these people. We are considering devoting special attention to this group at the start of the programme, possibly in the form of a communities of practice for project leaders.

7.3 Structure of the implementation organization

The initiating group has decided to accommodate the implementation organization, in the form of an independent foundation, at the CUR House. In this way the implementation may benefit from the knowledge available at the CUR House as well as from the synergy with the various other programmes housed there, such as the programmes that are part of the '8 for Space' group, all linked to CUR.

A separate foundation has the advantage that the tasks and responsibilities remain clear and that separate control of the LIVING WITH WATER programme by the members of the consortium can be maintained. The foundation will be established as soon as the programme has been approved.

In the further substantiation of the implementation organization a well-structured and flexible, 'lean and mean' programme bureau will be the objective.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

The organizational structure of the LIVING WITH WATER programme (see Figure 7.1) will include a number of bodies with clear tasks, responsibilities and competencies

Board

The board is responsible for:

- Control and realization of the mission and the strategic objectives of LIVING WITH WATER.
- Establishing and implementing the general and strategic policy.
- Administering the financial means.
- Appointing the programme director and the members of the knowledge engine and the WAR.
- Signalling new developments that influence the activities of the programme. In this respect the knowledge engine and the WAR are independent advisory bodies to the board.
- Approving the annual plan and the budget for the next year as well as the annual report and the annual accounts of the past year.
- Establishing the investigation programme.
- Project approval.

The board will meet at least 4 times per year. It will consist of 10 people at most and will consist of an independent chairman plus representatives from the various stakeholders.

- Representatives from the contracting ministry.
- Water managers (national, provincial and regional).
- Water users.
- Universities.
- R&D organisations.
- Consultancy agencies and the construction industry.
- Social organizations and citizens.

The contracting ministry will appoint the independent chairman. The members of the board will be appointed and dismissed by this independent chairman.

Programme office
A programme office will be established to handle policy preparation, supervisory and executive tasks. The board and the appointed director will be in charge of the programme office. In addition to the director, the implementation organization will include a number of programme coordinators and secretarial and administrative support. The primary task of the programme coordinators consists of initiating, supervising and monitoring the realization of research projects, including all accompanying operational aspects. The programme coordinators will be recruited from the various networks and disciplines that are relevant to the programme. In this respect, recruiting a coordinator from the network of the water boards and from the 'Innovatienetwerk de Groene Ruimte en Agrocluster' is being contemplated in order to establish a good relationship with these networks. For specific issues specialists will be hired on an ad hoc basis.

Knowledge engine
The knowledge engine develops, monitors and innovates the knowledge agenda of the programme. The knowledge engine is the heart of the programme with an eye for relevant developments in society, trends in the water world, international developments and innovations. The knowledge engine is composed of people with a broad view of the water world, who will be recruited from all relevant stakeholders. They are expected to be able to take up a position independent of the interests of their employer. The board will appoint the members of the knowledge engine for a period of two years.

The knowledge engine has the following tasks:

- As a forum for demand-driven, innovative substantiation of the programme they advise the board and the programme management on the knowledge agenda and the executive programme.
- Assessing, selecting and monitoring project proposals on the basis of the central criteria of social relevance and social costs and benefits. Moreover, they will monitor the development of the programme.
- Bringing together a wide variety of stakeholders, for example by combining theoretical knowledge and practical knowledge in one joint learning environment.

The knowledge engine will consist of about 10 people. In order to prevent compartmentalization and to adequately incorporate new developments into the programme, part of the knowledge engine will be replaced annually. At least one member of the WAR will also be a member of the knowledge engine.

Scientific Advisory Council
The task of the WAR is to monitor the scientific quality of the programme. To accomplish this they will meet at least twice per year. The WAR consists of about 10 experts from relevant fields of investigation with a broad experience in fundamental scientific research. The scientific coordinators of the 4 knowledge themes also are members of the council. Some of the members of the WAR may be from abroad.
NOW will assist with the scientific monitoring of the projects.

In the previously described structure the board is responsible for realizing the programme. The knowledge engine will advise the board with respect to the social relevance of the programme. With respect to the scientific aspects this will be taken care of by the WAR. The operational implementation will be in the hands of the programme office. In order to obtain efficient lines of communication, the director of the programme bureau will also be a member of the knowledge engine and of the WAR. Moreover, he/she will also be the secretary of the board. Last but not least, at least one person will be a member of the knowledge engine as well as of the WAR.

The names and CV's of the candidates for the different positions in board, programme management, WAR and Knowledge engine are available upon request.

The programme is an open. This implies that parties can participate in the programme during the entire course of the programme. In order to take part, a party must become a member of the LIVING WITH WATER platform. This can be arranged at any moment during the course of the programme. The following procedure has been designed for submitting project proposals:

Submitting proposals

A request for proposals will be extended twice annually. This request will include directions regarding what part of the research programme is the subject of the tendering procedure (both factual and in terms of the desired composition of the consortia) plus the available budget. Members of the platform may submit proposals (parties that are not members of the platform but that want to submit a proposal anyway, will first have to become a member).

The programme office will check whether the submitted proposals are complete and meet the demands and will subsequently present the plan to the WAR. This council will assess the scientific quality of the proposals. The assessment of the WAR will be forwarded to the knowledge engine.

The knowledge engine will rank the submitted proposals. This ranking will be conducted on the basis of the assessment of the scientific advisory board in combination with an assessment framework that involves the social relevance of the proposal as well as the social benefits (an initial draft of the assessment framework is presented in Appendix 7) and quality of the consortium.

The parties that submitted the proposal will be informed of the results of this analysis. This message may stipulate that the proposal either does not meet the requirements, or does meet the requirements but needs to be adapted, or fully meets the demands. Following this round, the consortia that submitted a complete and adequate project proposal are asked to elaborate this proposal in conformance with a fixed format. Depending on the number of proposals submitted, the knowledge engine will recommend what proposals qualify for implementation. This recommendation will be submitted to the board. The board will make the eventual decision.

A modified procedure will be followed for fundamental scientific issues. A request for proposals will only be extended twice: at the start of the programme and after one year. Subsequent to a screening of the social relevance by the knowledge engine and the scientific relevance by the scientific advisory board the submitted proposals will be presented to NWO. NWO will assess the scientific quality in conformance with the NWO system and will formulate a recommendation for the scientific advisory board. They will use this recommendation to formulate an advice for the management and the board. The board will take the decision.

Quality assurance

Maintaining the quality of the research is essential to the LIVING WITH WATER programme. Quality assurance occurs at four levels:

1. Project participant level.
2. Project level.
3. Sub-programme level.
4. Entire programme level.

At the organizational level the participating organizations are expected to maintain a quality policy based on ISO or INK. The majority of the organizations participating in the consortium work with such a quality assurance.
Within every project the agreed performance and the interim results will be monitored periodically, in accordance with the schedule below:

- The financial as well as the planning progress will be reviewed every 3 months. To be conducted by the project supervisor (one of the programme coordinators).
- The progress with respect to the objective and the factual aspects will be reviewed every 3 months. To be conducted by the supervising group, this includes the project supervisor and members of the knowledge engine plus representatives of the project consortium and the WAR.

The quality assurance of (fundamental) research programmes will be conducted via (international) visitations and evaluation. These will be specifically outlined for the fundamental research projects. In case of extremely critical parts of a programme, a second opinion of external experts will be organised.

At the level of the entire programme the knowledge engine and the WAR play an important role. They monitor and, if required, redirect the consistency and the harmonization of the entire programme as well as the quality of the programme and its sub-programmes. Moreover, a mid-term review by and international committee of experts is proposed, to be organized by NWO.

Monitoring

Every project is supervised by a supervisory committee. This committee will be composed of experts from the social field, from R&D organisations and from the world of science. The central task of the supervisory committee is to monitor the factual progress of the project. This implies monitoring the projects as regards their objectives, progress and knowledge transfer. The members of a supervisory committee will be compensated for their work, so that their supervision is not free of obligations.

A modified procedure will be followed for fundamental scientific issues. Here too a supervisory committee will be installed. In addition to a supervisory committee, efforts are made to realize supplementary possibilities to establish a contact between fundamental scientific researchers (and thus fundamental scientific knowledge) and applied research and practical situations. This might involve coaches, practical training and coupling of fundamental and applied scientific research projects.

7.4 Collaboration within and outside the consortium

Collaboration within the consortium

Collaboration within the consortium may take place via a number of different mechanisms:
- Within a joint project, with the objective of reaching a joint research objective.
- Within a community of practice, focussed on a characteristic practical situation.
- Within a knowledge exchange infrastructure, focussed on a specific theme or a cluster of projects.

For more information regarding the collaboration within the consortium, please refer to section 7.3.
We will concentrate more specifically on the relationships with other relevant knowledge networks below.

One of the conclusions of the '*Over Stromen'* memorandum is that knowledge in the water world is scattered and compartmentalized. Too many organizations focus on their own niche and little synergy is developed. One of the sub-objectives of the programme is to improve the synergy and the transparency of the knowledge field.

The LIVING WITH WATER programme has links to the work programmes of the following knowledge organizing parties:
- Stichting Toegepast Onderzoek Waterbeheer (STOWA).
- Innovatienetwerk Groene Ruimte en Agrocluster.
- Nederlands Instituut voor Ruimtelijke Ordening en Volkshuisvesting (NIROV).
- Civieltechnisch Centrum Uitvoering Research en Regelgeving (CUR).
- Raad voor Ruimtelijk, Milieu en Natuuronderzoek (RMNO).
- Algemeen Verbond Bouwbedrijf (AVBB).
- Water-Front.
- Netherlands Water Partnership.

Furthermore the programme complements the target subsidy programmes of WL/Delft Hydraulics and TNO (knowledge theme Sustainable use and management of soil/subsoil and water, 2003 - 2006) and the research programmes of DLO and '*Rijkswaterstaat*'.

In the international context LIVING WITH WATER links up to the Partners for Water Programme. Methods and technologies can be directly introduced in the Toolbox Integrated Water Management, which is being developed by the Netherlands together with the Global Water Partnership and the World Bank.

These links were realized by involving these organizations in the programming of the investment package. In the implementation phase key people from the various organizations mentioned above will be invited to join the knowledge engine, the WAR , the programme management, the communities of practice, review and audit teams and project supervisory committees. The programme coordinators will preferably be recruited from within the consortium, with an even distribution among water managers ('*Rijkswaterstaat*', water boards), R&D organisations, consultancy agencies and knowledge transfer and organizing parties .

7.4.1 Collaboration with existing and new ICES/KIS programmes

The LIVING WITH WATER consciously tries to link up and harmonize with existing ICES/KIS projects such as "*Systeeminnovatie Ruimtegebruik, gebiedsontwikkeling stad en land"* (SRG), Delft Cluster, NIDO, and Connekt. Since the implementation organization is housed at the CUR House, where an alliance of some of these organizations, the '8 for Space', is also housed, this harmonization is assured for the duration of the programme.

The knowledge programmes SRG and LIVING WITH WATER agreed to collaborate and to exchange the amassed knowledge regarding relevant parts of the programmes. Within the SRG programme practical projects will be conducted aimed at a combination of red and green functions with water (blue), the so-called 'mirror' projects, which involve a continuation of the activities of the current Habiforum programme. The SRG programme starts from a spatial perspective and investigates the possibilities for innovative function combinations of water, living, recreation, nature, infrastructure, etc. plus the required processes of collaboration, planning and implementation. The LIVING WITH WATER programme will supply the input regarding the values of water, specific water communication (such as participation of citizens and farmers), specific water-related administrative arrangements and concepts for multiple use of space in relation to water.
The practical projects in the programme will be strengthened by SRG with input of knowledge regarding spatial perspective, possibilities for innovative combination of functions between water, living, recreation, nature, infrastructure, etc. plus the required processes of collaboration, planning and implementation. Moreover, Habiforum has started setting up communities of practice that focus on the development of innovative concepts in practical situations. These communities of practice, plus new ones to be established, will be used to strengthen the LIVING WITH WATER programme.

Agreements have been made with the Innovatiecentrum Groene Ruimte and Agrocluster. At the interfaces of agricultural aspects and space for water, collaboration and harmonization will be organized. The Innovatiecentrum will be represented in the board and will be asked to post a programme coordinator from the agricultural network to the programme management.

The two **NIDO** projects involving how parties value water can be used as stepping stones for programming research in the scope of LIVING WITH WATER. In the long-term, innovation committees for water management can be set up in collaboration with the NIDO with the objective of strengthening the process of change in the direction of sustainability.

The ECON programme (theme 4 spearhead 8)
Possible interfaces between LIVING WITH WATER and ECON are:

- Increase the knowledge of the (VIJNO) layer 'subsurface', including the water systems that are present there (specifically focussed on the influence of using the subsurface).
- Water conscious construction'.
- Multiple use of soil/subsurface/water system.
- The value of (ground) water.

The programme Economic, social and cultural dynamics in the urbanizing Netherlands (theme 4 spearhead 1)
This programme investigates the economic, social and cultural 'drivers' that determine the dynamics and the developments in land use and spatial planning in the Netherlands. LIVING WITH WATER will also use the results of this investigation.

The programme 3D Dynamic Sustainable Delta (theme 4 spearhead 2)
A major part of the Knowledge Project Plan must be implemented in rural areas. A mutual coherence exists between the (quality of) water systems and the landscape. Thus it is of importance to connect the 'water' and the 'rural area' expertise networks. To achieve this, the programmes will be collaborating on, among other things, regional innovation projects and pilot projects that may or may not be linked to the implementation of infrastructural investment projects.

The Moving in Space programme (theme 4 spearhead 4)
One of the functions of water is the transport by water on behalf of recreation, and the transport of people and goods. New forms of water traffic may possibly require adaptations in the water system. Changes in water management may have consequences for the shipping traffic. For example, a lot of space for water will offer opportunities to pleasure cruising.

The programme Process and system innovation in the construction industry (theme 4 spearhead 5)
Both LIVING WITH WATER and this programme are designed to involve the implementing parties in the planning and spatial development processes at an earlier stage. The research within the water theme that focus on implementation may serve as a learning environment for this spearhead.

The Space for Geo-information programme (theme 4 spearhead 7)
A well-functioning geo-information infrastructure is an important basis for research into water management and water systems. The Space for geo-information proposal designs develops and innovates this basis. In this respect the project 'information node water' of the Space for geo-information programme is relevant. .

7.4.2 Setup of the collaboration with the Delft Cluster and Climate Changes Spatial Planning

It is acknowledged that the three ICES/KIS III programmes Delft Cluster, Climate Changes Spatial Planning and LIVING WITH WATER each have their own mission and their own field of innovation. This can be briefly characterized as follows:

- The mission of the Delft Cluster is to contribute, from the field of **technical disciplines**, to innovative solutions for problems that are considered to be socially relevant in the **civil engineering sector**, using **applied scientific research**;
- The mission of Climate Changes Spatial Planning is to contribute, from the field of **natural scientific disciplines**, to innovative research into **climate changes** and to solutions to the resulting socially relevant problems, in relation to the **arrangement and the spatial planning** of our country.
- The mission of the LIVING WITH WATER programme is to contribute to innovative solutions for social problems that are related to the **need for space for adequate water management and the value of water**, in relation to the **arrangement and spatial planning** from an adequate balance of **technical, natural and socio-economic sciences.**

Although each of the programmes has its own core area of attention, obviously there is an overlap creatind possibilities for synergy and collaboration.

The steering committees for the programmes have decided to create added value by close co-operation the bridge project model has been selected for this co-operation (see Figure 7.2.).
A so called 'bridge group' is established for the areas of common interest, composed of stakeholders from the three programmes. These bridge groups formulate a programme per area type, including a specification of the global issues plus the desired knowledge development. Bridge projects are initiated, which fit in the area of common interest. The initial versions of the bridge programmes can be found in Appendix 9.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

Thus the activities of a bridge group involve:

1. Common problem analysis and initiation of the research questions and substantiation of the bridge projects

2. Common selection of a pilot area for the translation of scientific knowledge into practical knowledge
3. Testing and formulating recommendations, as well as contributing to the selection of the bridge projects
4. Common creation and maintenance of a knowledge network in order to achieve dynamic harmonization and knowledge exchange during the implementation of the bridge projects (output becomes input).

Examples of bridge projects are:

- **15. Participative Integral assessment of multiple use of space at sea.** An RIKZ bridge project for the area type Coast and Sea.
- **19. Knowledge project Floating City.** A bridge project for multiple use of space for living and water storage in collaboration with the Delft Cluster and SRG.
- **39. Living with Rivers.** A bridge project for the river area in collaboration with the Delft Cluster and Climate Changes Spatial Planning.

Appendix 9 includes a description of the bridge programme for the coastal area, for the river area and for the peat-meadow area.

7.5 Agreements regarding intellectual property

In view of the public character of the programme, all knowledge developed will be publicly available as much as possible. With respect to the intellectual property of knowledge developed within a knowledge project the following rules apply (in conformity with the Bsik arrangement, article 17):

- Basically any rights of intellectual property belong to a university, R&D organisation or company that is a member of the consortium. As desired by the participants.
- All participants in the project to which these rights are applicable are entitled to use these rights
- Agreements regarding the exploitation of intellectual property will be made per individual project in order to obtain customized agreements.

8 KNOWLEDGE: DISTRIBUTION AND TRANSFER

8.1 Contribution of the knowledge project to distribution

The investment package LIVING WITH WATER contributes to the knowledge infrastructure in Dutch water management because:

- Knowledge requiring parties collaborate in formulating the knowledge demand.
- The compartmentalized knowledge organizations collaborate within the projects.
- The R&D organizations, which are technically and scientifically oriented, collaborate with the more socio-economically oriented knowledge institutions.
- Universities and knowledge institutions will collaborate with design and consultancy agencies and with the executive organizations, so that theoretical knowledge filters down to those in the field and practical questions from the field help steer the direction of the applied knowledge development.
- The general level of knowledge about and the involvement of the citizens and interest groups with water management increases through the investment in the transfer of knowledge.
- The results of the stronger knowledge infrastructure is a better, more facile communication between knowledge requiring parties and knowledge suppliers regarding the planning, design, realization and management of water and space.

The transfer of knowledge is a central theme within LIVING WITH WATER Four levels are distinguished here (see Figure 8.1):

1. Project level.
2. Programme level.
3. Field level.
4. Societal level.

Each level has its own characteristics, with the target group, the objective, the tools and the available budget as the central points.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

Within the projects knowledge is primarily distributed between the various parties involved in a project. The fact that the global stakeholders from the various disciplines, each with its own expertise and constraints, are collectively responsible for the results, ensures a driving force behind the dissemination of the information. This must be carefully considered when composing the project consortia, so that there are not too many conflicting interests within the group. This would not promote the open exchange of information.

The following communication infrastructure is used within the project:

- A regular meeting structure with project group and supervisory committee.
- A web-based project site, accessible for all the global stakeholders in the project.
- (Digital) interim reports and progress reports.
- (Digital) final reports, fact sheets, presentations and items that ultimately go to the programme's digital platform.

The transfer of knowledge with parties outside the project must be arranged more explicitly, however. Not all project partners feel the same level of urgency to support the programme's mission from within their project, once the project is underway. For this reason each project, in whatever form, must explicitly stipulate the manner in which knowledge is transferred. Financial resources must also be reserved for this transfer within the project (approximately 4 to 5 %). A knowledge exchange infrastructure must be set up to transfer the knowledge. This infrastructure consists of the following components that distribute the knowledge at levels 2, 3 and/or 4:

- A digital platform that offers interim and final products from the knowledge development projects, for internal communication, for discussions, etc. (level 2).
- Setting up a number of communities of practice, in which knowledge is exchanged between a specific cluster of projects, for example regarding the river areas (levels 2 and 3).
- A knowledge platform (the so-called Knowledge Integration Sessions), to which each project contributes the claims, problems, results and newly formulated ideas at least twice a year (level 2 and 3).
- A series of all sorts of creative activities (symposia, training programmes, coaching sessions), by which the message from the projects and other activities can be propagated (levels 2, 3 and/or 4).
- Publications in trade magazines and scientific journals, a newsletter with facts and news items (levels 2, 3 and/or 4).

For fundamental scientific projects, which are frequently far removed from practical applicability, a part of the available budget will also be reserved for the transfer of knowledge. They also use the communication forms mentioned above. Each fundamental scientific project will have a supervisory group made up of relevant experts, who also have their roots in the work field involved. For Ph.D. students internship positions will be created and coaches from knowledge institutions will be made available to ensure that the knowledge 'flows'.

For the transfer of knowledge to the engineers and the consultancy firms and the bureaus' customers, the 'Traverse' knowledge exchange project can be used. Research organisations, consultancy firms and the customers of the various bureaus participate in 'Traverse'. The objective of Traverse is to initiate and strengthen the exchange of knowledge between these three parties. The Traverse project office maintains a portal for this purpose on the Internet, where knowledge requiring parties and parties offering knowledge can locate each other in a digital marketplace.

8.2 Access to the available knowledge

The access to the available knowledge depends in part on the position of the interested parties in relation to the programme (levels 1 through 4) and to their own contribution. The access to knowledge depends on the parties' individual contribution. Three different levels are distinguished here: 'observation', 'discussion level' and 'full participation'.

Fout! Objecten kunnen niet worden gemaakt door veldcodes te bewerken.

'Observation' level

The final reports of research conducted and or publications, in whatever form, are made available via the LIVING WITH WATER programme's Web site. In principle, everyone has access to this, including those who have not contributed to the programme. The personal contribution is quite limited in this situation; the available knowledge is also restricted. Only the final reports and the public publications are made available. The interim products and concepts are not available to the 'observers'.

'Discussion' level

By paying a basic membership fee, parties are entitled to access to the knowledge infrastructure and to interim products, workshops, communities of practice, platform meetings, etc. In this way, parties can gain access to the knowledge and experience amassed during a knowledge project while making only a limited contribution.

'Full participation' level
By paying an extended membership fee and/or participating in projects (in the form of a financial contribution) parties can participate actively in the projects. The level involves the greatest individual contribution. The knowledge acquired is also considerable, however, because the parties actively participate in a project that is generally related to their personal needs.

8.3 Bottlenecks to the dissemination of knowledge and knowledge transfer

There is an overabundance of knowledge in this world. It is thus increasingly more difficult to get the message across, in spite of, or perhaps due to the digital tools. Bombarding the target groups with an enormous load of 'bytes' makes no sense. This programme must disseminate a specific dose of information under the motto: *a little less information, but truly valuable information*. That is why we are appealing to the professionals' and the citizens' need to receive the message in a pleasant, relaxed manner.
Harmonization with the other ICES/KIS programmes is thus desirable, for example by maintaining a common events calendar, formats for Web sites or a common Web site via a portal, communities of practice, etc. Something similar is already being done within the CUR.
Transfer of knowledge is food for the communication specialists. One of the projects within the programme would also be to devote attention to optimizing the knowledge transfer aspect, a subject about which the technical participants in any case can learn a lot from their socio-economical colleagues.

8.4 Motivation for the selected approach

The selected approach is based on an evaluation of a number of ICES/KIS II programmes, as they are now being executed from the CUR House. The positive experiences have been implemented in this programme. The negative aspects have been modified. We are working on a collage of knowledge transfer resources with the proper amount of information based on clearly defined target groups, objectives and selections of tools.

8.5 Monitoring the dissemination of knowledge and knowledge transfer

The indicators for an adequate dissemination of knowledge and knowledge transfer are:

- The number and type of parties and people who participate at a specific level in the programme.
- The number and type of knowledge transfer products ((interim) reports, fact sheets, presentations, items, workshops with number of visitors) and the value the parties ascribe to these products based on periodic marketing research.
- The number of passive and active Web site hits.
- The recognition of the programme by investigating its perception in the work field and outside it.

9 FINANCES: BUDGET AND COVERAGE

9.1 General cost overview

The project costs of the knowledge project LIVING WITH WATER consist of:

1. The costs of the fundamental scientific and the innovative implementation-oriented practical research.
2. The costs of programming, transfer of knowledge and communication at programme level.
3. The costs of programme and project management and organization.

All costs are excluding VAT for a period of 4 years.

1. The costs of scientific research and practical research

These costs relate to two forms of research:

- *Fundamental scientific research*
  Approximately € 12,000,000 has been estimated as the cost of fundamental research, allocated across approximately 20 projects. These costs include the salary costs for the Ph.D. students, the university assistance and the project-specific assistance from NWO, the WAR and the programme management.
- *Innovative implementation-oriented research*. Approximately 60 projects have been identified for this type of research with a total amount of € 30,000,000. The global allocation of these funds across the research themes is also shown in table 9.1. Sometimes it is necessary to utilize more intensive process management during moments at which conflicts of interest or other causes lead to the stagnation of a project. Management capacity is made available for this by deploying mentors from the network to support project teams, project co-ordinators and/or supervisory committees.
- The total costs for the scientific research and practical research are € 42,000,000, including approximately € 1,600,000 in costs directly related to project supervision from the programme management. The costs of the project management within each of the projects amount to an estimated average of 4% of each project budget; at least an equal amount must be reserved for communicating knowledge to the outside world. Moreover, for each project that is conducted within LIVING WITH WATER approximately 8% of the budget goes for supervision, project management and the transfer of knowledge.

The proposed knowledge project thus involves the following financing needs for the period 2003 – 2007. These are summarized in Table 9.1.

Table 9.1 Overview of project costs (in €, excl. VAT)

	Coastal areas	River Areas	Regional low	Regional high	Urban expansion	Subtotal
Communication	1,260,000	1,680,000	2,100,000	1,260,000	2,100,000	8,400,000
Valuation	1,260,000	1,680,000	2,100,000	1,260,000	2,100,000	8,400,000
Management	1,260,000	1,680,000	2,100,000	1,260,000	2,100,000	8,400,000
Water systems	2,520,000	3,360,000	4,200,000	2,520,000	4,200,000	16,800,000
Sub-total	6,300,000	8,400,000	10,500,000	6,300,000	10,500,000	42,000,000

2. The costs of programming, transfer of knowledge and communication

In order to be able to conduct the programme, costs are also incurred at the programme level. These costs are split into (a) the costs of realization such as programming, transferring knowledge and communication and (b) the costs of the operational organization itself.
The following costs can be distinguished under the category realization costs:

- *Project initiation and selection*
  This is an important activity of the knowledge engine in collaboration with the project coordinators. Part of these support activities must be compensated. Programming sessions will also be conducted that involve preparation costs and accommodation costs. The costs cannot be diverted to the projects, because these activities must have an independent character. The costs for the project initiation and selection are estimated at € 485,000, including the costs for the knowledge engine.
- *Programme Supervision* from the scientific coordinators, the NWO and WAR.
  In addition to the regular project management which each project will receive to ensure its continuation, contractual obligations, transfer of knowledge and quality assurance, the programme needs assistance and, if necessary, adjustment by the scientific coordinators, NWO and scientific advisory council. The costs that are directly involved for each project are paid from the project budget (see above). However NWO and the WAR must also advise the programme management regarding the selection of the fundamental scientific projects. Moreover, the scientific advisory council and NWO will also deal with the scientific level of the entire programme. NWO will be invited to conduct an (international) mid-term evaluation and end evaluation of the entire programme.
  The total supervision costs for the scientific coordinators, the WAR and NWO, which will be charged to the realization of the programme, come to € 345,000 for the total programme.
- *Corporate communication*
  These are costs at the programme level for workshops and project visits to propagate LIVING WITH WATER to the world. All parties involved in the programme will make a contribution to this 'corporate' communication through lectures and presentations at various events and to various target groups. The total costs for the programme come to € 60,000.
- *Knowledge integration between projects*
  Activities include setting up communities of practice, project integration teams and theme events. The programme coordinators and the scientific supervisors must make a substantial contribution to the integration of knowledge among the various projects, the design of communities of practice and the maintenance of such communities, the functioning of the project integration teams and organizing theme events and recording and communicating the results of these events. The total costs for these activities come to € 720,000.
- *Communication with third parties*
  In principle, funds are reserved within each knowledge project to transfer the results achieved to the scientific world and to the field. The funds required to make the results marketable abroad are also taken into account. But at the programme level it is important to reserve funds for generalizing the project results, translating them into the context of application to different target groups and setting up ICT tools to make the project results accessible (for example via an electronic product guide). The total costs including a newsletter, web site, symposia and congresses are estimated at € 200,000.

Table 9.2 OverviewCosts for programming, transfer of knowledge and communication

Project initiation and selection (knowledge engine)	485,000
Project supervision (NWO/ WAR)	345,000
Corporate communication	60,000
Knowledge integration projects	720,000
Communication third parties	200,000
Total	1,810,000

Management and organization

The office costs for the programme management are comprised of the following items:

- *Costs of the board*
  LIVING WITH WATER utilizes a management format in which some of the board members (chairman, vice-chairman and treasurer, who comprise the Executive Committee) receive remuneration. Moreover, meeting costs and travel and lodging costs are also paid. These costs are estimated at € 30,000/year, or a total of € 120,000.
- *Programme management*
  The programme management is recruited from CUR, members of the consortium and from the market, depending on the desired profile, relation to the programme and availability. The programme management consists of:
  - A programme director for 4 days per week.
  - 4 programme coordinators, partly part-time.
  - A number of review specialists, who assist with the programme management, to be recruited from the network, for specific project tasks.

  The programme director spends an average of 20% of his time on general management tasks. Approximately 30% of his time is spent on knowledge management, 20% on project selection and initiation and 30% on project supervision. The programme coordinators spent 30 % of their time on general management, project initiation and knowledge communication activities. About 70% of their time is spent on project supervision .The costs of the programme management come to a total of € 225,000.
- *Programme office*
  The programme office for LIVING WITH WATER will be located at the CUR in Gouda Its general facilities will be supported by the CUR. These include:
  - Management support (strategic, legal, financial).
  - Secretarial support.
  - Financial administration and management.

  The office costs amount to € 510,000 for 4 years.
- *General external costs*
  These include non-project-related housing, general and technical support (mail, archive, reception, ICT) travel and lodging costs, external meeting costs, attending seminars and congresses, subscriptions, office supplies, printing costs and general costs, membership in the Chamber of Commerce, purchasing literature, bank costs, internet costs, courier costs, letterhead and business cards, insurance and accountant costs. Over a period of 4 years these costs come to a total of € 535,000.

The total costs for management and organization thus amount to € 1,390,000. With a programme scope of 45.2 million euros, this is 3%.

Table 9.3 Overview Management and organization costs

Costs of the board	120,000
Programme management	225,000
Programme office	510,000
General external costs	535,000
Total (excl. VAT)	1,390,000

Table 9.4 Summary of the programme costs (in € for 4 years excl. VAT)

1. Research	42,000,000
2. Programming, transfer of knowledge and communication	1,810,000
3. Management & organization	1,390,000
Total (excl. VAT)	**45,200,000**

9.2 Financing

Non-project-related costs

The non-project-related costs are financed two ways:

- *ICES contribution*
  The non-project-related costs for management and organization and knowledge management are € 3,200,000. Approximately 67% of this, or € 2,140,500, consists of salary expenses. The rates used in the calculation of the non-project-related costs are approximately 75% of the average market rates, because a contribution is generated from the organizations from which the programme staff is recruited. That means that the rates consist of salary costs with a surcharge of 100%. The ICES contribution consists of 50% of the salary expenses with a surcharge of 50%, which comes to € 1,070,250. The ICES contribution for the other costs is 50% of € 1,059,500, or € 529,750. The total ICES-KIS contribution to the non-project-related costs is €1,600,000.
- *Contributions from the participants*
  The remaining € 1,600,000 comes from annual contributions from all members of the Living With Water consortium.

Scientific research

An amount of € 11,000,000 is reserved for fundamental scientific research. The share of salary expenses here amounts to an estimated € 7,500,000. These are primarily the salaries for the Ph.D students and the researchers, that is, the direct salary costs plus social security. ICES pays € 4,500,000 plus part of the non-salary costs of € 2,100,000 for a total of € 6,600,000. This means an additional € 4,400,000 in financing is required. We expect to receive € 3,400,000 from public/private project financing. The remaining € 1,000,000 can be obtained through co-financing from collaboration with NWO and other research programmes.

Practical research

The costs of the practical research are € 27,000,000. Approximately € 18,000,000 of this consists of salary costs that are based on rates in conformance with the market. ICES pays part of the salary expenses (direct salary costs with social security) € 10,800,000, plus part of the non-salary costs, which is approximately € 5,400,000 for a total of € 16,200,000. The public/private contribution must thus be € 10,800,000.

Knowledge management

The costs of the knowledge management are € 4,000,000. ICES pays € 2,400,000. The public/private contribution must thus be € 1,600,000.

9.3 Time and cost schedule with milestones

The assumption is that the knowledge project plan will be approved in September 2003 and that all preparations regarding setting up the foundation, the contract with the contracting ministry, appointing the programme director, programme management, the WAR and the knowledge engine will be arranged by then. In consultation with all the parties involved an annual schedule will be drawn up per year that takes the requirements and constraints from ICES/KIS and the contracting ministry into account. The schedule for 4 years will thus be ready in the spring and the annual programme for the coming 12 months will be specified at the proper level of detail. That means that the first group of projects can be selected and contracted in the spring of 2003. Thus the time and costs schedule for 4 years is as follows.

Table 9.5 Costs schedule for 4 years (in € excl. VAT)

	Years					Total
	2003	**2004**	**2005**	**2006**	**2007**	
1. Research	4,200,000	12,600,000	12,600,000	8,400,000	4,200,000	**42,000,000**
2. Management & organization	275,000	340,000	351,000	363,000	61,000	**1,390,000**
3. Realization costs for the knowledge programme	359,000	442,000	457,000	471,000	81,000	**1,810,000**
Total (excl. VAT)	4,834,000	13,.382,000	13,408,000	9,234,000	4,342,000	**45,200,000**

The milestones will be set in conformance with the constraints stipulated by the contracting ministry and the Senter conditions. In principle, the financial monitoring reports will be submitted annually, taking the preceding tendering proposal into account.

9.4 Cumulating subsidies and link to European programmes or parties

The consortium expects cumulating subsidies to occur in 75% of the projects, related to participation in a EU programme and/or substantial participation of foreign partners. Financial contributions of the EU and foreign partners have not been included in the contributions from the participants

APPENDIX 1 STAKEHOLDERS IN THE LIVING WITH WATER PROGRAMME

Table 1.1 Survey of all parties involved

Knowledge requiring parties:	Knowledge developing parties
Public organizations • Water Boards (verenigd in de Unie van Waterschappen en de STOWA) • Municipalities (verenigd in de Vereniging Nederlandse Gemeenten) • Provinces (verenigd in het Interprovinciaal Overleg) • Province of Noord-Holland • Ministry of Transport and Water management (Rijkswaterstaat/Directorate General of Public Works and Water Management)* • Ministry of Agriculture* • Ministry of Landbouw, Natuur en Visserij • Dienst Landelijk Gebied • Ministry of VROM (Ministry for Housing, Planning and the Environment) (RPD and DGM) • Waterschap Mark en Weerij • Province Noord-Brabant • Hoogheemraadschap of West-Brabant • Hoogheemraadschap van Rijnland • Province Drenthe • Province Overijssel • Province Fryslân • Province Zeeland • Province Groningen • Province Utrecht • Waterschap Noorderzijlvest • Waterschap Hunze en Aa's • Wetterskip Laurenswâlden • Waterschao Sevenwolden • Wetterskip Boam en Klif • Wetterskip de waadkant • Wetterskip Fryslân • Wetterskip Mame-Middelsee • Waterschap Reest en Wieden • Waterschap Velt en Vecht • Waterschap Groot-Salland • Waterschap Regge en Dinkel • Waterschap Zuiderzeeland • Waterbedrijf Groningen • Waterleiding maatschappij Drenthe • KNMI • Consortium Drijvende Stad • Uitwaterende Sluizen • Centrum voor landbouw en milieu • De Stichtse Rijnlanden • Centraal Bureau voor Statistiek • Gemeente Almere Associations of interests: • ANWB • Natuurmonumenten • Stichting Natuur en Milieu • Instituut voor Mulieuvraagstukken • Wereldnatuurfonds • In Natura • VEWIN • LTO-Nederland • Amstelland Ontwikkeling Wonen B.V.	Universities: • Technische Universiteit Delft, Faculteiten Civiele Techniek en Geodesie en Technische Bestuurskunde, • RBA-Center for River Basin Administration • Katholieke Universiteit Brabant, Centrum voor Recht, Bestuur en Informatisering • University van Amsterdam, faculteit politicologie • University Utrecht, afd. Milieuwetenschappen • University Twente, faculteit Construerende Technische Wetenschappen • University of Utrecht, Copernicus Insitute • Universtity of Utrecht, Faculteit Biologie • Erasmus-Universiteit Rotterdam, Centre for Sustainable Development & Management, faculteit. Sociale Wetenschappen • ICIS/University Maastricht • Landbouwuniversiteit Wageningen, Kennisinstituten • Alterra • Bouwdienst RWS • DWW • IVM • KIWA • LEI • NEI • RIKZ • RIZA • RIVM • RIVO • RWS directie Oost • RWS directie IJsselmeergebied • RWS Bouwdienst/WIS • TNO-NITG, TNO-Inro, TNO-MEP • WL|Delft Hydraulics • Nederlanse Instituut voor Toegepaste Geowetenschappen • Huisbergen Hydraulic Innovation and Design • Carthago Ingenieurs- en adviesbureaus (verenigd in de ONRI) • ONRI • Arcadis • DHV • Grontmij • Royal Haskoning • Infram • Alkyon • Cap Gemini/Ernst & Young • Resource Analyses • TAUW • Witteveen en Bos Construction firms: • Amstelland • Dura Vermeer • Heijmans • AVBB • VBKO • Accanto

Financiers and project developers: • Rabobank • Bouwfonds • Nederlandse Waterschapsbank	• Witteveen+Bos • H+N+S Landschapsarchitecten
Parties transferring knowledge	**Parties organizing knowledge**
• IHE • Stichting Wateropleidingen • Stichting Postacademisch Onderwijs	• STOWA • NIROV • Innovatienetwerk Groene Ruimte en Agrocluster • Water-Front • CUR • RMNO

Table 1.2 Acronyms, explanation and type of organization of stakeholders

Acronym/Name	Full Dutch name	Type of Organization
Alterra		Research institute for agriculture
Amstelland		Multi development corporation in building and infrastructure
ANWB	Algemene Nederlandse Wielrijders Bond	Dutch organization for recreation and mobility
Arcadis		Consultancy on water, environment and infrastructure
AVBB	Algemeen Verbond Bouwbedrijven	Federation of Dutch Contractors
AWT	Adviesraad voor het Wetenschaps- en Technologiebeleid	Advisory Council for Policy on Science and Technology
Cap Gemini		Consultancy Company on Management and Infrastructure
COB	Centrum voor Ondergronds Bouwen	Netherlands Centre for Underground Construction
Connekt		ICES/KIS II Programme on mobility
CUR	Civieltechnisch Centrum Uitvoering Research en Regelgeving	Center for Civil Engineering Research and Codes
DHV		
Dura Vermeer		Multi Development Corporation in Building and Infrastructure
EIB	Economisch Instituut voor de Bouwnijverheid	Economic Institute for the Construction Sector
Ernst & Young		Consultancy Company on Management and Infrastructure
Grontmij		Consultancy on Water, Environment and Infrastructure
Habiforum		ICES/KIS II Expertise Network for Multiple use of land and space
Heijmans		Multi Development Corporation in Building and Infrastructure
ICES/KIS	Interdepartementale Commissie voor Kennisinfrastructuur	Interdepartment Commission for Infrastructure investment in knowledge infrastructure
Infram B.V.		
IPO	Interprovinciaal Overleg	Association of the provinces of the Netherlands
IVM		Research Institute on Environment
KIWA		Research institute on Waterresources and supply
KNMI	Het Koninklijk Nederlands Meteorologisch Instituut	The Royal Dutch Meteorologic Institute

LEI	Landbouw - Economisch Instituut	The Agricultural Economics Research Institute
LNV	Landbouw, Natuur en Visserij	Ministery of Agriculture, Nature Management and Fisheries
LTO	Land- en tuinbouw organisatie	Dutch organization for agriculture and horticulture
NEI		Netherlands Economic Institute
NIDO		Dutch programme on sustainability
NIROV	Nederlands Instituut voor Ruimtelijke Ordening en Volkshuisvesting	Netherlands Institute of Housing and Planning
NRLO (Innovatienetwerk Groene Ruimte)	Nationale raad voor landbouwkundig onderzoek	National council for agricultural research
NWO	Nederlandse Organisatie voor Wetenschappelijk Onderzoek	Netherlands Organization for Scientific Research
OTB	Onderzoeksinstituut OTB	Research institute for housing, urban and mobility studies
Provincie Noord Brabant		Province of North Brabant
Province of Overijssel		Province of Overijssel
Provincie Zuid-Holland		Province of South Holland
RAVI		Network organization for geo-information
RBA TUD	RBA TuDelft	River Basin Administration Delft University of Technology
Resource Analysis		Consultancy on Water and environment
Directorate General of Public Works and Water Management		Directorate-General Public works and watermanagement
Rijkswaterstaat – DWW	Rijkswaterstaat Dienst Weg- en Waterbouwkunde	Directorate-General Public works and watermanagement Road and hydraulic engineering institute
RIKZ	Rijksinstituut voor Kust en Zee	National institute for coastal and marine management
RIVM	Rijksinstituut voor volksgezondheid en milieu	The National Institute of Public Health and the Environment
RIVO	Nederlands Instituut voor Visserij Onderzoek	Netherlands Institute for Fisheries Research
RIZA	Rijksinstituut voor Integraal Zoetwaterbeheer en Afvalwaterbehandeling	Institute for Inland Water Management and Waste Water Treatment
RMNO	Raad voor Ruimtelijk, Milieu- en Onderzoek	Advisory council for research on spatial planning, nature and the environment
Royal Haskoning		Royal Haskoning
SKB	Stichting Kennisontwikkeling Kennisoverdracht Bodem	Centre for soil quality management and knowledge transfer
Stowa	Stichting Toegepast Onderzoek Waterbeheer	Foundation for Applied Water Management Research
Tauw		Consultancy on Water and Environment
TNO/NITG	Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek	Netherlands Institute of applied Geoscience/NITG
Unie van Waterschappen		The Association of Water Boards in The Netherlands
Universiteit Utrecht		University of Utrecht
VNG	Vereniging van Nederlandse Gemeenten	The association of Dutch municipalities
VROM	Ministerie van Volksgezondheid, Ruimtelijke Ordening en Milieu	Ministery of Housing, Spatial Planning and Environment
Waterlanden USHN	Hoogheemraadschap uitwaterende sluizen in Hollands Noorderkwarties	Waterboard in North Holland
Witteveen+Bos		Consultancy on Water and Environment
WL/Delft Hydraulics		Research Institute for Hydraulics

APPENDIX 2 SCIENTIFIC COORDINATORS AND CV'S

Person	Institute	Expertise
Prof.dr.ir. M.J.F. Stive	WL|Delft Hydraulics	Full Professor Delft University
Prof.dr. Th. A.J. Toonen	Universiteit Leiden	Hoogleraar bestuurskunde
Prof.dr. W.A. Hafkamp	Erasmus University Rotterdam	Professor of environmental studies
Prof. K. Turner	CBE	Director of CSERGE and professor in the school of environmental sciences
Dr. J.M. Gutteling	Onderzoeksinstituut IBR	Universitair hoofddocent
Prof.dr. C.M.J. van Woerkum	Communicatie en Innovatie Studies van de Landbouwuniversiteit	Hoogleraar
Prof.dr. H. Verbruggen	Vrije Universiteit Amsterdam	Director of the Insitute for Environmental Studies

Curriculum Vitae Jan Gutteling

PERSONALIA

Naam:	Gutteling
Voornamen:	Jan Martien
Titel:	Dr.
Adres:	Parnonlaan 16, 7577 KP Oldenzaal
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	06-47270983
Telefoon (werk):	053-4893290
Fax (werk):	053-4894259
E-mail:	j.m.gutteling@utwente.nl
Geboortedatum:	25 juni 1954 te Rotterdam

PUBLICATIES EN HUIDIGE ONDERZOEKSACTIVITEITEN

Zie bijgevoegd publicatieoverzicht: de laatste 10 jaar zo'n 60 boeken, boekdelen, artikelen in gereviewde wetenschappelijke tijdschriften in Nederland en vooraanstaande internationale wetenschappelijke tijdschriften, onderzoeksrapporten, vakpublicaties.

Momenteel ben ik als universitair hoofddocent verbonden aan het onderzoeksinstituut IBR en de opleidingen Toegepaste Communicatiewetenschap en Psychologie van de Universiteit Twente.
Als onderzoeker richt mijn belangstelling zich op risicoperceptie en risicocommunicatie, met specifieke interesse in het gebied van de (strategische aspecten van) crisis- en risicocommunicatie. In eerste instantie begon dat midden jaren 80, samen met Dr. Kuttschreuter, met onderzoek voor VROM naar communicatieprocessen rond de externe veiligheidsproblematiek, dat ook de afgelopen jaren weer veel in de belangstelling is gekomen (o.m. door de gebeurtenissen in Enschede). Dit risicothema is in de loop der jaren uitgebreid naar terreinen als:

- Hoog waterrisico's, onder meer in gezamenlijke projecten met de Bouwdienst van Rijkswaterstaat, en het project Riviere*n*land, eveneens van Rijkswaterstaat.
- Onlangs afgerond is een inventariserend project voor het Ministerie van Verkeer en Waterstaat met betrekking tot de beleving van de risico's (en de communicatie daarover) van het transport van gevaarlijke stoffen.
- 'moderne biotechnologie' waarbij het onder meer gaat over de relatie tussen mediaberichtgeving en publieke perceptie (ik maak sinds 1996 deel uit van een groep Europese onderzoekers op dit terrein onder leiding van John Durant en George Gaskell). In dit kader heb ik eind 2001 flankerend onderzoek gecoördineerd ten behoeve van de Commissie Terlouw en het publiek debat 'Eten en Genen'. Dit project begint nu een serie belangrijke – want spraakmakende – internationale publicaties op te leveren (onder meer uitgegeven door Cambridge University Press, London Science Museum, en Public Understanding of Science). In het kader van dit project wordt nauw samengewerkt met prof. dr. Cees Midden (TU Eindhoven), en collega's in bijna alle EU-landen, plus Canada (prof. dr. Edna Einsiedel) en de VS (prof. dr. Susanna Priest). Met Midden wordt gewerkt aan een serie experimenten rond het thema 'trust' en genvoedsel.
- 'Millenniumprobleem' waarbij de focus vooral lag op de analyse van de 'rivaliserende rationaliteiten' van experts en leek (nog steeds een intrigerend knelpunt in elke vorm van risicocommunicatie),
- 'Lood in drinkwater' gericht op de rol van intermediaire kaders in de door de overheid aangestuurde 'low profile' risicocommunicatie. Dit project is uitgevoerd in sam,enwerking met de GGD Rotterdam (dr. Fred Woudenberg).
- Op dit ogenblik loopt een project waarbij de mogelijkheden van moderne ICT voor de risicocommunicatie worden onderzocht, bijvoorbeeld op het terrein van de participatiebevordering van omwonenden rond bodemsaneringsoperaties en de ontwikkeling van een online expertise systeem op het gebied van risicocommunicatie.
- Toekomstige projecten zullen zich meer gaan richten op de organisationele component van risicocommunicatie activiteiten van bedrijven en organisaties. Sleutelbegrippen daarbij zijn: interne en externe risicocommunicatie, reputatie, de lerende organisatie.

NEVENACTIVITEITEN (voor zover relevant)

Diverse consultancy-activiteiten meestal voortvloeiend uit onderzoeksprojecten of afstudeerbegeleiding TCW-studenten.

Wetenschappelijke begeleidingscie., onder meer Gezondheidsonderzoek Schiphol voor RIVM/TNO, Hoogwaterrisico's voor Rijkswaterstaat, Perceptie van water voor STOWA, CRUST (corbon re-use and underground storage) van Novem en CO2-reductiebureau.
Buitenlid van de Cogem.
Verschillende externe promotiecommissies (R. Lion, S. Lyklema).
Voorzitter Klankbordgroep Akzo Nobel Hengelo (1997 - voorjaar 2000).
Eindredacteur Tijdschrift voor Communicatiewetenschap (per 1/3/2000), het enige Nederlandstalige peer-reviewed tijdschrift op het gebied van de communicatiewetenschap.
Reviewwerkzaamheden (recent) voor onder meer Risk Analysis, Journal of Risk Research, Journal of Applied Social Psychology, Psychonomic Bulletin
Advisering betreffende de communicatieaspecten project 'Risico's van bedrijven' in de nasleep van de afhandeling Vuurwerkramp Enschede.

WERKERVARING (Algemeen)

1980 - heden:	Universiteit Twente, Faculteit der Wijsbegeerte en Maatschappijwetenschappen, Afdeling Communicatiewetenschap, vh. Vakgroep Psychologie
1980 - 1982:	als Medewerker onderzoek, projecten TNO-CLEO en KWF
1982 - 1986:	als UD, tijdelijk dienstverband, onderzoeksterrein: risicoperceptie en risico-communicatie, externe projecten (zie hieronder)
1986 - 1999:	als UD, vast dienstverband, onderzoeksterrein: risicoperceptie en risicocommunicatie, externe projecten (zie hieronder)
2000 – heden:	als UHD, vast dienstverband, onderzoeksterrein: crisis- en risicocommunicatie, externe projecten (zie hieronder)

WERKERVARING (Onderzoek)

24 januari 1991	Promotie UT 'Contouren van risicovoorlichting'
Projecten	3e geldstroom i.o. van TNO-CLEO, Koningin Wilhelmina Fonds, DGD-Midden Twente, Ministerie van VROM, Nederlandse Organisatie voor Technologisch Aspectenonderzoek, Regionaal Orgaan voor de Verkeersveiligheid Overijssel, Ministerie van Binnenlandse Zaken, IBM, Cogas, NOVEM, Commissie Terlouw (Tijdelijke commissie Biotechnologie en voedsel), Stichting Weten, alsmede UT OSF-project POWAM 2e geldstroom: EU (CA en 5e kaderprogramma), acquisitie 3e geldstroom. Sinds 2001 onder meer projecten voor SKB, Rathenau Instituut, RIVM, Bouwdienst Rijkswaterstaat, Ministerie van LNV, Ministerie van Verkeer en Waterstaat.
Begeleiding	AiO-projecten: Van den Boogaard (promotie 1988), Caljé (promotie 1996), Galetzka (promotie 1998), Gurabardhi (promotie ca. 2004)

WERKERVARING (Onderwijs)

Sinds 1982:	Ontwikkeld en gedoceerd: Oriënterende vakken Psychologie en Sociale Psychologie (W&M, WWTS), Risicobeleving en Communicatie (W&M) (dat is onderwijs specifiek gericht op studenten van de technische opleidingen van de UT)
Sinds 1995:	Ontwikkeld en gedoceerd: Inleiding Sociale Psychologie (TCW), Psychologie van de Persuasieve Communicatie (TCW), Risico- en Crisiscommunicatie (capita selecta)
Sinds 1997:	Afstudeerdocent TCW, acquisitie afstudeerplaatsen TCW-studenten, stafmentor TCW-studenten
Sinds 1998:	Coördinator Minor Psychologie, Coördinator TCW-Major Strategische Communicatie. Ontwikkeld en per december 2000 gedoceerd: Risico- en Crisiscommunicatie (Majorvak), stroom Risicopsychologie (Minor Psychologie)

WERKERVARING (Bestuurlijk)

Lidmaatschappen	WMW: VCW, Bibliotheekcie, Automatiseringscie, Examencie. (TCW), voorbereidingscie TWICOR. UT: CCR, CVUV, Voorbereidingscie: Opleiding Toegepaste Psychologie UT
Onderzoekdecaan	WMW 1991-1993
MT	TWICOR Executive Committee Society for Risk Analysis- Europe Opleidingsbestuur Opleiding Toegepaste Psychologie

Name: Marcel J.F. Stive

Date of birth: February 25, 1951

Academic rank: Full Professor

Degrees:

1988	PhD Civil Engineering, Delft University of Technology
1977	MSc Civil Engineering, Delft University of Technology

Faculty/Department service:
Since 2001: Coastal Engineering Chair, Hydraulic Engineering Section, Faculty of Civil Engineering and Geosciences, Delft university of Technology

Other related experience:

1994-2001	Senior Specialist Marine and Coastal Management, DELFT HYDRAULICS (0.70 FTE);
1994-2001	Professor Coastal Morphodynamics, Netherlands Centre for Coastal Research, Faculty of Civil Engineering and Geosciences, Hydrotechnical Section, Delft University of Technology (0.30 FTE)
1992-1993	Visiting Professor, Universitat Politècnica de Catalunya, Departament d'Enginyeria Hidràulica, Marítimai Ambiental, Laboratori d'Enginyeria Marítima
1990-1991	Deputy Director, Division Harbours, Coasts and Offshore Technology, DELFT HYDRAULICS
1989-1990	Head Marketing & Research, Division Harbours, Coasts and Offshore, DELFT HYDRAULICS
1987-1989	Head Hydrodynamics Section, Division Harbours, Coasts and Offshore, DELFT HYDRAULICS
1985-1986	Head Waves Section, Division Coasts, Harbours and Offshore, DELFT HYDRAULICS
1983-1984	Senior Research Engineer, DELFT HYDRAULICS
1977-1983	Project & Research Engineer, DELFT HYDRAULICS

Consulting (since 1996):

2002-pres	Netherlands: Expert Advisor to Rijkswaterstaat on hydraulic boundary conditions for coastal defence
2002-pres	Belgium: Expert advisor to Ministry of Flanders on coastal safety Oostende
2002	Netherlands: Expert Advisor to Delft Hydraulics on morphological response of tidal basins to sea-level rise
2002	Netherlands: Expert Advisor to Delft Hydraulics on maintenance of failure set-backlines for coastal resorts
2002	Netherlands: Expert Advisor to Resource Analysis on new policy for Zeeland delta
1999-pres	Netherlands: Expert Advisor to Rijkswaterstaat/RLD/DHV on morphological feasibility of offshore airport island in the North Sea
1999-2001	Netherlands-Belgium: Long-term strategy for management and policy development for the Western Scheldt estuary
1996-2000	Israel-Netherlands: Member Dutch-Israeli Steering Committee on Tel Aviv Offshore Islands Project

Principal (journal) publications (since 1995):

2002	L. Hamm, M. Capobianco, H. H. Dette, A. Lechuga, R. Spanhoff and M. J. F. Stive, 2002. A summary of European experience with shore nourishment, *Coastal Engineering, 47, 2, Pages 237-264*
2002	M. J. F. Stive, S. G. J. Aarninkhof, L. Hamm, H. Hanson, M. Larson, K. M. Wijnberg, R. J. Nicholls and M. Capobianco, 2002. Variability of shore and shoreline evolution, *Coastal Engineering, 47, 2, Pages 211-235*
2002	M. Capobianco, H. Hanson, M. Larson, H. Steetzel, M. J. F. Stive, Y. Chatelus, S. Aarninkhof and T. Karambas, 2002. Nourishment design and evaluation: applicability of model concepts, *Coastal Engineering, 47, 2, Pages 113-135*
2000	Capobianco, M., Stive, M.J.F., Soft intervention technology as a tool for integrated, coastal zone management, Journal of Coastal Conservation, 6: 33-40
1999	Capobianco, M., De Vriend, H.J., Nicholls, R.J. and Stive, M.J.F., Coastal area impact and vulnerability assessment: A morphodynamic modeller's point of view, Journal of Coastal Research, 15, 3, 701-716

1999 Guillén, J., Stive, M.J.F., Capobianco, M., Shoreline evolution of the Holland coast on a decadal scale, Earth Surface Processes and Landforms 24, 517-536

1998 Capobianco, M., Stive, M.J.F., Jiménez, J.A. and Sanchez-Arcilla, A., Towards the definition of budget models for the evolution of deltas, Journal of Coastal Conservation 4: 7-16

1998 Stive, M.J.F., Wang, Z.B., Capobianco, M., Ruol, P. and Buijsman, M.C. , Morphodynamics of a tidal lagoon and the adjacent coast, in: Physics of Estuaries and Coastal Seas, Dronkers & Scheffers (eds), Balkema, Rotterdam, pp 397-407

1996 Sanchez-Arcilla, A., Jimenez, J.A., Stive, M.J.F., Ibañez, Pratt, N., Day Jr, J.W. and Capobianco, M., Impacts of sea-level rise on the Ebro Delta: a first approach, Ocean & Coastal Management, Vol 30, Nos 2-3, pp. 197-216

1995 Stive, M.J.F. and De Vriend, H.J., Modelling shoreface profile evolution, Marine Geology, 126, 235-248

1995 Jelgersma, S., Stive, M.J.F. and Van der Valk, L., Holocene storm surge signatures in the coastal dunes of the western Netherlands, Marine Geology, 125, 95-110

Membership societies:
Member Royal Dutch Institution of Engineers (KIVI)
Member European Union of Conservation of Coasts (EUCC)
International Affiliate Member American Society of Civil Engineers (ASCE)

Honors and awards:
1991 Researchers of Excellence Award, Science and Education Programme of the Generalitat de Catalunya, Barcelona, Spain

Teaching activities for 2002/2003:
fifth-year graduate course: Coastal inlet and tidal basins (DUT)
fourth-year graduate course: Introduction Coastal Engineering (DUT)
fourth-year graduate course: Physics of Coastal Systems (UU)
second-year course: Introduction Hydraulic Engineering (DUT)

Other assigned duties:
Associate Editor Journal of Coastal Research
Member Editorial Board Journal Coastal Engineering
Member Editorial Board Scientia Marina
Founding and Steering Committee Member Coastal Dynamics Conference
Member National Technical Advisory Committee on Coastal Defence (TAW)
Chairman Working Group Coasts of National Technical Advisory Committee on Coastal Defence
Member of Board of Trustees Netherlands Centre for Coastal Research (NCK)
Member of Board of Trustees Netherlands Centre for River Engineering (NCR)
Member Dutch Committee IGBP-Project Land Ocean Interaction Coastal Zone

Curriculum vitae van prof. dr. C.M.J. van Woerkum

C.M.J. van Woerkum (1947) studeerde sociologie aan de Katholieke Universiteit Nijmegen, met als specialisatie massacommunicatie. Vanaf 1971 is hij werkzaam aan de leerstoelgroep Communicatie en Innovatie Studies van de Landbouwuniversiteit te Wageningen. Tot 1980 was zijn voornaamste opdracht het ontwikkelen van een strategisch model voor de massamediale voorlichting. Dit was ook het thema van zijn proefschrift (Voorlichtingskunde en massacommunicatie; het werkplan van de massamediale voorlichting, 1981). Daarna richtte hij zich meer op de positie van voorlichting als een beleidsinstrument, naast en in combinatie met andere instrumenten en op de persuasieve voorlichting, gericht op houdings- en gedragsverandering. Vanaf 1990 is het centrale thema de communicatieve aspecten van interactieve beleidsontwikkeling en, vanaf 2001, communicatiemanagement. Zijn speciale belangstelling gaat uit naar communicatieprocessen op het gebied van de landbouw, natuur en milieu en de gezondheid. Vanaf 1 juni 1989 is hij als hoogleraar aan genoemde leerstoelgroep verbonden.

Prof.dr. C.M.J. van Woerkum (01-09-1947)

Prof.dr. W.A. Hafkamp
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Prof.dr. W.A. Hafkamp (Wim, 1953) is professor of environmental studies at the Erasmus University in Rotterdam. He became an environmental economist, after having studied econometrics at the Tilburg University (study completed in 1977). He took his doctor's degree at the Free University of Amsterdam on a dissertation on the modelling of the interactions between economic and environmental systems.

Presently, he is dean of the Faculty of Social Sciences at Erasmus University. Prior to that he headed the Erasmus Centre for Sustainable Development and Management (ESM) of the same university. The ESM, a department of the Faculty of Social Sciences, has a interdisciplinary orientation on the questions of environment and sustainable development. It conducts education and research with a particular focus on environmental management in industry, the interaction between governments and industry in environmental policy, interactive water-management and mobility. Hafkamp is (co-)author and editor of numerous publications in scientific and professional journals, edited volumes, etc. ESM houses the Graduate School for Environmental Management (GSEM), that provides an international "off-campus" Ph.D. program, and a Master's program, that is carried out in co-operation with 14 other European universities, joined in the European Association for Environmental Management Education (EAEME).

Professor Hafkamp is a member of the Dutch Advisory Council on Housing, Spatial Planning and Environment (VROM-raad), and the similar council for Transport and Infrastructure (V&W-raad), president of EAEME, chairman of the Program Commission of the strategic research program Environment and Economics (until 1-12-01), chairman of the board of the Scientific Institute for Environmental Management of the University of Amsterdam. Additionally, he is a member of the editorial boards of the "Journal of Environmental and Resource Economics".

Professor Kerry Turner, CBE

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Kerry Turner is the Director of CSERGE and a Professor in the School of Environmental Sciences at the University of East Anglia (UEA). Kerry specialises in environmental economics, coastal zone and wetland management, conservation economics and waste management research. He has published widely on these subjects including a number of best selling texts.

Kerry serves on the Broads Authority, the East of England Sustainable Development Round Table, on the Environment Agency's Anglia Region Environment Protection Advisory Committee and their Estuaries Advisory Group. Kerry previously served on the Board of the National Rivers Authority and was the Chairman of the Office of Science and Technology's, Foresight Panel on Natural Resources and the Environment until April 1999. Kerry was a member of the UK Climate Change Impacts Review Group, for the DoE and a lead author with the IPCC Working Group II and UNEP's Biodiversity Assessment Panel. In 2000, Kerry was awarded a CBE for his services to sustainable development. Kerry has also been a consultant to a number of Government departments, international and national agencies.

Curriculum Vitae
Voorjaar 2000

Prof. dr. Th.A.J. Toonen
Hoogleraar Bestuurskunde
Departement Bestuurskunde
Universiteit Leiden

1. Persoonsgegevens

Naam:	Toonen, Theo A. J.	
Adres:	Plantage 51	
	2377 AE Oude Wetering	
telefoon:	071 3314440	
	universiteit	: 071 5273839
fax:	thuis	: 071 3314432
	universiteit	: 071 5273979
Gsm:	06 - 5 12 104 96	

Geboortedatum: 12 april 1952
Geboorteplaats: Oss

Huidige werkgever: Universiteit Leiden
Departement Bestuurskunde
Wassenaarseweg 52, 2300 RB Leiden
Telefoon: 071-5273839
Fax : 071-5273979

2. Opleiding

- Dissertatie: Erasmus Universiteit Rotterdam (Denken over Binnenlands Bestuur: theorieën van de gedecentraliseerde eenheidsstaat bestuurskundig beschouwd), september 1987 (promotoren: prof. dr. U. Rosenthal, prof. mr. drs. M. Oosting)

- Katholieke Universiteit Nijmegen, Doctoraalexamen Politicologie, specialisatie Bestuurskunde, juni 1976 (*cum laude*)

- Katholieke Universiteit Nijmegen, Kandidaatsexamen Politicologie, december 1972

- Titus Brandsma Lyceum, Oss, HBS-A, mei 1970

3. Aanstellingen

- 1 oktober 1990 - heden: Hoogleraar Bestuurskunde (Institutionele bestuurskunde, met inbegrip van de internationale vergelijking en theorievorming), Universiteit Leiden (0.9 sedert 1-9-98)
- 1 oktober 1989 - 1 juli 1993: Professor of Comparative European Public Administration, PA-department, College of Europe, Brugge
- 1 september 1989 - 1 oktober 1990: hoogleraar bestuurskunde (0.5), Rijksuniversiteit te Leiden
- 1 september 1989 - 1 oktober 1990: universitair hoofddocent bestuurskunde, in het bijzonder belast met internationalisering (0.5), Erasmus Universiteit Rotterdam
- 1 oktober 1987 - 1 september 1989: universitair hoofddocent bestuurskunde, in het bijzonder belast met de coördinatie van het eerste fase onderwijs
- 1 september 1984 - 1 oktober 1987: universitair docent, vakgroep bestuurskunde, Erasmus Universiteit Rotterdam

- 1 januari 1984 - 1 september 1984: Visiting Fellow, Workshop in Political Theory and Policy Analysis (co-directors: prof. dr. V. Ostrom, prof. dr. E. Ostrom), Indiana University, Bloomington, Indiana, U.S.A
- 1 oktober 1976 - 1 september 1984: wetenschappelijk medewerker vakgroep bestuurs-en politieke sociologie/politicologie, Erasmus Universiteit Rotterdam
- 1 januari 1976 - 1 augustus 1976: part-time adjunct wetenschappelijk medewerker vakgroep bestuurskunde, Katholieke Universiteit Nijmegen (0.6)
- 1 januari 1975 - 1 januari 1976: kandidaatsassistent vakgroep bestuurskunde, Katholieke Universiteit Nijmegen

4. Bestuurlijke activiteiten
- mei 1997 – september 2000, Voorzitter Departement Bestuurskunde Leiden
- januari 1998 – heden, Lid dagelijks bestuur Nederlandse Onderzoeksschool bestuurskunde (NOB)
- januari 1997 - heden, Academisch Coördinator INPA (Indonesian Netherlands Public Administration) Programme (RUL/BiZa-Ned; Biza-Jakarta)
- januari 1994 - januari 1996, Directeur Onderzoek Nederlandse Onderzoekschool Bestuurskunde (NOB) (incl voorzitterschap voorbereidingsgroep Erkenningsaanvraag KNAW; heeft tot erkenning geleid begin 1996)
- september 1992 - september 1995, Voorzitter Vakgroep Bestuurskunde RUL
- Lid Stuurgroep Politiek-bestuurlijke Studiën van Europa, FSW, Rijksuniversiteit te Leiden, december 1992 - september 1995 (initiatiefnemer samen met prof Van Staden - Politicologie)
- najaar 1992 - voorjaar 1993, Lid Commissie Profilering Onderzoek (voorzitter Prof. dr W.Wagenaar), FSW - RUL.
- Voorzitter Doctoraal Examencommissie Gemeenschappelijke Studierichting Bestuurskunde Leiden-Rotterdam, oktober 1991 - september 1993
- januari 1985 - januari 1993, Directeur Internationale Programma's Bestuurskunde Rotterdam/Leiden,
- Voorzitter Commissie Internationalisering Faculteit Sociale Wetenschappen EUR, juli 1988 - 1990
- Voorzitter EUR/CvB - Commissie Uitwisselingsprogramma Erasmus Universiteit-Hull University (inclusief voorbereiding ERASMUS-area-studies program "CITES"), januari 1988 - 1990
- Onderwijscoördinator vakgroep Bestuurskunde, Erasmus Universiteit Rotterdam, januari 1987 - september 1989
- Lid Inter-universitaire Werkgroep Bestuurskunde Rotterdam/Leiden, september 1986 - september 1989
- Lid Dagelijks Bestuur vakgroep Bestuurskunde, Erasmus Universiteit Rotterdam, september 1986 - september 1989
- Voorzitter Begrotingscommissie Sociale Faculteit Erasmus Universiteit Rotterdam, september 1984 - september 1989
- Lid Dagelijks Bestuur Sociale Faculteit Erasmus Universiteit Rotterdam, september 1980 - september 1982
- Lid Faculteitsraad Sociale Faculteit Erasmus Universiteit Rotterdam, september 1979 - september 1980
- Lid onderwijscommissie Sociale Faculteit Erasmus Universiteit Rotterdam, september 1978 - september 1980
- Secretaris vakgroep bestuurs- en politieke sociologie/politicologie, september 1977 - september 1979
- Diverse universitaire commissies: o.m. Cie Halberstadt (RUL), Adviesraad CML (RUL), Commissie Studiepad Sociologie (vz; zomer/najaar 1997)
- Diverse interuniversitaire commissies: o.m. Werkgroep Onderwijs Bestuurskunde van de Vereniging voor Bestuurskunde (VB); VB Correspondent European Group of Public Administration (EGPA); International Contact Group (ICG) VB; Academische Raad, sectie politicologie.

5. Maatschappelijke dienstverlening
- Bestuurskundig Adviseur Grotius Consultancy Holding bv (0.1)
- Lid Spiegelgroep Minister& Staatssecretaris Onderwijs, Ministerie OC&W, mei 2000 - heden
- Voorzitter G.A. van Poelje Jaarprijs Commissie van de Vereniging voor Bestuurskunde (VB), 1997 heden.
- Lid Bestuur (Secretaris/penningmeester) Stichting Taskforce Kwaliteit Bijstand (TKB) Stichting ter ondersteuning decentralisatieproces en kwaliteitsontwikkeling uitvoering Algemene Bijstands Wet (ABW) opgericht door de Minister van Sociale zaken en Werkgelegenheid), september 1997 – heden.

- Pre-adviseur Nota Mensen, Wensen, Wonen; Wonen in de 21ste eeuw, Staatsecretaris Volkshuisvesting, juni-december 1999.
- Adviseur Verzelfstandiging Onderwijs Inspectie (traject Variëteit & Waarborg en Stimulerend Toezicht), Ministerie OC&W, december 1998 –januari 1999
- Lid Bestuur Stichting LVO (Landelijke Veranderingsorganisatie ter ondersteuning invoering nieuwe Algemene Bijstandswet opgericht door de Minister van Sociale Zaken en Werkgelegenheid), juni 1993 – september 1997
- Lid Commissie Binnengemeentelijke Decentralisatie Amsterdam (cie Tops) – Voorjaar 1997
- Lid van de Raad voor het Binnenlands Bestuur (RBB), mei 1992 - december 1996.
- Lid van de Commissie Bestuurlijke Organisatie van de Raad van Advies voor de Ruimtelijke Ordening (RARO), januari 1993 - december 1996.
- Lid Beraadsgroep Minister en Staatssecretaris SoZeWe (Voorbereiding Reactie Van der Zwan/ Doelman-Pel), september 1993 - januari 1994
- Extern Lid Commissie Strategie Provinciale Vernieuwing, Interprovinciaal Overleg (IPO), Commissie van Kemenade, najaar 1992 - zomer 1996.
- Extern deskundige Subcommissie Bijstand van de Tweede Kamer der Staten Generaal, Voorzitter Mevr. Doelman-Pel, Ronde Tafelgesprek over de bijstand in de toekomst, 's-Gravenhage, 28 juni 1993 (Stenografisch Verslag vastgesteld 5 juli 1993)
- Lid Adviescommissie Bestuurlijke Organisatie Stadsregio Breda (voorzitter: prof. dr. W. Konijnenbelt), september 1990 - april 1991
- Extern Deskundige Werkgroep Provincies van de Raad voor het Binnenlands Bestuur (RBB), voorzitter: prof. dr. U. Rosenthal, september 1987 - juni 1988 (*Eerste en Tweede advies over de plaats en functies van provincies*, 's-Gravenhage, maart 1988 en juli 1988)
- Extern Deskundige Werkgroep Decentralisatie van de Raad voor het Binnenlands Bestuur(RBB), voorzitter: prof. mr. J. ten Berge, september - december 1987 (Tweede RBB-advies over decentralisatie: *Medebewind: Van autonome waarde!*, 's-Gravenhage, februari 1988)

6. Redactionele activiteiten

- *European Yearbook of Comparative Government and Public Administration (*Nomos/Westview; Baden-Baden/Boulder) Co-editor with J.J. Hesse (Oxford/Berlin), 1993-heden
- *Administration and Society* (SAGE), European Editor, 1993 - heden,
- *Policy and Politics* (the Policy Press), International Board, 1990 - heden
- *Bestuurswetenschappen*, Co-redacteur met dr. J. Raadschelders Bestuurswetenschappelijke Kroniek, 1991 - heden
- *Public Administration Review,* Contact Editor European Administration, 1991-1993
- *Comparative Civil Service Systems Consortium (CCSSC),* J.G.M. Bekke, James L Perry, Th. A .J. Toonen (Initiator and co-dir), Leiden University, Indiana University, since 1993

7. Internationale onderwijsactiviteiten

- Chairman, Steering Committee EU Thematic Network in Public Administration (Socrrates), 1997-heden; Founding Director European Public Administration Network (EPAN)
- External Examinor Public Administration and European Studies Programme University of Limerick 1994 - 1998.
- Director ERASMUS-Project European Masters of Public Administration (EMPA), Erasmus Universiteit Rotterdam/Rijksuniversiteit Leiden, London School of Economics (LSE), Katholieke Universiteit Leuven, Verwaltungshochschule Speyer, januari 1989 - 1997
- Director ERASMUS PA Network: Exchange Network in Public Administration , Public Policy and Public Management (36 institutions of Higher Education in 12 EC and EFTA countries; annual exchange of 250 students) 1987 - 1997
- Co-director ERASMUS-PA-Network Summer School on Europe of the Regions, 1994 en 1995
- Europa College Brugge, Comparative Public Administration Course, 1989-1993
- Short-term consultant on curriculum development in Public Administration for the
- department of Public Administration of the University of Malang, augustus 1991
- Seminar, *Decentralisation and Local Government in International Perspective*, Malang (Indonesia), August 25 - September 3, 1991
- Diverse Gastcolleges: o.m. Blacksburg, Berlijn, Indiana, Dubrovnik, Washington State, Lexington, Leuven, Madrid, Athene, Oxford, Vaasa, Florence, New York, Berlin

8. Promoties

- (2000) Dolfing, B., Geregeld Waterbeheer, april
- (1999) Schout, J.A., Internal management of external relations: the Europeanization of an Economic Affairs Ministry, 11 –2 – 1999 (met U.Rosenthal)
- (1996) Hendriks, F, Beleid, cultuur en instituties; het verhaal van twee steden, 27 mrt)
- (1992) Krapels, J, Samenwerking Politie (met U Rosenthal)
- (lopend) Gool, B. van, Representatieve Bureaucratie en Positieve actie India, gepland 2001
- (lopend), B. Connaughton, Europe and National Administrations: comparative view, (samenwerking University of Limerick, Ierland) (2004)
- (lopend) Meijer, L., Waterschappen als 'social capital'.

Short CV of Harmen Verbruggen

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Short outline on working experience/field interest
Prof. dr. Harmen Verbruggen is director of the Institute for Environmental Studies, Vrije Universiteit Amsterdam. In 1994 he became professor of International Environmental Economics. His major field of specialisation is the interplay between development economics, international economic relations and environmental studies. Recent research interests include the interrelationships between environment and international trade, the international coordination of environmental policies, environmental policy instruments and clean technology.

Membership advisory bodies

2002-present:	Co-chairman Programme Council of National Climate Change Research
2002-present:	Member of Programme Advisory Council of Energy research Centre of the Netherlands
2001-present:	Board Member SENSE Research School
2001-present	Jury Dr. A.H. Heineken Prize for Environmental Sciences of the Royal Netherlands Academy of Art and Science (KNAW)
2001-present:	Member of the KNAW committee Human Dimensions Programme on Global Environmental Change (HDP)
2000-2001:	Chairman Interdepartmental working group Cost-effectiveness of Energy Subsidies, Ministries of Finance and Economic Affairs
2000:	Chairman Commission Review Near Shore Windpark, Ministry of Economic Affairs
1999-present:	Associate editor of *Environmental and Resource Economics*
1997-2001:	Chairman of Programming Group IV (Integration) of the Dutch National Research Program on Global Air Pollution and Climate Change
1996-present:	Vice-chairman and since 2000 chairman of the programme commission Environment and Economy of the Netherlands Organisation for Scientific Research (NWO) Research Programme
1995-2002:	Vice-chairman (since 1998) of the National Committee for International Cooperation and Sustainable Development (NCDO)
1994-present:	Member of the Committee Sustainable Development of Social Economic Council (SER)
1994-1996:	Member of the Steering Committee of the Indo-Dutch Programme on Alternatives in Development (IDPAD)
1993-2000:	Member of the Steering Committee of the research programme Collaborative Research in the Economics of Environment and Development (CREED)
1991-present:	Consultant for UNCTAD and OECD on international trade, environment and development issues
1991-1994:	Member of the Council for Environmental Protection (CRMH), as economic expert
1991-1992:	Member of the Advisory Group on Environmental Issues for India and Sri Lanka (AMILIS), Ministry of Foreign Affairs, Directorate General of International Cooperation
1988-1995:	Member of the managing editorial board for development issues of 'De Internationale Spectator'
1986-2001:	Member of the working group Greening of the Fiscal System I and II, Ministry of Finance

Selected Publications
Gerlagh, R., R. Dellink, M. Hofkes and H. Verbruggen (2002). A Measure of Sustainable National Income for the Netherlands. *Ecological Economics,* 41, pp. 157-174.

Verbruggen, H. (2001). Commentary In Response to the Paper by Timothy Swanson, Negotiating Effective International Environmental Agreements: Is an Objective Approach to Differential Treatment Possible? *International Environmental Agreements: Politics, Law and Economics*, 1, (1), pp. 155-157.

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Bergh, J.C.J.M. van den, and H. Verbruggen (1999). Spatial Sustainability, Trade and Indicators: An Evaluation of the "Ecological Footprint". *Ecological Economics*, 29 (1), pp. 61-72.

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APPENDIX 3 ELABORATION OF THE KEY ISSUES PER AREA TYPE

For each of the area types the key issues can be divided into a problem definition and the associated research questions.

1. Coast and sea

Problem definition
Because of the rising seawater level and heavy storms some parts of the coast will no longer be sufficiently safe if no extra measures are taken. Now, 50 years after 1953, people in the Netherlands are hardly aware of the danger of flooding from the sea; they feel they are safe behind the Delta works.
To limit the increasing risks, especially at the weakest links in the coastal defences, relocation of current functions may be desirable. The spatial planning measures that must be taken, such as widening the coastland, will displace the present functions in the coastal area. Moreover, even without the sea level rising, the spatial pressure along the coast, in the estuaries and on the North Sea continues to increase.

Currently spatial planning decisions on the coast and the North Sea are often taken on an ad hoc basis, which means that the suitability and the importance of the space for other use is not sufficiently taken into account. Long-term developments are a problem in weighing political decisions as opposed to social interests (politicians"think in 4-year terms"). There is no integral instrument for terms longer than 50 years.

There is a lack of administrative body for the North Sea (no zoning plan and no mayor for the North Sea). Because of this there is no administrative context for stipulating and weighing the different uses of the North Sea. This is also an international problem. For example, when planning construction at sea, only the problems of the coastal region involved are weighed against the natural potential of the North Sea.
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A knowledge impulse is required to be able to make well-founded choices focussed on a more sustainable use of space in the coastal area and on the North Sea while preserving the ecological quality. The administrative task is to designate the points from which a transfer of functions to the sea can be realized and to integrate them in the spatial planning. The social and psychological task is to make the Netherlands aware of the sea again.

To achieve this a well-founded and broadly supported vision is badly needed regarding the use and the management of the sea, which focuses on what users want and is based on knowledge of the processes along the shore, in the estuaries and at the North Sea. This vision will have to offer a framework in which to weigh a possible transfer of functions from the land to the sea. For many years alternatives at sea (such the 'Maasvlakte II, 'Plan Waterman', Flyland, windmill parks) have been considered as possible solutions for inland problems.
Functions that qualify for this are:

- Marine construction: an analysis of the social, economic and ecological pros and cons of land and marine construction, based on insight into the nature, the extent and the perception of the consequences of the various options for marine construction.
- Marine aqua-culture: an analysis of the economic, social and ecological possibilities for sustainable production and the use of aquatic biomass (algae, sea weeds, shellfish, sponges, fish) along the coast in estuaries and at the North Sea, in combination with off-shore activities aimed at energy generation, nature development and water recreation.
- Sustainable energy: an analysis of the possibilities and the consequences of various forms of energy generation in and at sea (windmill parks, solar panel parks, use of the tidal movements and sea currents, energy from biomass), based on insight into how they could contribute to reducing climate problems. Scale and site selection are important aspects in this analysis.

These new functions will be investigated in terms of their technical possibilities, their possible integration with other functions in the area (coastal defence, shipping traffic, fishery, sand extraction), the ecological consequences (bio-diversity, bird migration, breeding ground, cohesion North Sea-Wadden Sea-Delta area), how these are perceived and the legal implications both at the national and the international level.

The administrative task is to designate and integrate the points from which a transfer of functions to the sea can be realized in the spatial planning. This far-reaching planning process must be completed together with the administrative and private parties, citizens, interest groups and knowledge institutions involved.
This cannot be realized without the commitment and the participation of many stakeholders (administrative parties, private parties, citizens, interest groups, knowledge institutions).

Area-specific key issues for the coast and the sea

- How do North Sea managers handle the arrangement of the North Sea? How can collaboration be established, including at the international level?
- How can the available knowledge be put to use (for example, the results from the various MER studies)?
- What function combinations are conceivable and feasible at sea and in the coastal area? (R. Waterman has identified 21 combinations). Conducting synergy studies such as marine culture with windmill parks or islands can be considered.
- Development of a frame of reference for the transfer of functions to the North Sea. Cost-benefit analyses may be economically, politically or socially driven. These may conflict with one another. Social interests often cannot be sufficiently translated into an economic value, which causes social interests to become subordinate.
- How can the various values be weighed? What happens if the construction is not realized at sea but on land? The economic, ecological and safety aspects should be taken into account in a balanced way.
- What are the social, economic and ecological pros and cons of land and marine construction, based on insight into the nature, the extent and the perception of the consequences of the various options for marine construction?
- Technical issues:
  - What are the natural developments in the North Sea?
  - Can the North Sea bottom be used for storage of CO2 (injection)?
  - What are the possibilities for sustainable production and for the use of aquatic biomass (algae, sea weeds, shellfish, sponges, fish) along the coast in estuaries and at the North Sea, in combination with off-shore activities aimed at energy generation, nature development and water recreation?
  - What are the possibilities and the consequences of various forms of energy generation in and at sea (windmill parks, solar panel parks, use of the tidal movements and sea currents, energy from biomass), and how can they contribute to reducing the climate problem?
  - Technical aspects of marine construction, for example islands, coastal sites, atolls with platforms and floating houses (combining the functions of energy generation and storage and recreation). What does the logistic outset look like?

2. River area

Problem definition

The duration and the frequency of periods with extreme precipitation and peak discharges in the rivers will increase because of continuing climate changes. As a result not only the chances of flooding and other water-related problems increase, but because of a more intensive use of space and larger investments in the infrastructure, the resulting risks will also increase dramatically.

The social acceptance of flooding and other water-related problems has decreased over the last 50 years. There is little understanding for a problem that, though it involves a very real risk, may not occur for years on end. (It is a question of phantom security).
The need is felt to limit the possible damage as a result of flooding and other water-related problems and thus limit the (potential) damage (effectively more than 500 million euros in recent years, potentially billions).

The increasing demographic pressure and prosperity pose ever increasing demands on the available space for living, working and recreation. The need for mobility and the demand for space for roads, railroads, waterways and multi-modal trans-shipment facilities is proportionate to the increasing prosperity. The growing awareness of responsibility for a sustainable living environment makes demands on the available space for nature development in an ecological main structure that is in harmony with the river area.

Moreover, climate changes will cause longer periods of small discharge and precipitation. This will increase both the duration and the frequency of periods of water shortage and shipping restrictions on the rivers. On the one hand this implies that adaptation of the water distribution in the Netherlands may be required. On the other hand we will have to economize on our use of fresh water. The quest will be for possibilities that can be fit in spatially and that are accepted socially as well as in economic terms in order to make a difference in the availability of water of a certain quality for various functions of use.

The answers are mainly sought in introducing water-focussed spatial planning (WB21 and Vijno specification: more than 300.000 ha for retention, storage and discharge of water).
The technological task is to enlarge the water storage capacity, to slow down the discharge to brooks, rivers and drainage areas and to realize more flexible dams and dikes.
The administrative task is to designate the places where this can be realized and integrated into the spatial planning. This includes foreign parts of the catchment area, the soil, surface waters and the ground level.

The social and psychological task is to make the Netherlands aware of water again.
This will have to be attuned with the international approach to catchment areas and the European Water Framework Directive in particular (although that does not yet offer many details regarding water quantity). This cannot be realized without the commitment and the participation of many stakeholders (administrative parties, private parties, citizens, interest groups, knowledge institutions).

The combination of higher flood risks and increasing claims on space in the river area plead for drastic spatial and functional changes in this area. In coherence with the factual questions (particularly the economic feasibility of combining the functions of water storage and new forms of use for space and nature) this programme will devote attention to the decision-making process. Possible solutions for the problems outlined above involve increasing interests that may be either coherent or conflicting. The democratic decision-making process is becoming more complex, requires more and more preparation time and places an increasing burden on the available means. Currently, the spatial and social introduction of major infrastructure projects such as the Betuwe Railway, already account for more than half the implementation costs.

The water boards along the main rivers in particular will be facing complex and largely unfathomed processes in the near future. For the area outside the dikes, measures in the scope of *Space for the river* are imminent (lowering of the washland along the river, digging adjacent trenches, moving dikes back and adaptations in mineral extraction). Within the dikes another use of space is diligently being sought that may satisfy the three-step strategy of WB21 (retain, store temporarily, discharge) and the European Water Framework Directive. The measures within and outside the dikes will interfere with one another.

The proposed river programme looks for answers to the following area-specific key issues:

- What are the social, ecological and economic consequences of more space for high water storage, for which a broadly applicable, integral appreciation system for water and spatial quality will have to be developed?
- What is the social perception of water and of the risks of flooding and other water-related problems? This strongly determines the possibilities, the limitations and the way in which space for water can be introduced into the living environment.
- How can mitigating and compensating measures (e.g. facilities to limit damage, such as elevated or floating construction, financial compensation for farmers) be taken and how can possibilities be created to insure damages, so that space for water becomes less restrictive for spatial developments?
- Can space for high water in the rivers be combined with national and regional policy objectives in the field of spatial planning, environment and nature and landscape, such as the development of water transport arteries, strengthening the use of underground space, contributing to CO2 reduction, influencing the leaching of compounds from the soil and contributing to the restoration of cultural-historical structures?
- How can the effectiveness of various spatial measures intended to reduce current and future bottlenecks regarding safety and water-related problems to an acceptable level be quantified?
- Investigations into the possibilities of prioritizing the issue of water distribution and making a distinction regarding the demands and the constraints of functions, growth and types of nature. And conversely, investigations into the possibilities of adapting the choice of functions, growth and types of nature to the changing availability of water of a certain quality.
- How can the international-administrative aspects of the LIVING WITH WATER programme be effectively implemented at the level of international catchment areas?
- Can high water be fun? And does this imply opportunities? "Freude am Fluss". The return of water into our daily living environment may have a communicative value. Making water visible in our living environment may manifest its role in the arrangement of this environment ("the persuasiveness of water"). The role of citizens as 'users' (for example organized in hamlets) in the design process is important. How can this be achieved? This requires a pro-active attitude from water managers and spatial planners.
- In a number of fields important technological knowledge is still lacking:
  - Climate scenarios and their effects on river systems
  - The effects of frequent or infrequent inundation on the quality of the water and the soil and on the flora and fauna.
  - The relation between the assessment of the risk of damage as a result of flooding and other water-related problems and insurance premiums.

3. The Low Netherlands

The anticipated increase in extremes in the precipitation pattern as a result of climate changes will lead to greater risks of water-related problems in the living and working environment, particularly in the Low Netherlands. Approaching water-related problems through technical means (enlarging the capacity of drainage areas and pumping facilities) generally does not lead to an actual resolution of the problem, but instead shifts part of the problem to other areas. Spatial solutions, whether or not in combination with technical measures (water storage), are deemed increasingly essential. Moreover, the low Netherlands is

facing a low water problem more frequently. The availability of adequate freshwater during dry periods will strongly decrease and filling these areas with water from other regions will become increasingly difficult. Thus the desirability of storing precipitation locally (especially the winter surplus) is increasing. Storage is expected to require a great deal of space and the water level will fluctuate strongly per season. This may involve storage in the soil as well as in and along waterways and in (parts of) polders. Thus installing extra water storage facilities is desired.

Creating water storage by simply buying the required land is impossible on a larger scale due to the associated costs for obtaining and arranging these parcels. The quest is for economical and socially acceptable forms of co-use of the water storage areas. Another important aspect is that the soil-related agriculture in the Netherlands is under pressure because of economic developments, environmental policy objectives and social appreciation. In this respect the increasing pressure of urbanization is another important aspect, particularly in the western part of the Netherlands. This causes the surface to harden, which reduces the storage capacity of the soil, but it also changes the social appreciation and the need for spatial quality in the rural areas.

In terms of water storage the proposed programme looks for answers to the following area-specific key issues:

- What are the effects of water storage on the surrounding areas, in this case nature and the agricultural sector (opportunities and threats)?
- Are there possibilities for water as a new economic pillar for the rural areas in the Low Netherlands (reward storage, reward improvements in the water quality)?
- Can water storage be combined with changing claims on space and the desired expansion of urban areas in terms of the multiple use of space?
- What is the influence of the long-term risks of flooding as well as of water shortage on short-term decisions in planning and policy processes?
- In what way can agreements be made regarding water storage and co-use between public and private parties, including an acceptable financial arrangement?
- In what way can we economize on the use of freshwater and what measures could be a part of that process?
- How can the distribution of the available freshwater be improved and what are the consequences, in the broadest sense, of such redistribution?
- What are the social, ecological and economic consequences of more space for water, as far as the agricultural sector and nature are concerned?
- How can the social perception of water-related agriculture and nature be mapped? This strongly determines the possibilities and the limitations on the way in which space for water, agriculture and nature can be introduced to the living environment. Investigations into the integration possibilities of a recreational function?
- What are the long-term costs and benefits of water storage in relation to changes in agricultural and natural areas. This is no trivial problem, since it has appeared to be impossible to establish this in the scope of the dehydration policy.
- In a number of fields important technological knowledge is still lacking:
  - The effect of dehydration control (what objectives are still not achieved after the implementation of a 'new' water management).
  - Possibilities for restoring the water quality when emission constraining measures appear to be ineffective. How can the environmental quality demands (MTR standards) for surface waters be met when this appears to be impossible even if the manure policy is strictly maintained?
  - Investigations into the consequences of water storage in agricultural areas, such as inundation frequency, etc.
  - Investigations into the consequences of 'new' water level management for natural areas that depend on seepage.

As a result of climate changes the sea level rises and at the same time the level of the soil in the Low Netherlands is subsiding because of consolidation of the geological formations and the settling of the peat areas. Because of this emergence and seepage of salty groundwater is increasing considerably in large parts of the Low Netherlands.
At the same time the possibilities to reduce the influence of salty groundwater by flushing the soil with water from other areas will diminish. For as a result of climate changes there will be a far smaller discharge in the main rivers in summer. This implies that less freshwater is available for salinization control. The proposed investigation will devote attention to the way in which salinization problems can be tackled.

In terms of salinization the proposed programme looks for answers to the following area-specific key issues:
• What are the effects of salinization on the current use of space and nature? • How can the mapping of the physical and chemical processes be improved so that it will be possible to make 'hard' predictions regarding the expected extent of the salinization? • What possibilities and spatial-functional consequences advocate storing local water with the purpose of using it to decrease salinization problems? • What opportunities does salinization offer for new forms of use of space and nature? • The social appreciation/acceptance of changes in the use of space, nature and landscape and the weighing of the material and the immaterial valuation of these changes on which this is based.

The settlement of the lower peat areas in particular also creates a number of problems. Policy-makers as well as research parties are showing an increasing interest in the long-term developments in the peat meadow areas. The policy-making parties for the peat meadow areas are facing a dilemma:

- The peat areas can only be preserved by developing a wetland landscape.
- Continuing the drainage will sooner or later lead to a strongly subsided agricultural area without peat.

Only the first alternative will stop the degradation of the peat and the related soil subsidence. But dehydration benefits agricultural use. This does not solve the problem of the disappearance of the peat. The question is whether and when the stakeholders are prepared to make a fundamental choice regarding this dilemma. The proposed programme focuses on presenting the consequences of this fundamental choice in images, numbers, and words as clearly and as broadly as possible.

On the one hand this implies a scientific inventory of the effects in terms of climate, nature, and water. On the other hand it implies an open dialogue regarding planning possibilities with the (local) parties involved, including taking the scientific insights into account. This dialogue will make clear what the dilemmas regarding the spatial arrangement include. Moreover, it will facilitate a process of substantiated selection. A structured approach that focuses on the long-term perspective is expected to contribute to gaining support for an open dialogue among the social organizations and local parties involved.

The results will be applied as a basis for a fundamental social and political discussion regarding wishes, opportunities and constraints for preserving and developing peat meadow areas as landscape and the role of the stakeholders in this respect.

In terms of peat meadow areas the proposed programme looks for answers to the following area-specific key issues:
• To what extent will the peat meadow areas change over the long-term as a result of developments in the various fields of policy such as Space for Water and climate policy? • To what extent will these changes lead to a variety of allocation options in the long-term and how will these options relate to the need for more space for water? • What fundamental and applied scientific issues must be investigated in order to be able to implement the various allocation options? • How should the value (economic and social) of the various allocation options, the process development, the communication with the parties involved (including farmers and citizens), the administrative organization and the development of tools be weighed in the comparison with integral scenario developments?

4. The High Netherlands

Problem definition

The High Netherlands consists of the sandy areas situated at a higher level in the east and the south of the Netherlands. The water management focuses on supervised, natural discharge of the water to the collection points. These collection points are the arms of a branched system of brooks, waterways via which the water is eventually discharged to the lower areas. Traditionally the rural areas in the High Netherlands have fulfilled a major role in storing water in the soil by infiltrating precipitation into the groundwater (long-term storage) and by slowing down the rate of discharge (temporary storage).
During the growing season the water supply originates from the groundwater springs, which ensure a basic discharge of water of good quality in the branched water system.

The climate change causes higher discharge peaks and less replenishment of groundwater stocks. Furthermore an increase in (crop) evaporation is expected during the growing season, which will result in an increased demand for water.
The increasing demand for space for living, working and infrastructure lead to less and less available space for (temporary) water storage and to faster discharge of the precipitation. Moreover the more intense use of the soil, which puts a strain on the quality of the water because of leaching and flushing, plays a role as well.
Social changes lead to a lesser acceptance of flooding or other (ground)water-related problems, although on the other hand the involvement of citizens in administrative planning processes is also decreasing.

The increasing peak levels of precipitation and the decreasing natural storage possibilities cause flooding or other water-related problems in the lower areas. Brooks and waterways overflow their banks and peak discharges occur in the rivers. In case of an unfortunate combination of several discharge peaks from the surrounding countryside, this may lead to a calamity in the lower part of the catchment area.

Because of the high pressure on space in the High Netherlands, this problem cannot be resolved through technological measures alone. It is extremely important to develop an integral valuation methodology that takes into account the social, ecological, cultural and socio-economic consequences of the changes in the use of space. A clear social, ecological, cultural and socio-economic valuation of all water aspects (flooding and other water-related problems, the quality of the water and water shortage) will facilitate better organization of administrative and planning processes (both for the short and the long term), with more citizen involvement.
To accomplish this a structure of communication will also have to be established, in which water managers, spatial planners, administrators and other parties and people involved speak one common and clear language.
Moreover, all legal (damage claims), administrative and planning aspects related to flood prevention in a calamity situation will have to be embedded in (inter)national, regional and local policy objectives, responsibilities and competencies.

With regard to the High Netherlands the proposed programme looks for answers to the following area-specific key issues:

• What is the social perception of damage due to water shortage and drought? This will strongly determine the possibilities, the constraints and the way in which space for water storage can be introduced to the living environment.
• What are the social, ecological and economic consequences of more space for stockpiling water, for which a broadly applicable, integral appreciation system for water and spatial quality (in urban, rural and nature areas) will have to be developed.
• How can methods be determined for spatial integration and for socially and economically accepted possibilities to make a distinction regarding the demands and the constraints of functions, growth and types of nature in the quality - quantity distribution of water? And conversely, for the possibilities for adapting the choice of functions, growth and types of nature to the changing availability of water of a certain quality?
• How can the available knowledge be mobilized and integrated? Does this involve attuning knowledge regarding various sub-aspects of knowledge that already exists?
• In addition there is also a lack of factual knowledge regarding parts of the knowledge chain:
  o When will the damage to natural and woodland areas be considered socially unacceptable?
  o When will the decrease in agricultural yield be considered socially unacceptable?
  o How can the water demand that will arise be met?

5. Urban areas

Problem definition
The urbanization of the Netherlands is and will remain a process with major consequences for the spatial quality as well as for the possibilities to store water. On the one hand, water is very important for the daily living and working environment. The desire to live on the waterfront has strongly increased, as is illustrated by the exorbitant prices for houses along the water. At the same time water is also a serious (latent) threat to the living
function. Flooding and other water-related problems in a populated area involve major economic and psychological implications.

Within this field of tension between the desire for and the fear of water in and around the city - plus the dynamics of these water systems - people are trying to find new concepts for organization and design that are socially desirable and acceptable and at the same time contribute to a reduction in water-related problems. This not only involves a living function, but other urban functions (such as industrial areas, infrastructure, recreation areas, sports accommodations, etc) as well. Water-conscious construction primarily means building at the right place. (Ground) water problems will have to be taken into account in selecting these sites. The investigation also focuses on the possibilities of above ground and underground storage of water.

The transition area between the city and rural areas appears to offer quite a number of opportunities for high quality use of space and water (green-blue city margin zones). The technical, economic, planning and social consequences and possibilities of combinations of constructing for safety and constructing for living, working and recreation (living on or in the dike) will be investigated. Furthermore investigations will be conducted into decreasing the vulnerability to water-related problems of the urbanized environment. Project developers and real estate agents will definitely be involved in this theme in order to incorporate the possibilities and the desirability's from the field into this investigation.

In terms of the urban area the proposed programme looks for answers to the following area-specific key issues:

- What are the social, ecological and economic consequences of water-conscious construction? To be able to answer this question a broadly applicable, integral valuation system for water and spatial quality (in urban, rural and nature areas) will have to be developed.
- What is the social perception of water and of the risks of flooding and other water-related problems? This strongly determines the possibilities, the constraints and the way in which water- conscious construction can be introduced to the living environment.
- How can zoning and local area plans regarding water storage enable an environmentally friendly use of water and the like?
- What are the liability and the legal status of floating houses and who is responsible for water damage?
- How can a transparent set of rules and regulations be designed that enables faster decision-making processes by authorities and other official bodies?
- How does one finance the higher prices of floating houses and the costs of making the environment suitable for water storage? Per cubic meter of storage?
- An inventory of possible locations for water-conscious construction (such as peat meadow areas).
- In a number of fields important technological knowledge is still lacking:
  - Safety in relation to water-conscious construction (the technical possibilities for preventing water-related problems for houses and buildings).
  - Possibilities for the multiple use of space, connections between chains (water chain management).
  - Logistics in a water-rich environment. Expansion of technology and tools (possibilities and quality assessment): an urbanized area with a high groundwater level.
  - Underground construction and water management.
  - Customized foundation technologies and draining possibilities for construction in low areas with high (ground)water levels.
  - Combine water-nature-CO2 reduction-energy growth (biomass).

APPENDIX 4 THE EU THEME DESCRIPTIONS IN RELATION TO THE PROGRAMME

Environment and Sustainable development
The thematic Sub-Priority 1.6.3 Global Change and Ecosystems will strengthen the necessary scientific knowledge for the future orientation of the strategy. It will also provide the socio-economic tools and assessments and the overall management practices which should ensure the implementation of the strategy at the EU level and, to some extent, at the World level.

I. Impact and mechanisms of greenhouse gas emissions and atmospheric
pollutants on climate, ozone depletion and carbon sinks

The objective is to detect and describe global change processes, associated with greenhouse gas emissions and atmospheric pollutants from all sources, including those resulting from energy supplies, transport and agriculture, to improve prediction and assessment of their global and regional impacts, evaluate mitigation options and improve the access of European researchers to facilities and platforms for global change research. Research will concentrate on carbon and nitrogen cycle, atmospheric pollutants and their regional impacts, climate dynamics and variability, prediction of climatic change and its impacts, stratospheric ozone and climate interactions and adaptation and mitigation strategies.

Sub I.6. Adaptation and mitigation strategies
Research will focus on the development of strategic policy options in the context of international agreements on Global Change. Scenarios of impacts of global change focusing on socio-economic and societal impacts should be developed.

II. Water cycle, including soil-related aspects

The objective is to understand the mechanisms and assess the impact of global change and in particular climate change on the water cycle, water quality and availability, as well as soil functions and quality to provide the bases for management and technological tools for water systems to mitigate the impacts. The research will concentrate on hydrology and climate processes, the ecological impacts of global change, soil functioning and water quality, integrated management strategies and mitigation technologies, and scenarios of water demand and availability.

Sub II.3. Integrated management strategies and mitigation technologies
Research will focus on the development of integrated approaches and tools for water-soil resources management in the context of global change – with its different components of climate change, land use change, other anthropogenic drivers, etc. - and integrated vulnerability assessments, taking also into consideration socio-economic and technological aspects of water use.

II.3.1) Integrated water management at catchment scale

Indicative topic for Network of Excellence or Integrated Project to implement in 2003
II.3.1.b) **Methodologies of Integrated Water Resource Management and Transboundary issues.** This action should be launched through an international partnership, involving European and developing countries, integrating engineering, natural and socio-economic sciences , for developing research activities on river basins in Europe and in different parts of the world, particularly on transboundary catchments.

Sub II.4. Scenarios of water demand and availability
With the aim of defining a sustainable development framework and to provide to policy-makers instruments in support of policy choices, more advanced analytical tools have to be worked out in order to define more realistic medium- and long-term scenarios of water demand and availability at a wide regional level. The research will concentrate on the development of scenarios for Europe and neighbouring countries.

Indicative topic for Network of Excellence or Integrated Project to implement in 2003
II.4.1.a) **Water scenarios for Europe and for neighbouring countries.** Development of medium-long term (25-50 y) scenarios, based on advanced policy, socio-economic and technological option design strategies , that should become a reference for large scale regional planning. The participation of third countries should cover in particular the areas surrounding the European borders.

III. Biodiversity and ecosystems
The objectives are to develop a better understanding of marine and terrestrial biodiversity and of ecosystem functioning, to minimize the negative impacts of human activities on them and to ensure sustainable management of natural resources and terrestrial and marine ecosystems (including freshwater systems) as well as the protection of genetic resources. The research will concentrate on assessing and forecasting changes in biodiversity, structure, function and dynamics of ecosystems and their services, with emphasis on marine ecosystems' functioning, relationships between society, economy, biodiversity and habitats , integrated assessment of drivers affecting ecosystems' functioning and biodiversity, and mitigation options and on risk assessment, management, conservation and rehabilitation options in relation to terrestrial and marine ecosystems

Sub III.1. Assessing and forecasting changes in biodiversity, structure, function and dynamics of ecosystems and their services, with emphasis on marine ecosystems' functioning
This research priority should focus on understanding biodiversity and ecosystems patterns, processes and dynamics at European and global scales, in a changing environment. Proposals must take account of the developing Earth Systems Analysis and Modelling initiatives.

III.1.1 **Developing an integrated network for European long-term terrestrial and fresh-water biodiversity and ecosystem research,** based on existing facilities. The role of this network should be to structure and integrate research carried out to assess and forecast changes in biodiversity, structure, functions and dynamics of ecosystems and their services, and to general conservation options. Research will focus on the interplay between species, biodiversity change (species and genetic levels) and on the interplays between biodiversity and ecosystems, considering the likely impacts of the main drivers. Socio-economic implications and especially public attitudes must be considered.

III.1.2 Developing an integrated network to structure and integrate European research on marine biodiversity and ecosystems. The objective of the research part of the network should be to understand, assess and forecast marine biodiversity (species and genetic levels) on a global scale, in an ecosystem context. The function of biodiversity and the consequences of changes in biodiversity on marine ecosystem stability and functioning and on their ability to provide goods and services should be considered, as well as the combined effects of the main drivers. Socio-economic implications must be taken into account.

Sub III.2. Relationships between society, economy, biodiversity and habitats
Topic for STREP and Co-ordination Action to implement in 2002
III.2.1. Generating models of socio-economic impacts on biodiversity and ecosystems with a view to facilitating the development of integrated strategies for preserving/restoring their integrity. Economic mechanisms, institutional and legislative systems, industrial and commercial practices at European and global scales should be taken into account. This work should be envisaged in conjunction with the work to be done in the frame of Thematic Priority 7 (Citizens and Governance in a knowledge based society).

V. Strategies for sustainable land management, including coastal zones,
agricultural land and forests
The objective is to contribute to the development of strategies and tools for sustainable use of land, with emphasis on the coastal zones, agricultural lands and forests, including integrated concepts for the multipurpose utilization of agricultural and forest resources, and the integrated forestry/wood chain in order to ensure sustainable development at economic, social, and at environmental levels. Qualitative and quantitative aspects of multifunctionality of agriculture and forestry will be addressed. Two parts will be addressed in this indent, the first one dedicated to the sustainable land-use and the second one addressing the qualitative and quantitative aspects of multifunctionality of agriculture and forest/wood chain.

Sub V.1. Sustainable use of land
Indicative topics for STREP and Co-ordination Actions to implement in 2003
V.1.1.b) **Development of new concepts, strategies and tools** for sustainable land-use and landscape management through a multi-functional approach. Integrated framework for decision-support in land-use, including the identification of thresholds of sustainability, cost-effectiveness and cost benefit analysis and other economic methods or policy tools.

V.1.2) Integrated Coastal Zone Management (ICZM) considering spatial and temporal integration and stakeholders involvement for Sustainable Development
This activity will address in an harmonize and synthetic way the assessment of the causes for environmental degradation and their socio-economic impacts in the coastal zone at a regional and global scale. It will

generate option development and decision making tools: methodologies, models and tools for integrating interrelated processes, including socio-economic driving forces and feed-backs , for integrated management; it will provide in a consistent way socio-economic impact from short-term events and long-term changes, involvement of stakeholders and co-ordination of different players.

Indicative topic for Network of Excellence to implement in 2003
V.1.2.a) **Establishment of a long-lasting network** of all research partners working at international, national and regional levels on ICZM in Europe to: stimulate co-ordination and coastal research including by integrating existing or emerging national networks and stimulate emergence of such networks when they do not exist, promote interdisciplinary approaches and using the scientific knowledge generated by the research on ecosystems, develop decision-making tools for integrated management including socio-economic parameters, involve stakeholders in the management of multiple/conflicting use of natural resources, promote communication and dissimulation of knowledge.

The activities carried out in the thematic priority *Citizens and Governance in a Knowledge based Society* are intended to mobilize in a coherent effort, in all their wealth and diversity, European research capacities in economic, political, social sciences and humanities that are necessary to develop an understanding of, and to address issues related to, the emergence of the knowledge-based society and new forms of relationships between its citizens, on one hand, and between its citizens and institutions, on the other.

Research Area 1 Improving the generation, distribution and use of knowledge and its impact on economic and social development.
The objective is to improve significantly understanding of the characteristics of knowledge and it's functioning as a public and private good, and to provide the bases for policy formulation and decision making.

Research Area 2: Options and choices for the development of a knowledge-based society.
The objective is to develop an integrated understanding of how a knowledge-based society can promote the societal objectives of the EU set at the Lisbon summit and subsequent European Councils of sustainable development, social and territorial cohesion and improved quality of life, with due consideration to the variety of social models in Europe and taking into account aspects relating to the ageing of the population.

Research Area 3: The variety of paths towards a knowledge society.
The objective is to provide comparative perspectives across Europe and thus provide an improved basis for the formulation and implementation of transition strategies towards a knowledge society at the national and regional levels.

Research Area 4: The implications of European integration and enlargement for governance and the citizen.
The objective is to clarify the key interactions between European integration and enlargement, and issues of democracy, institutional arrangements and citizens' well-being.

Research Area 5: Articulation of areas of responsibility and new forms of governance.
The objective is to support the development of forms of multi-level governance, which are accountable, legitimate, and sufficiently robust and flexible to address societal change including integration and enlargement, and to assure the effectiveness and legitimacy of policy making.

Research Area 6: Issues connected with the resolution of conflicts and restoration of peace and justice
The objectives are to support the development of institutional and social capacity in the field of conflict resolution, identify factors leading to success or failure in preventing conflict, and develop improved options for conflict mediation.

Research Area 7: New forms of citizenship and cultural identities.
The objectives are to promote citizens' involvement and participation in European policy making, to understand perceptions and impacts of citizenship and human rights provisions in Europe and to identify factors that allow mobility and coexistence of multiple identities.

APPENDIX 5 SURVEY OF PROJECT PROPOSALS

Table Survey of the partners in the project proposals

Legend: The names of the project consortium leaders are in bold print
The names of the partners in the consortium that have already been contracted are in normal script
The optional partners in the consortium are in italics

No	Project name	Costs €)	End users			Knowledge provider			
			National Authorities	Provinces/ Municipalities	Water boards	Universities	Knowledge institutions	Consultancy agencies	Other partners
1	2 x 3 project (two sectors, three layers)	900,000	*RIZA* *RIVM*		Unie van Waterschappen	**RBA TUD**			HarmoniCA
2	Aquasauris	500,000				TUT		**Infram BV** CAP Gemini	
3	Storing age at the source	475,000		Prov. NBr.	Waterschap Mark en Weerijs	**U-Utrecht**	**NITG** Alterra		*Natuurmonumenten*
4	• Sustainable energy • Marine construction • Marine cultivation	2,300,000					WL, **NITG**, MEP, RIVO		
5	Innovative water management in the Betuwe area	100,000					TNO/MEP	**DHV**, CLM, DLV	
6	Gouwe Wiericke West	62,000		**Prov. ZH** 5 municipalities	Hoogh. Rijnl., Waters. W&W				WLTO
7	Limitations to citizen participation?	105,000	**RIZA**						
8	Supporting active participation in spatial planning with ICT tools					TUD	**IVM/VU**, TNO/INRO. RIVM	Resource Analysis, Royal Haskoning	
9	Ilperveld integral	4,600,000		**Prov. NH** Landsmeer	Waterlanden, Hoogh. Uit Sl.				Sti.N.H. Landschap
10	National and regional, in interaction optimal	250,000		RIZA		TUD	**Delft Hydraulics**	Communication consultancy	
	Subtotal	9,292,000							

No	Project name	Costs €)	End users			Knowledge providers			
			National Authorities	Provinces/ Municipalities	Water boards	Universities	Knowledge institutions	Consultancy agencies	Other partners
11	Interactive implementation	450,000		Prov. Gron.Stad Gron. Deventer	De Veluwe, Groot Salland	TUT		**Tauw**	
12	Interactive planning and cost-benefit analysis for GGOR (Dutch acronym for Desired groundwater-surface water regime in the North of the Netherlands	1,150,000		Prov. Drenthe, Overijssel, Groningen	Groot Salland, Reest and Wieden, Veld and Vecht, Hunze and Aa, Noorderzijlvest		**NITG**	Haskoning, Tauw	
13	Knowledge network Multiple use of space with water in the West of the Netherlands	200,000		**Prov. NH** Prov. ZH Prov. Utrecht					
14	Spatial planning and water systems in the Regge and Dinkel area	615,000	RIZA	Overijssel	Regge en Dinkel VITENS		**NITG** Delft Hydraulics		
15	Participatory integral evaluation for multiple use of space at sea	3,330,000	**RWS/RIKZ**	various partners	various partners	various partners	various partners	various partners	
16	Perspectives in integral water management	1,867,000	RIZA *RWS directie ZH* *RWS directie Oost*			**U Utrecht** ICIS Maastr.	**NITG** WL, KNMI	Carthago Cons.	
17	Pilot projects for Multiple use of space with water in the West of the Netherlands	500,000		**Prov. NH** Zuid Holl. Utrecht					CUR/ Habiforum
18	Using processes and technology for a best possible water system	300,000		Municipality Province	Water board			**Arcadis**	LTO Natuurorganisatie
19	Vision of the future of the Haarlemmermeer	7,200,000				TUD	WL, Geodelft	Oosterhuis Arch., Middelkoop Advin, Royal Haskoning	**Dura Vermeer** OTB, EIB, Ecorys
20	Statistics regarding extreme precipitation in the Netherlands	600,000	RIZA		Stowa	RIVM	**KNMI**		RIONED, HKV
	Subtotal	16,212,000							

No	Project name	Costs €)	End users			Knowledge providers			
			National Authorities	Provinces/ Municipalities	Water boards/ Water works	Universities	Knowledge institutions	consultancy agencies	Other partners
21	Tools for (improving) trans-national catchment area management	180,000				**TUT**		**Cap Gemini Inframm**	
22	Salinization problems in the low Netherlands	2,330,000	RWS	Noord Holl. Zuid Holl. Zeeland	Hoogh. Rijnland *KIWA*	**VU** *TUD*	**NITG**	Witteveen & Bos	
23	The values of water: a basic principle for urban and rural water management	250,000					**TNO/MEP**	Tauw	**NIDO**
24	What about the peat areas?	450,000	various partners	various partners	various partners	various partners	**Alterra**	various partners	various partners
25	Influence of water storage on the quality of water, soil and spatial planning	295,000	RWS Oost NL	Gelderland Overijssel	Gooi en Eemland Veluwe		**TNO/MEP** Delft Hydraulics		
26	Platforms for regional water management	300,000			Water boards	WUR	CLM	**Arcadis**	
27	The influence of a green harbour on a blue flag			Gem. Den Helder			**TNO/MEP** Ecomare		St Noordzee
28	Creative dredging	820,000	RIVO RWS				**TNO/MEP** NITG		*Dredging companies*
29	Health of the North Sea and the Wadden Sea	500,000					**Delft Hydraulics**		
30	Nature, safety and shellfish	2,750,000	RWS				**TNO/MEP**	Engineering agency	Contractor @Ondernemer schelpdierst
	Subtotal	7,875,000							

No	Project name	Costs €)	End users			Knowledge providers			
			National Authorities	Provinces/ Municipalities	Water boards/ Water works	Universities	Knowledge institutions	consultancy agencies	Other partners
31	Water retention and nature	250,000	RWS		Water boards	Uni Nijmegen		**Arcadis** Bureau Drift	*Stichting Ark*
32	Future exploration "Ocean farming – sustainable use of the sea"		various partners	various partners	various partners	various partners	various partners	various partners	**Innovation network GR STT**
33	Water economics	750,000	**RIZA**, CBS			EUR	**IVM** , RIVM, LEI, NEI		
34	Low water country ICES/KIS RvW|WvW	1,500,000		IPO, VNG	UvW	TUD, TUT	**Delft Hydraulics** Alterra	Grontmij	
35	The Blue Head	4,500,000	Staatsbosbeheer	Amsterdam Noord Holland					**Natuurmonumenten**
36	High water strategies Vecht / Zwarte Water	1,130,000	RWS DON RWS DIJG RIZA	**Overijssel** Various provinces	Various Water boards	TUT		**DHV**	
37	Fun at the river (Freude am Fluss)	950,000	RPD	Gelderland		**KUN**	**Delft Hydraulics**		
38	Sustainable and water-conscious construction in Almere Hout	175,000	RWS-BWD RIZA	**Almere**	Zuiderzeeland	*Wageningen-Univ.*		**DHV** IHE	
39	Living with rivers	500,000	**RIZA** *RWS DON DZH DWW*				**Delft Hydraulics** Alterra		
40	From opportunity control to risk control in case of flooding of the rivers upon increasing risks of high river discharges.	500,000	RIZA			TUD	**Delft Hydraulics** Alterra	*Witbo*	
	Subtotal	10,255,000							

No	Project name	Costs €)	End users			Knowledge providers			
			National Authorities	Provinces/ Municipalities	Water boards/ Water works	Universities	Knowledge institutions	consultancy agencies	Other partners
41	Socially responsible protection of dams and dikes along rivers in view of the increasing risks of high river discharges	500,000					**Delft Hydraulics**		
42	Integral measures for controlling the problems related to the contaminated sediments in the Bitterfeld/Wolfen region	500,000					**TNO-MEP** TNO-STB TNO-NITG Delft Hydraulics UFZ Dld	Gicon DLD	
43	Evaluating urban water plans	1,000,000		various partners	various partners	**TUD**	Delft Hydraulics Alterra		Bouwkunde TBM
44	Transition to sustainable urban water systems	2,800,000			KIWA	TUD	**Delft Hydraulics** IHE		
45	Farming with water			Vallei en Eem *Prov. Utrecht* *Leusden* *Amersfoort*				**Arcadis**	CLM
46	FEAST	577,000				**IVM** **TUT**			CSTM
47	Space for new administrative arrangements					**Erasmus**			CPM
48	Rolspellen en communicatie: de water voor ruimte methodiek als middel voor communicatie	140,000		DLG Groningen Stad Groningen	Waddenzee-beheerders Waddenzeeonder zoekers	*TUD* *ICIS/Univ Maastricht*	**Delft Hydraulics**		
49	Managing information flows and user participation in watermanagement in Europe: towards new forms of governance	1,080,000				**VU** *IVM* *RUG IVEM*			
50	Meanings of Water	275,000	*RWS/RIZA*			*WUR*	*Alterra*		**Expertisenetwerk landschapsbeleving**
	Subtotal	6,872,000							
	Grand total	50,506,000							

APPENDIX 6 OVERVIEW OF BAIT PROJECTS

This appendix contains more detailed information regarding the knowledge questions, objectives and approaches for the so-called "bait projects". The consortium wants to use this appendix to provide a more concrete image of the projects that are conducted in the LIVING WITH WATER knowledge programme as examples of how the mission specified in Chapter 2 will be implemented in practice. These bait projects have been selected in such a way as to give a complete overview of all knowledge themes and types of areas represented within the knowledge programme. The bait projects are thus a selection of all the project proposals submitted, based in part on the selection criteria as presented in Appendix 8.
The numbering for the project titles refers to the numbers of the projects in the previous appendices. The following items are described for each project

- Knowledge question and objective.
- Contents of the project.
- Intended results.

3. Storing at the source

Knowledge question and objective

The report "Water policy for the 21st century" (WB21) pleads for an approach in which the water management focusses on "accommodating water rather than resisting water". An important idea in this framework is initially to keep the water upriver contained per management area or catchment area, and in the second place to store the water downstream and finally to discharge the water more rapidly. The use of space would have to be modified to accomplish this. Conservation groups are enthusiastic about this idea; they want to recover the natural stream systems upstream, keeping more water locally and delaying its release. This would level out periods of high drainage and increase the groundwater in infiltration areas, thus reducing the dehydration (through seepage) both upstream and downstream. This notion is also criticized. A recent study (Van Deursen et al. H_2O 35(5), 2002) shows that increasing the upstream storage in the Rhine catchment area has little effect on the peaks in drainage. Another point of criticism is that plans for rigorously attuning the use of space to the water system are economically infeasible.
The Brabant Atlas 'Water in Image' has launched an even more far-reaching idea. It introduces a proposal to disconnect the numerous, frequently small-scale, natural depressions (including the pools) that have been drained in the past, from the drainage system. These depressions can then fill up again during the wet period and do no longer contribute to the drainage problem.

The objective of this project is to use a detailed area study to answer the following questions:

- Under what circumstances does enlarging of the upstream storage (increasing the absorption capability) lead to a reduction of the drainage during periods of high water?
- How much emergency retention is required downstream of the streams and rivulets to absorb the highest drainage peaks?
- What is the economic value of increasing the upstream storage in terms of reducing agricultural yields, reclaiming land, water management investment, reduction of damage from floods, etc?
- What is the ecological value of increasing pool, water quality and new natural areas?
- What is the societal broad-based support for such a modification in land use and in which manner can this support be increased via communication and new administrative arrangements?

Contents of the project

The project studies whether upstream storage of water in mid-sized catchment areas has positive effects on the drainage patterns in regional rivers. The feasibility, the costs/benefits, the consequences for the environmental planning and the societal support will also be analyzed. Moreover, the effect on seepage areas and any bottlenecks this may cause for the water quality for the areas to be flooded will also be studied.

The following steps can be distinguished:

- The hydrology of a mid-sized catchment area will be modelled. We have chosen to use the Merkske, a rivulet of the "The Merk" river in west North-Brabant. We already have a great deal of data regarding this area (including the location of the pipe drainage, the dimensions of all the water drainage channels, the location of the irrigations wells, etc.). In addition, we have a detailed groundwater model with a resolution of 100x100 m. The groundwater model will be linked to the surface water module.
- Using the hydrological model, the hydrology of two extreme scenarios, both of which are based on a changing climate regime, will be modelled:
  - Ecotopia. Here the goal is to achieve maximum storage and minimum groundwater drainage upstream; the land use is attuned to this. This can be achieved in part by closing all the channels and ditches that have been dug since the end of the 19th century to drain the numerous pools and original wet heath land.
  - Technocratia: In this model the changes in land use based on autonomous socio-economic developments are modelled as an autonomous process, simultaneously attempting to restrict the risk of floods downstream using controlled storage reservoirs.

For both alternatives the consequences of the risk of floods, the water balance, the quality of the groundwater in storage areas (source and stream valley), the economy and the ecology are calculated. For the Ecotopia scenario we will also look at how much downstream storage is still needed to absorb the highest drainage peaks.

Intended result

- A report and two articles (one in a trade magazine and one in an international hydrological magazine) which describe the research and evaluate and compare the economic and ecological value and effects on security of storage at the source with storage in the upstream area.
- A brochure for administrators and water managers that clearly explains the positive effects of storage at the source in an appealing manner, as well as the corresponding risks and solutions.
- A workshop for water managers in collaboration with authors of other storage studies.
- A presentation/brochure for the local population containing the design and the concept results to measure the support for the different scenarios.

6. Gouwe Wiericke West

Knowledge question and objective

The province of Zuid-Holland and water managers have formulated a global vision for the Gouwe Wiericke West peat field area. Implementing this vision would create a situation in which an integral approach to the problem provides solutions for:

- A sustainable approach to the water management.
- Economically sustainable agriculture in large parts of the Gouwe Wiericke area.
- Maintaining and developing natural values, both in the wet areas (Reeuwijkse Plassen) as well as the grassland areas.
- Strengthening and developing the recreational/tourist possibilities of the area.
- Maintain and strengthen the existing characteristics of the peat field landscape and develop another landscape in a part of the area (MT polder) with a multiple use of space through water, nature, extensive agrarian management and recreation.

The objective of this project is to answer the following questions using a detailed area study:

- What process can we utilize (communication and organization) to come up with an organizational plan supported by both society and government, that does not get bogged down in objection procedures?
- How do we translate/present the technical questions/results, so that these can actually be integrated into the interactive planning process: balance between simplifying, without patronizing.
- What are the possibilities for the multiple use of space in both the basins as well as in the areas with flexible water level management?
- How can we best prevent the settling of the peat using flexible water levels?
- How can a basin or reservoir, which in principle is intended for water conservation, be deployed to prevent water damage?

Contents of the project

The knowledge will be developed using a pilot project approximately 300 ha of basin or reservoir will be created, flexible water level management will be introduced in parts of the water system and the area will be further rearranged. The plan of approach and financing will be specified under collective (province, water managers, municipalities) management responsibility. At any rate, the following items will be involved:

- Develop design concepts for peat pasture areas.
- Current and future values of landscape, recreation, nature, agriculture, tree/ornamental plant cultivation and water.
- Influence of the selected process on existing procedures (including MER, regional planning, zoning plans).
- Requisite instruments: existing instruments (including land allocation instruments) as well as newly to be developed instruments.
- New approach to land reclamation, property, management and maintenance (basin or reservoir, natural areas).
- Legal consequences.
- Method of financing the design concept.
- Desired administrative organization (Reeuwijk Regional Team and others draw up the managerial framework for the coming year).
- Participation of interest groups.
- Communication with residents/users.

The pilot will also serve as a testing area for more theme-oriented projects within the knowledge programme, such as What about the peat areas, Limitations to citizen participation and Value of water.

Intended result

The organizational plan must be ready and the procedures must have been reviewed by 2007. Based on the insights obtained into the values of water a societal and economic weighing of the design concept can be made. Then there will be sufficient societal and administrative support in the region so that work can actually begin. The knowledge amassed will then be recorded in a final report. The transfer of knowledge within the project will primarily be between the participating parties. In addition, knowledge will be transferred using the knowledge network for Multiple Use of Space and Water for the West-Netherlands.

7. Limitations to citizen participation

Knowledge question and objective

Interactive control is a hot topic within government at the moment. Citizen participation is needed when preparing, implementing and managing policy. Underlying factors include broad societal consensus regarding what is socially desired, the increased diversity in lifestyles and the necessity to strengthen the political legitimacy. On the other hand there are signals from the populace that citizens want to exert more influence on government policy. The general support of the citizen for government intervention increasingly disintegrates into so-called specific support for different groups for specific decisions; these groups of well informed citizens more and more frequently are parties in the policy arena as well.

However, there is also a limit to this need for citizen participation for both governments and citizens. In some situations the government can consciously choose a different management style for parts of the policy process; moreover, manpower and tools are not always adequate for a broad interactive approach. Moreover, the citizen cannot and does not want to be a party to everything. Citizens are happy to leave some matters (still, even if the citizen is mature, highly educated and can organize things him/herself) to an expert system or to the representative democracy.

The objective of this project is to answer the following knowledge questions:

- Identifying factors that make it possible to clearly define the approach to the aspect of citizen participation in a project per type of project.
- Mapping out the consequences for the organization and the work method for the district water control board (e.g. service desk function, intermediary function).

Contents of the project

The project will begin with a desk study to map out the knowledge related to citizen participation in policy areas other than water management. The importance of citizen participation in formulating plans for water managers will be mapped out using a number of practical projects: in what areas does the citizen want to be/not want to be involved, about what topics does the citizen want to have a say? Then these will be compared with the desires and restrictions of the water manager: what are the consequences for the organization and work method of the water control board (in the context of the organization of the participation at higher scales levels in the province and catchment areas)?

Based on this theoretical and practical knowledge an analysis will be made that is then tested against scientific knowledge in this area. The analysis will result in a flowchart that can be used to choose the method of citizen participation for different types of projects and areas. This flowchart will be related to models for modifications of the organization of water managers.

The flowchart for citizen participation and the models for organizational adaptations for water managers will be tested in practical projects within the programme such as: Gouwe Wiericke and Noord-Brabant.

Intended result

- A flowchart that can serve as a guideline for the approach to citizen participation using features of the project.
- Future-oriented models (related proposals) for modifying the organization of the water control authority against the background of the revised relationship with the citizen.

11. Interactive implementation

Knowledge question and objective

There are three important motivations for developing the concept of interactive implementation:

- First or all, many integral plans in the Netherlands are never implemented, even if they are formulated interactively. Many great plans are never implemented. Broad-based support for a plan does not turn out to be identical to generic support for implementing that plan.
- Secondly, intervening in a living environment is uncertain. The societal effects of measures frequently involve structural uncertainties. With traditional plan processes these can be difficult to accommodate, which means that there is often behaviour designed to reduce the uncertainties. This results in weak plans riddled with compromises.
- Thirdly, a cycle of formulating, implementing and managing plans occurs in the living environment. Frequently the creativity is concentrated in the planning phase, even though it is also possible for executors and managers to be creative. In executing the projects, the parties involved discover that things could have been accomplished smarter and cheaper, but then it turns out to be impossible to deviate from the original execution plans without complicated procedures involving those who are providing the subsidies and licenses. Managers are frequently burdened with cost savings imposed while the plans are being formulated.

The experience from the complexity sciences is that this does not lead to a solution but that structural changes are needed. We are dealing with an over-regulated system.

It appears to be simple to work using an interactive structure. It gives the feeling we have been doing that all along; we call it working pragmatically. However, experience teaches that the desired result is not achieved. The idea behind interactive implementation is to experiment with another form of work.

Objectives of the Interactive implementation project:

- Actually apply the concept of interactive implementation in a number of projects.
- Recognize the mechanisms and patterns that ensure that projects actually come to fruition through interactive implementation.
- Develop scientific knowledge regarding the mechanisms and patterns observed.

Contents of the project
Interactive implementation provides a new structure for processes of formulating, implementing and managing plans. The work method involved in interactive implementation is particularly applicable to complex processes with many stakeholders, diffuse and various measures and considerable uncertainties in the relationships between measures and effects. In case of integral projects it is frequently said: "the whole is greater than the sum of the parts". Interactive implementation makes this "completely" visible and allows this to be reflected. Interactive implementation involves a new method of working. The creed here is "parallel to one another rather than one after another". Policy, formulation plans, design, execution and management all occur in parallel to one another. The implementation begins before the planning process is completely finished. In particular this is feasible in case of integral projects, where many diffuse measures are used to improve the general quality of the environment.

Broad-based support is created around real projects and seldom around plans alone. People in a neighbourhood or residents of rural areas only become enthusiastic when they actually see what the values of water are. For local politicians, as well, integral water management only comes to life once they see the projects executed. The essence of Interactive implementation is that broad-based support for a plan does not automatically mean broad-based support for the execution of a plan! If the execution becomes the focal point, and a dialogue is initiated between the managers and designers and those formulating the policy actively participate in the execution, there is less chance of a half-hearted affiliation between policy, formulation of the plans, design, execution and management.

The concept of Interactive implementation will be applied to a number of concrete projects. In so doing a great deal of attention will be paid to specific problems regarding licenses and subsidies, among other things. The first concrete project is the recovery of streams by the Veluwe Water Control Board.
At INTERREG IIIb the PURE and FLOWS programmes will be applied and developed interactively as practical projects. These programmes want to conduct their practical projects as part of ICES/KIS to make it possible to broaden and deepen the scientific aspects. Concrete projects in PURE and FLOWS are the restoration of the west side of the city of Groningen, the development around the Zandwetering in the city of Deventer's periphery with a focus on multiple use of space with water as the driving force, and the perception of risks related to water management in Flevoland.

Twente University will focus on the link between technique and society and the Delft University of Technology will work further develop the theoretical knowledge regarding the theory of complex networks.

Intended result
Provide a generic description of the experiences from the pilot projects. Theoretical justification of the points of interface between interactive implementation/citizen involvement. The cases will be described and the learning experience will be published in the form of a manual. This manual will also be published in modified form in English in the framework of the Interreg IIIb PURE project in which water projects will be conducted in parallel in the Netherlands, England and Sweden.

12. Interactive planning and cost-benefit analysis at GGOR Noord-Nederland

Knowledge question and objective
The GGOR (Dutch acronym for Desired Ground and Surface Water Regime) has been or is currently being established for a large part of the Netherlands. But so far the required filling of the gap between the present situation and the desired situation has not actively started. Admittedly, this is a difficult situation because it not only requires involvement of all active water managers (policy makers such as provinces, designers such as DLG and operational agencies such as water boards and water companies), but also the involvement of other stakeholders representing the interests of individual, water-dependent citizens (Natuurmonumenten, Staatsbosbeheer, LTOs, VNG, VNO, etc.). In addition to a multitude of parties involved, sometimes with opposite interests regarding water management, also a large number of varying spatial measures can be considered that have to be weighed for their effectiveness. Because of this the problem tends to become a complicated issue as well, also in terms of technology.

The objective is to bridge the gap between the current and the desired situation via interactive planning. This can only be realized if all parties involved:

- Can interactively and in a comparable manner generate results of options in water management
- Can weigh the consequences of these options in a comparable manner as well

This project focusses on creating support by interactive planning and an integrated social weighing of societal, economic and hydrological objectives. Adequate communication is perhaps a suitable metaphor: it requires fluency in one and the same language (grammar, spelling, etc) and for a real understanding an identical flair for language.

Contents of the project

The challenge of enabling interactive planning lies in being able to generate a database with which random combinations of measures at random sites can be evaluated in a matter of seconds (to replace the specialist and time-consuming model scenarios). Or in other words, citing a water manager: "If I push here, it hurts over there".
A second challenge for enabling scenario selection lies in the further development of the (economic) weighing of water quality, the eco-systems in natural areas, the quality of products in agricultural areas and the space for urbanization and safety (continuation of the STOWA 'Waternood' programme)
The fact that smart and user-friendly ICT solutions lead to easily accessible databases is of importance regarding both points mentioned above. Thus, an interactive, broadly applicable and jointly developed management tool becomes a realistic objective.

The implementation of GGOR in the north of the Netherlands is to function as a pilot project.
The project has been phased as follows:
1. Process description: agreement on administrative feedback, package of measures and policy variables to be evaluated.
2. Generation of a measures database:
   - Elaboration of the so-called 'Impulse Response Method', which enables a faster and simplified calculation method for hydrological processes and implications for land use functions.
   - Translation into quantitative and qualitative hydrological and socio-economic variables in order to enable weighing.
   - Setup of an interactive ICT management tool with the following characteristics: broad applicability, easily accessible, and very fast ('at the conference table') generation and weighing of random scenarios.
3. Elaboration of management strategies:
   - Basic agreements and set up main lines of water management.
   - Elaboration at sub-levels.
   - Interactive mutual harmonization and elaboration consensus.
4. Create a future harmonization and evaluation platform

Intended result

- Reports and articles describing the investigation.
- Implemented ICT planning tool for supporting interactive planning.
- Recorded weighing methodology with socio-economic factors incorporated.
- Database containing the results of all scenario runs to be used for further policy analyses.
- Regional dynamic model of sub-systems (groundwater, surface water) and management.

14. Spatial planning and water systems in the Regge and Dinkel area

Knowledge question and objective

In the Dutch high sandy areas (the sandy regions in the North, East, Mid-section and South of the Netherlands) crucial hydrological relations have been lost, intensified or extensified, or have been modified by changes in the transported agents/agentia, as a result of artificial interventions.

One challenge for the spatial planning in the sandy regions is searching for a design for land use and the arrangement of the landscape that will result in making the forms of land use involved economically profitable and sustainable, creating a spatial structure that (again) exhibits fundamentally natural hydrological patterns.
The purpose is to optimally utilize the safety, the resilience and the natural value of the system.

The objective of the project is to apply systemized hydrological knowledge in the landscape planning, in this case in the three primary parts of the architectonic spatial design process (analysis, synthesis and evaluation). To accomplish this the following items will be studied in the broad sense:

- What changes in the different sectors of agriculture, nature management, municipal water management and exploitation of (ground)water are possible to contribute to a sustainable water system configuration?
- How can the spatial placement of these functions be attuned to water issues?

Contents of the project

The Regge and/or Dinkel catchment area has been selected as a pilot area for working out the ideas mentioned above. The advantages of this are that a completely modernized hydrological system description is available as well as a large-scale very detailed set of models of the ground and surface water. There is also previous experience with landscape design from a hydrological perspective in the same area. The project can also be integrated with an ongoing design project, in which aesthetic and social aspects are carefully considered, set up by the Kunstkring Diepenheim and supported by a number of occurrences that are involved with "culture" (including SKOR).

Intended result

- Reports and articles that describe the research incorporating architectonic landscape design with water management strategies.
- A methodology that is in line with the casco concept (linked to the philosophy of the layer approach from the Fifth Memorandum Spatial Planning), in terms of spatial planning, including water as the organizing principle.
- A database that includes the results of all the scenario runs which can be used for further policy analyses and to incorporate the knowledge within the techniques for spatial planning. Regional dynamic model of sub-systems (groundwater, surface water) and management.

15. Participatory integral evaluation for multiple use of space at sea

Knowledge question and objective

Many spatial questions cannot be resolved on land itself and thus area in the North Sea is being used more and more, in particular as a result of immobile activities on the sea floor. Not only do existing activities demand more space (such as oil and gas extraction, cables and pipes), but a trend toward installing new immobile activities (wind energy generation, aquaculture, islands off the coast, transmission antennae) can also be observed. This latter group of activities involves a shift of traditional 'land functions' to the sea. The inability (lack of space) or reluctance to accommodate the spatial demand on land is the underlying reason. Space at sea is also scarce, however, so the search for possibilities for the sustainable multiple use of space is still necessary. Stakeholders have experienced barriers to the development of initiatives that appear to be related to outdated modes of spatial planning and murky frameworks for evaluation.

The European policy for the coastal areas and the sea will increasingly constitute the framework for national plans during the coming years (Water Framework Guidelines, Recommendation for Integrated Coastal Management, European Marine Strategy Memorandum, Guideline Strategic Environmental Impact Reports). The keyword in this European policy is the integral approach in which the goal will be trans-national harmonization with specific details to be filled in by the region. Internationally there is an increasing convergence in the development of frameworks for evaluation. Fleshing out the details regarding such frameworks from the perspective of the multiple use of space is clearly a perspective that will give Dutch initiatives favourable chances in terms of international implementation. Strategic knowledge development for evaluation frameworks in service to the societal generic support for evaluation require an active participatory approach from the sectors and citizens involved.

Moreover, this lends support to recent insight that considerable efforts will be required to be able to meet the requirements of WB21. Different plans have been formulated in this framework for the "departitioning" of the Netherlands. Such plans are intended to provide details for the requirements of the WB21, including attempting to revitalize the brackish eco-dynamics, to focus on spatial development and to pursue the generation of tide energy. These plans are strong in terms of their synergy between different policy areas (LNV, VROM, V&W). An integral trans-disciplinary weighing and embedding at the different managerial levels is equally difficult.

The project 'Sustainable multiple use of space at sea' studies the (im)possibilities of utilizing the space in the coastal areas and on the North Sea for different (combinations of) activities and the effects of the increasing occupation of that space.
The primary knowledge questions are:

- What are the possibilities for and the consequences of sustainable multiple use of the coastal areas and the North Sea?
- What would the integral frameworks for evaluating sustainable multiple use of space look like and what methodologies and instruments would be effective in developing this?

The objective of the project is to investigate the possibilities of multiple sustainable use in the coastal areas and at sea and to develop frameworks for evaluating whether to allow (new) initiatives for the multiple use of space in the coastal areas and at sea in a participatory manner. In these frameworks for evaluation (region-specific) societal analyses are combined with applied scientific analyses (regarding technical possibilities, economic and physical/ecological constraints). The operation of the new frameworks for evaluation will be tested using pilot studies.

Contents of the project

For the first knowledge question the study will focus on the societal, administrative-legal, economic and ecological advantages and disadvantages of the multiple use of space in the coastal areas and on the North Sea and the awareness of citizens and sectors regarding possible developments over the longer term. Different forms of use and combinations of these forms will be studied. Insight will be gained into:

- The (im) possibilities and risks of construction at sea compared to construction on land.
- The possibilities and consequences of different forms of energy generation on and in the sea. These include windmill farms, solar panel farms, utilizing tide movements and sea currents and energy from biomass.
- The possibilities for construction in the sea, i.e. sustainable production and utilization of aquatic biomass (algae, seaweed, shellfish, sponges, fish) along the coast and on the North Sea. Two specific examples of this have been formulated:
    1. ocean farming, in which the possibilities for marine culture on the open sea are explored,
    2. sea culture park, in which the possibilities of producing marine organisms in the coastal areas are explored.

Examples of multiple use of space are the combination of windmill farms with marine culture and a sea culture park as a combination of natural development and marine production in the coastal areas and the multiple use of dikes.

Research aspects of the first knowledge question are:

- Scenarios for coastal development in collaboration with the theme Climate and Space.
- Technical –scientific feasibility:
    - Ecological feasibility: environmental impact, pollution, threat to eco-systems and the coastal landscape based on a 'common knowledge base' and framework for evaluation.
    - Safety: what are the risks and how do we deal with them?
    - Technical feasibility: what are the technical and physical constraints?
    - Integration of the natural processes (build with nature).
    - Planological feasibility.
    - Administrative feasibility.
    - Logistic outset.
- Economic feasibility (is there a market?) and economic effects.
- Societal feasibility (broad-based support).
- Transferring knowledge, managing knowledge and developing new knowledge.
- Spatial impact and relationship of the plans.
- Animal welfare and other ethical aspects.

Indicators and evaluation frameworks for aspects such as safety, sustainable dynamics in physical and spatial quality of the landscape, sustainable transport, sustainable recreation and fisheries and recovery of bio-diversity are necessary to be able to develop future policy and to communicate this to the stakeholders. Innovative projects in the area of the multiple use of space in the coastal areas and at sea must fit in with prevailing policy, require evaluating their environmental impact, and can be subject to discussions regarding their usefulness and necessity. Dealing with a field of tension between short and long-term interests requires an adequate knowledge base and realistic possibilities for applying this knowledge. The design for a methodology for evaluating the

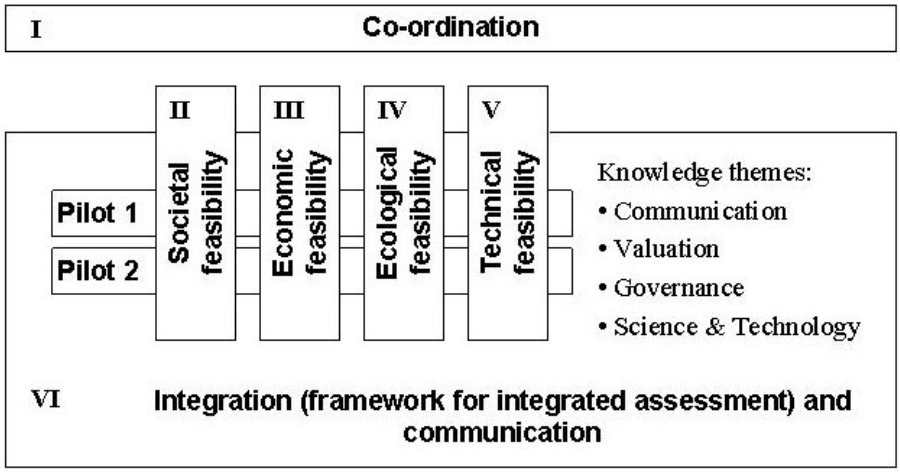
short and longer-term problems involved in sustainable development at sea and in coastal areas must fit in with the users' needs. The policy challenge for this is an innovative interplay between citizens and government focussed on transparency and participation. Developing frameworks for evaluating sustainable (multiple) use of space at sea would be served by an iterative and participatory process that is collectively deployed by public and private parties.

Research aspects for the second knowledge question are:
- Methods and techniques for integral evaluation.
- The social and cultural dimension of regionally applied frameworks for evaluation.
- Attitudes of the citizens, sectors and political figures and management in dealing with mid to long-term problems of coastal development.
- Trans-national input and feedback.

The project distinguishes the following work packages (WPs) within which the activities are performed:
- WP 1 Coordination.
- WP 2 Societal and administrative feasibility.
- WP 3 Economic feasibility.
- WP 4 Ecological feasibility.
- WP 5 Technical feasibility.
- WP 6 Integration (Evaluation frameworks) and Communication.

The four Knowledge themes (Appreciation, Communication, Control and Technique) comprise the leading motif in the integration step between the different feasibility studies and setting up the evaluation framework and the communication phase (see Figure 1).
The pilots play a central role in the project for both executing the feasibility studies and setting up and testing the integral evaluation frameworks.

Figure 1: Work packages



The following phases are distinguished in the project:
- Detailed specifications for the project proposal.
- Setting up the common conceptual framework.
- Working out the details for the pilot studies.
- Building blocks for the feasibility studies.
- Specifying the integration steps.
- Communication and feedback.
- Iterative integration of applied scientific analysis, societal analysis and the feasibility of adapting the management to new frameworks for evaluation.
- Testing the collectively developed evaluation frameworks in the pilot studies.
- Ongoing progress reports.

Intended result
Final reports describing:
- In terms of content:
  - Test of the robustness of initiatives for the multiple use of space in the coastal areas and at sea, based on applied scientific analyses and on societal analyses (using participatory integral evaluation) as anchors for the development of the sustainable use of coastal areas and the sea and having citizens and sectors internalize this.
  - Work out the specific details of concrete (inter)national examples of the multiple use of space and test these against the prevailing European regulations and national spatial policy, for costs/benefits, water consciousness and societal broad-based support.
- Process-oriented result
  - Insight into the economic, ecological and socio-cultural aspects of complex societal problems associated with the sustainable use of space on/in the North Sea
  - Experience and insight into public-private collaboration when drawing up evaluation frameworks for regional spatial planning regarding new activities at sea and concrete projects.
  - Building blocks for (region-specific) integral frameworks for evaluation
  - Increasing consciousness regarding water and regarding the sustainable multiple use of coastal space and the sea.

A step-by-step plan will be provided that makes the permissibility of (new) spatial functions at sea understandable. The project is intended to come up with a more refined evaluation system in a participatory manner and based on methodology and underlying knowledge, with more specific attention paid to combinations of functions (multiple use of space).

This project is one of the bridge projects for collaboration between the Delft Cluster and Space for Climate.

16. Perspectives in integral water management

Knowledge question and objective
The goal of water management in the Netherlands is to have the different user functions of the water systems function as optimally as possible in a sustainable manner. Protection against flooding is the primary objective, while ecological recovery and spatial quality of the water systems has become an important secondary objective. However, the integral and multi-sectoral character makes water management a complex task that is riddled with considerable uncertainties regarding the future. One important cause of these uncertainties is climate change, and the related increase in peak discharges and intense periods of precipitation, as well as water shortages in the summer. In addition there are important socio-economic and political uncertainties (such as population growth, growth of the cities, agricultural development, the level of ecological recovery) that influence the demand for water on the one hand, and on the other hand help determine to what extent space will be available for water in the future. These uncertainties are of a structural nature and the crucial question for the water managers is thus also what is the best strategy given the unavoidable uncertainties? Scenario studies that have been conducted during the past 10 years into the consequences of climate change on river discharge, fresh water maintenance and water-related functions have primarily been 'what-if' scenario studies in which different scenarios for climate and socio-economic developments have been worked out, but this has not led to a goal-oriented weighing of different management strategies.

The objective of this project is to analyze different multi-year strategies for water management under diverse future climatological and social circumstances, so as to identify robust strategies based on this.

Contents of the project

This analysis will be made by integrating gamma and beta research in the area of scenarios (based on world images and management styles) and hydrological modelling, and thus continues to build on a recent study that showed that such an approach can actually lead to new insights regarding the development of strategies in the face of uncertainty. The unique aspect of the proposed approach is that a hydrological model of the Netherlands (including groundwater, local surface water and river discharges) is dynamically linked to a social-cultural-economic (SCE) model. This means, for example, that if extremely high water is simulated by the hydrological model during a scenario run, the SCE model generates a social reaction (e.g. changing the way of thinking about water management such as WB21), which in turn can have an effect on the hydrological model during the subsequent period through modified management. The project focuses on the following water systems including their functions: branches of the Rhine and Maas rivers, the regional water systems within the Netherlands including groundwater, the IJsselmeer and the Rhine-Maas estuaries.

The project consists of five sub-projects, each with its own phasing and each conducted by different partners.

1. Sub-project 1: Formulate climate scenarios.
   Activities: On the basis of very long runs of Global Circulation models (GCMs) and the Rhine flow model combined river discharge and storm flood scenarios are constructed for the Netherlands.
   Results after 1 year: A combined collection of transient runs of sea levels, storm floods and river discharge.
2. Sub-project 2: Formulate Social-Cultural-Economic (SCE) scenarios and models
   Activities:
   - draw up story lines based on literature studies, existing scenario studies, stakeholder workshops and expert meetings. These story lines provide an integral description of possible developments in water management and the corresponding constraints. The story lines are based on social-cultural theory, and are detailed as 'transient management scenarios'.
   - convert the story lines to an SCE model that - under the constraints of a social vision and corresponding management style - describes the reaction of the social and societal complex to changes in hydrology (wet feet, drought, water quality) and economic conjuncture.
   - Convert the reactions of the SCE model into actual actions (policy and measures) that have a physical influence on the water management system (end of year 2).
3. Sub-project 3: Develop hydrological model instruments
   Activities:
   - Compile a transient hydrological model of the Netherlands. This must be a scaled light model with sufficient resolution, but with which groundwater levels, ground moisture levels and specific discharges can be calculated with sufficient speed.
   - Develop knowledge and model the morphological response of the lower delta to changes in storm frequency, sea levels and hydrological regime and the related effects of these on change in water and salt levels.
   - Develop so-called 'Rapid Assessment Meta-models' (RAM). These are fast, simplified models for expressing the response of functions (agriculture, nature, recreation, living) to hydrological changes (calculated with the large-scale hydrological model mentioned above) in terms of economic and societal figures. The RAMs can be both 'light' versions of existing models (e.g. ANIMO for erosion) or meta-models of existing model outcomes (including nature potencies, agricultural damage).
4. Sub-project 4: Integrated scenario runs
   Activities: With the help of the story lines and the SCE model it is possible to include the human actions in reaction to events (floods, drought, and socio-economic events) and changing insights regarding water management in the scenarios and to estimate the consequences of these actions on the water systems and water system functions with hydrological and effect models. A large number of these integrated scenario runs are run with the linked hydrological and SCE-model (linked via the results of step 2c and 3b). Each scenario run consists of a specific story line (combination of climate scenario and socio-economic context, societal vision and corresponding management strategy, along with climate fluctuation and social-conjunctural fluctuations and the response of the management to these fluctuations). To take the previously mentioned fluctuations into account collections of runs (with stochastic input of climate fluctuations and conjunctural fluctuations) will be analyzed.

5. Sub-project 5: Evaluate and identify robust management strategies.
   Activities: The results of a large number of scenario runs (collections) will be evaluated on the basis of a societal cost-benefit analysis for all fresh water-related functions and an estimate of the security risks. This enables the researchers to investigate what long-term management strategies do and do not appear to be generally robust under different (uncertain) future developments.

Intended result

- Reports and items that describe the research and identify robust long-term water management strategies.
- Database containing the outcomes of all the scenario runs and an evaluation matrix (gateways to management strategies, climate and socio-economic context) to be used for further policy analyses.
- Large-scale dynamic models of sub-systems (groundwater, rivers, estuaries) and management

19. Floating city knowledge project

Knowledge question and objective

The extensive municipal program, the high desirable densities, the mobility issue, the location in the delta metropole and problems with water, soil conditions and noise make the combination of building and water storage complex and diverse. In the vision of the Floating City Knowledge Group, the challenge for the Haarlemmermeer mentioned above demands a new integrated look at the spatial configuration.
The objective of this integral study is to come up with an innovative practical case and development path, that is geared to an integral sustainable vision of the Haarlemmermeer and generic knowledge development of concepts for water-conscious construction using a pilot project.

Contents of the project

The Floating City Knowledge Group announced its intention to develop the first floating city in the Netherlands with a consortium of public and private parties. The location will be Haarlemmermeer or its immediate environment. In order to realize this floating city many questions must still be answered. Not only is theoretical construction knowledge required; the parties must also learn from practical experience with such a new form of construction and urbanization.

For this reason the consortium intends to construct the first large-scale floating neighbourhood in the form of a pilot project. How the development path can be given concrete form in order to realize the pilot will be studied. The most important points of attention in the project proposal are geared to building in a municipal area with considerable demands on the available space while still creating enough space for water.

Collective new knowledge and competencies will be developed by combining knowledge and experience from public and private parties and knowledge institutions. This knowledge will also make an important contribution to strengthening the existing knowledge infrastructure dealing with the theme of 'wet urbanization in the municipal area'.

Water will be one of the important guiding factors in the new spatial planning for the Haarlemmermeer. New concepts will be developed for the low parts of the polder where a great deal of seepage occurs in combination with a considerable demand for urbanization. However, this is not restricted to new urbanization; it also applies to intensifying existing urban areas. Water-conscious construction is the motto here. In this context water-conscious construction means a construction method that can accommodate a changing water level and in so doing does not place any burden on the water storage capacity, contributes to the general water quality and also offers sufficient security during times of high water. In concrete terms this means a form of residences on floating bodies or on structures such as pilings, an elevated living surface, above ground crawl spaces and mounds that enable storage in the area in times of high water.
Moreover, retaining water in the area (structural storage) will mean a decrease in dehydration and will increase the quality of the water, which will benefit the eco-system in the polder. The goal is to achieve sustainable recovery of the water system based on these factors. There appear to be virtually no technical obstacles to living comfortably in a wet environment. There are technical solutions for collecting and removing household waste, installing public utility facilities and transportation. This means that water-conscious construction places less of a burden on the use of primary raw materials such as sand used for filling and it offers good opportunities for the application of sustainable energy.

A design in which red and blue and possibly green functions are stacked on top of one another, placing less of a burden on the scarce space in the Haarlemmermeer region. The three exponents of the multiple use of space (in the horizontal plane (2D), stacked (3D) and in time (4D) through including flexibility) will be to be intensively included; this will create new chances for architectonic design. An approach from the different landscape layers will contribute to sustainable spatial utilization.

Developing new techical, natural en socio-economic knowledge in parallel with the plan development will be indispensable. To accomplish this a strategic collaboration with social sciences and other projects within Living with Water will be concluded. By including the concrete problems that will be faced as the vision is translated into a concrete design, this knowledge will emerge based on demand. An attempt will be made to translate the learning experiences amassed in the process into a generic and transferable form. The development is bottom-up from the field rather than translating top-down from generic research to specific situations. The goal of this method is to develop an approach by which generic solutions and translation steps are developed, and to have the Haarlemmermeer serve as an example for the rest of the Netherlands.

Intensive collaboration of the private and public parties involved is needed in order to ultimately translate the vision into an executable plan. To do this a clear path from concept and plan development to project development must be translated into a clear process architecture. This must clearly specify the allocation of roles for the different participating parties, the stakeholders' responsibilities and how the financing for the consecutive phases can be set up. The knowledge group has developed some tentative models for this in collaboration with the PPS and Habiforum knowledge centre.

Intended result
A broad-based socially and economically responsible design vision for the Haarlemmermeer. A practical manual with concepts for water-conscious construction with a description of a clear process architecture**.**

This project will serve as a bridge project for the collaboration between the Delft Cluster and Living with Water

21. Instruments for (improving) trans-national catchment area management

Knowledge question and objective
International collaboration within the catchment areas of the Rhine, and in particular the Maas and the Schelde is a difficult task for water managers. The international collaboration that is increasingly necessary is hampered by institutional barriers. The recently adopted Water Framework Guideline has not been able to force a breakthrough in this area. Water managers tend to follow an even more nationally-oriented water management policy in order to demonstrate as quickly as possible that they are complying with the guideline. This attitude and approach does, however, increase the transparency of the management method and thus the exchangeability of information to a certain extent.
The dispute regarding collective international water management devolves into the following main points:

- Conceptual differences, in particular those involving quantitative and qualitative water management aspects.
- Administrative autonomy or the unwillingness to take on cross-border responsibilities and authorities via catchment area commissions.
- Standardization, normalization and reference frameworks.
- Differences in national legislation.
- Historical (political) and cultural differences.

There are a number of arguments for international research:

- The European guidelines.
- The increasing awareness regarding safety ("nature and man-made incidents").
- The increasing importance of sufficient amounts of clean water.
- The increase in the public support for effective collaboration.

The research must focus on:

- The institutional barriers and the factors that cause the failure of international catchment area management.
- Developing a process-oriented controlled approach geared to discovering the chances for and the strong points of collaboration based on this.

Contents of the project
A study of the (institutional) bottlenecks and barriers in the area of international (integral) catchment area management and the possibility of developing a process-oriented approach that can bring about trans-national collaboration in this problem area.
The possibility of organizational and administrative embedding guaranteeing cross-border aspects via trans-national public private collaboration (PPC). The use of the so-called PPC construction can eliminate the administrative dilemma caused when a catchment area has a trans-national scope, does not comprise an administrative entity and was in the past primarily the object of sectoral, frequently national attention.

Intended result
- An accurate description of the barriers and failure factors for the current initiatives in international catchment area management.
- A description of the opportunities the Dutch/Belgian/ French framework offers versus the Dutch/German framework.
- A description of so-called strategic paradoxes that form the basis for trans-national catchment area management.
- Guidelines for the design of a Trans-national Public Private Collaboration (PPC).
- A final report with recommendations.

22. Salinization problems in the low Netherlands

Knowledge question and objective
First rough model studies lead to the conclusion that most groundwater systems in the Dutch coastal areas are not even close to exhibiting a dynamic equilibrium. Even with a constant sea level the autonomous salinization process may take some centuries. The considerable difference between the sea level and the underlying polder land forces sea water into the aquifers at a high rate. The expectation is that salinization levels will increase dramatically. For the time being the autonomous development is the dominant factor, but increases in sea level and soil subsidence will certainly speed up the salinization process over the mid to long term. The distribution of sweet, brackish and salt groundwater in the Dutch coastal areas will thus be dramatically changed by the intrusion of salty groundwater, though the level and the scope of this is still unclear. Detailed analyses of the current salinization of the underground are only available at the local scale. An accurate estimate of the consequences of antropogenesis and natural processes on the distribution of sweet, brackish and salt groundwater for the near and distant future is not available.

Thus there is a need from those involved in the practical aspects of groundwater maintenance (national government, provinces, district water boards) to be able to predict the future effects of human intervention, climate changes and soil subsidence on the groundwater system in the Dutch coastal areas, e.g. in the framework of the Water Management for the 21st century, and to be able to offer solutions for this salinization problem. The integral water management must be modified accordingly, so that parties can anticipate the possible consequences for the mid to long term on a timely basis. While it is true that at the local level water managers have begun trying to identify this problem, as demonstrated by the Hoogheemraadschappen Uitwaterende Sluizen (the Large Geohydrologisch Study on Texel) and Rijnland (the Salt of the Earth study), but a structural and integrated approach is as yet not forthcoming.

Objective of the project
- Increase the knowledge of the hydro-geological and hydro-geochemical processes that lead to the salinization of the non-stationary density-dependent groundwater system in the Dutch coastal areas.
- Estimating the effects of human activities, climate change and soil subsidence on the groundwater system, and
- Coming up with solutions that make it possible to manage the effects of salinization.

Contents of the project
A study of the effects of changes in the groundwater system on the water maintenance, land use and drinking water supplies. The following consequences must be considered:
- Shrinking fresh water inventories in the dune areas (what is the current volume of the sweet water inventory in low areas of the Netherlands and to what extent and how quick is this supply changing?).
- The damage to sweet water fresh water lenses in the Holocene cover layers by soil subsidence and infrastructure work.

- Salinization of groundwater extraction points for the drinking water supply.
- Increased risk of salt damage to plants.
- An increase in the salinization in the low-lying polder areas of the North and West Netherlands with the consequence of more frequent flushing of waterways as well as greater seepage and salt contamination. The central theme in this project is thus the salinization problem. Distinguishing and identifying salinization and combating this is beginning to be given priority at all water management levels.

Intended result
- Calibrated model instruments for the non-stationary density-driven groundwater system in the lower areas of the Netherlands.
- Concrete measures (initially at the local level) to compensate for the salinization of the underground**.**

24. What about the peat areas?

Knowledge question and objective
The policy for the peat meadow areas is facing a dilemma:
- Continuing to drain these areas sooner or later leads to dramatically sinking agricultural areas with no peat.
- The peat areas can only be maintained by developing a marshy landscape.

Only the latter alternative can stop the destruction of the peat layer and the related soil subsidence. The question is whether and when stakeholders are prepared to make a fundamental decision regarding this dilemma. The goal of this project is to clearly and broadly present the consequences of that fundamental decision with images, figures and words.

The objectives of the project are to:
- Conduct an integral scenario study to analyze, map out and communicate the long-term consequences of draining peat meadow areas in the broad sense, which incorporates societal involvement and broad-based support for policy and design choices as effectively as possible.
- Increase the level of required knowledge regarding the (changing) relationship between water level management, agriculture and nature.
- Develop practical knowledge regarding the design, costs and financing options for water-neutral developments in residential, work and recreation functions and infrastructure in peat meadow areas.

Contents of the project
Integral long-term scenario study (including spatial design) for the peat bogs of the West Netherlands, that provides insight into the effects of different drainage strategies on the landscape, water maintenance, the use of space, nature and environment.
The mutual effects of the scenarios will be evaluated in terms of:
- Sustainability
- Societal costs and benefits. In the societal cost-benefit analysis economic, ecological and social factors are all carefully considered and the allocation of costs and benefits among the various stakeholders is clarified.

The scenarios will be described and evaluated and the appropriate spatial developments will be worked out interactively with the stakeholders in the area. Communication and creating visual images of the landscape for the various spatial scenarios is an essential element in this process.

The results can be applied as a basis for a fundamental societal and political discussion regarding the desires, the opportunities and the constraints for maintaining and developing peat meadow areas as landscape and the role of the stakeholders in this.

To provide additional foundation for the scenario and the evaluation study:
- Supplemental university studies will be conducted, which focus on filling in the most important gaps in scientific knowledge in the area of (changes in) functions, water management and the development of the peat soil, and the policy development with regard to the peat bogs (dealing with the uncertainty in the planning).
- For concrete situations design and construction options are detailed for water-neutral forms of construction and infrastructure in peat bogs.
- Financing options will be studied with which water-neutral developments in peat bogs could be realized.

Intended result

- Create detailed images and gain insight into the consequences (including the costs and benefits) of spatial, long-term developments in the peat bogs of the West Netherlands: provide a compass for spatial policy and water management for both the short and long term; the images as an instrument for societal participation in the long-term vision for the peat meadow areas.
- Insight into the throughput time for the scenarios and possibilities for phasing the spatial strategies and measures.
- A stronger knowledge network and increased knowledge and insight among the stakeholders in society.
- Generic evaluation method (MCA, MKBA) for integral weighing of the economically quantifiable and non-quantifiable costs and benefits over the long term.
- Fundamental knowledge development regarding the effects of changing water level management in peat bogs on the soil and soil processes.
- Possibilities for developing knowledge development geared toward practical applications for combining the function nature/water and agriculture/water in peat bogs.
- Knowledge development geared toward practical applications and concretely detailed spatial options for water-conscious development for residential, work and recreation functions and infrastructure in peat bogs.

33. Water economics: direct and indirect value of multi-functional water usage at the catchment area level

Knowledge question and objective

Water has purposes other than direct consumption by human beings. Water plays a very important role in different production processes in our economy. Water has more hidden value. The generally public character of water is part of the reason that there is either no existing market that trades in water, and thus no market price that reflects the relative scarcity of water, thus existing markets are imperfect. In order to promote an economically efficient allocation of enough water of the desired quality we need more insight into the socio-economic value of water for these different objectives. Quantifying these values in economic terms would likely lead to better decision-making - based on economic efficiency – by Dutch water managers and more efficient operation of the regional and national economies.
The primary objective of this project proposal is to develop and implement an integral water and economy 'model' that shows the interactions between water and the economy at different relevant scale levels for policy and decision-making (regional, national and international catchment area). This can be seen as the technical track of the proposal.

A second objective of the proposal is to move the value of water higher on the political policy agenda and to ensure that it plays a full-fledged role in policy and decision-making, for example through generating authorised values for water for use in Societal Cost-Benefit Analyses for integral policy and management issues. This can be seen as the communication and process track of the proposal.

Contents of the project

Making the relationships between water and the economy visible should make the value of water for the regional and national economy clear. This involves both the direct value as well as the indirect value of water as a result of direct and indirect use. By making these relationships explicit it must be possible to make the use and management of water and the services that water provides to different societal and economic shareholders and sectors now and in the future more economically efficient and to predict future developments in the supply and demand of water-related economic functions ('water services') and their effect on the regional and national economies in order to support decision-making regarding the economically efficient allocation of water quantity and water quality.

Intended result

The end result will be an operational integral water economy model in which the relationships between water and the economy are shown at the regional, the national and the international-catchment area levels. The values of water that are calculated using this model must serve as input in Societal Cost-Benefit Analyses for policy proposals, policy scenarios or concrete water management issues. Specifically one could think of assessing the scope of the consequences of different policy scenarios of both water usage (supply and demand) as well as direct and indirectly related economic activities. Future supply of and demand for water services and their

economic consequences, such as those required in the framework of the EU Water Framework Guideline can also be specified with this model.

36. High water strategies Vecht/Zwarte Water

Knowledge question and objective
In a high water situation in the catchment area of the Vecht and the Zwarte Water, decisions must be made regarding the most desirable management strategy for each situation. Technical questions play a role in this, such as the effects of specific measures on water levels (retaining, storing, discharging), but also the co-ordination between and the authorities of the agencies involved.

The following knowledge questions are asked:
- Is it possible to develop a dynamic and interactive decision-making protocol for high water situations in the entire Vecht catchment area, with the objective of keeping extreme situations manageable by applying specific measures?
- Is it possible to include the three-pronged WB21 approach of retaining, storing and discharging as measures in the decision-making support system?
- What modifications need to be made in communication and to protocols to actually be able to control the water management in the Vecht catchment area with the help of a new decision-making support system?

The ultimate objective is to create an organisation structure of decision-making protocols to prevent problems caused by high water in the Vecht catchment area.
This organization structure and/or these decision-making protocols must be supported by a dynamic decision-making support system, which makes it possible to carefully consider decisions during every possible situation involving the operational water management under extreme circumstances. Disaster scenarios are thus prevented because different measures such as giving the water space can be carefully considered using tools such as BOS taking into account the societal and economic consequences of the locations selected.

Contents van the project
PHASE I – Definition phase.
PHASE II – Model development phase / BOS.
PHASE III – OS/BP implementation phase.

Technical knowledge regarding constructing and implementing a catchment-area-broad BOS.
Technical knowledge regarding constructing and implementing a catchment-area-broad high water model.
Knowledge of possible measures and related considerations (economic, social) regarding deploying these measures within the catchment area in case of extreme situations.

Gamma
Developing communication and control protocols among all the partners involved regarding water management in the entire catchment area during extreme situations.
The unique aspect of this project is that all physical (beta) knowledge is utilized for the social (gamma) aspects, ultimately resulting in a complete integration of beta and gamma.

From the beta side the knowledge is generated regarding the hydrological response of the water systems in the Vecht catchment area under different circumstances. From the gamma side the available knowledge is deployed to weigh all the interests involved in the catchment area under extreme situations.
Finally the knowledge fields of both disciplines are explicitly linked using management protocols to be developed in a BOS.

It is essential to understand that the beta knowledge makes no sense without the gamma knowledge, while conversely the gamma knowledge can only be deployed with sufficient beta knowledge. In this way this project directly addresses the practical questions of a water manager that involve both beta as well as gamma contexts and is faced with the challenge of delivering sustainable water management, also under extreme situations.
Not only is clarity regarding the effects of different measures under different extreme situations essential for good communication; harmonizing the authorities of and the co-ordination between the organizations during these extreme situations is also necessary. Investigating and applying the right communication protocols is thus an essential element of this project.

Intended result
The end result consists of three phase products:

- Phase I: a definition study of the organization structure and/or decision-making protocols together with the Decision Support System and the related decision-making protocols.
- Phase II: a dynamic BOS based on available geographic information and a (high water) model of the entire Vecht catchment area, which has yet to be developed.
- Phase III: setting up an organization structure/decision-making protocol, with a communication and decision-making protocol between all the parties involved for the water management in the Vecht catchment area in extreme situations.

38. Sustainable and water-conscious construction in Almere Hout

Knowledge question and objective
The goal of the project is to answer the following knowledge questions:

- How can a (residential) area be set up sustainably taking into account a changing social environment and water constraints (e.g. polder level, water quality, water management, precipitation)?
- Can a conceptual, generic framework be developed for such watery areas?

The objectives of the project are:

- Involving the water system at an early stage in the design of a new subdivision, for example, so as to reach a commonly supported exploration of possible innovative and sustainable paths for a solution for integral area development. Simultaneously conducting harmonization discussions with stakeholders regarding their desires and requirements for possibilities of the water system and the spatial allocation of the area.
- Developing a design for a (generic) framework for evaluation that can be deployed when developing a (new) urban development plan with the water system as a leading principle. This framework is drawn up based on a series of hydraulic constraints and principles that can be linked to societal desires and requirements, government policy and spatial planning issues so that they can be used in future development memorandums and plans.

Contents of the project
The following activities will be conducted during the project a package of guidelines, constraints and principles will be drawn up that provide a starting point for projects in which sustainable construction and development are integrally combined with water systems and water management. A (generic) framework for evaluation will help steer the harmonization and decision-making process in which the hydraulic constraints and principles are linked to societal desires and requirements and the spatial planning issues. Here it is essential that the water system is involved early during the development of a new subdivision, for example, to make a wide-ranging exploration of relevant innovative and sustainable paths for a solution for integral area development possible.

This innovative approach is characterized by involving the water system early in the process. This offers the possibility of finding scientifically responsible sustainable solutions for questions regarding the local and provincial water system - such as storage capacity (underground and/or in the surface water), (ground)water levels, safety, water quality, recreation, transport, etc, before actually allocating an area. These solutions together with the societal input determine the allocation measures for the area.

The (water-conscious) development of the first phase of Almere Hout is an outstanding project for learning about the preceding process and validating the guidelines and principles created in the process in practice. Experiences that are amassed while executing this project ensure that comparable projects can be conducted more efficiently in the future. In addition, it offers the chance to concretely apply the government policy as described in 'Water Management for the 21st Century' and in the VROM and LNV memorandums in the field so that an appealing example is generated.

The total project Almere Hout, from which the preceding pilot project is taken, involves the step-wise development of approximately 20,000 residences in Almere Hout for the coming decades. The approach to the development of these residences will be different from the standard VINEX process and norms.
A new contemporary integral and sustainable methodology based on the principle of water-conscious construction is being used. The process is an interaction between a multi-functional water system and the desires and requirements of the stakeholders in terms of the residences, nature, recreation and other functions. Constant

monitoring and harmonization guarantees a generic process during this preparatory phase and offers the possibility to quickly modify constraints at different scale levels based on changing insights.
For the design of Almere Hout the water system both behind (local) and in front of (provincial) the dikes is a crucial factor in further classification of the residential areas. The design must have a multi-functional character in order to accommodate the many functions that can have a direct or indirect influence. With a clever application of the water system, taking the lay of the land (the deepest part of South East Flevoland) and future anticipated soil subsidence into account, the durability of the residential environment can be increased using:

- Flexible and sustainable water management: integral management measures at different scale levels taking into account autonomous developments.
- Improved water quality and storage capacity: by linking the water system to the high or low water levels the storage capacity of the area increases and improved water quality is achieved due to better flow possibilities.
- Safety: breaks in the dike, increasing peaks in precipitation, the water level of the IJsselmeer, etc. Standardizing the dikes plays an important role here. Solutions for the safety of the local system can also be found outside this system at the provincial level.
- Open waterway connections: if there are no locks, etc. this stimulates the recreational use of the water system and links the city with the Almeerderhout forest.
- Socio-economic: living / working on the water, spatial dividing line, cityscape / experience.
- Ecological connection zone: a nature/culture landscape function.

For the actual, functional classification of the residential area the parties involved were consulted from the beginning of the plan formulation process; on the one hand the users: future residents, interest groups in the area of nature, the environment and recreation and developers, and on the other hand the managers of the wet and dry public spaces: Rijkswaterstaat, Staatsbosbeheer, the district water board, the municipality and the province. The objective was to change people's pattern of thinking from 'no wet feet' to 'living with water, and thus occasionally having wet feet (but then without damage)'.

Using an open communication structure the desires and requirements of the parties involved were clarified in terms of the functions living, working, facilities, green areas and recreation. Then per residential area a specific allocation of these functions was drawn up and linked to a water system in order to create as sustainable and integral a living environment as possible. By developing a broad range of different living environments, an important condition will be provided for a unique living, social and sustainable city.

The preceding results and explorations were specified using a 'Water Development Plan', which will be implemented into the municipal development plans later, as guidelines, principles and constraints for further classes of residential areas. In so doing a high level of flexibility is taken into account so that the parties can react quickly and adequately to future developments in the construction area, progressive insight and changes in desires and requirements of the interested parties.

Intended result

The results from the project will be collected in a 'tool box' from which a series of possibilities can be selected to create different living environments that take water, human beings, and the environment into account. These new allocation and design concepts are then socially and culturally desired and acceptable and simultaneously contribute to reducing the water problem. The principles and constraints can be incorporated by municipalities and provinces in the memorandums for separate development plans.

39. Living with rivers

Knowledge question and objective

The objective of the project is to come up with a related vision for controlling the risks of high water and spatial development (including landscape and nature) in the river areas and to incorporate the effects of this vision into a number of local/regional *'operating prototypes'.*

Contents of the project

To solve the high water problems people in the river areas are increasingly looking to the areas behind the dikes and the uniform security norms (chance of flooding) have been called into question. Parties are discussing emergency overflow areas, retention, compartmentalization, green rivers, etc. So far the consequences a new strategy poses for the spatial design, the spatial quality, and in particular the natural and cultural identity of the river landscapes have not yet been sufficiently identified. This requires a holistic generic approach, in which the dividing lines between the policy areas of V&W, LNV and VROM must be eliminated.

Intended result

The project will function as a bridge project to current research programmes and other ICES/KIS III knowledge projects such as:

- River area/River basins of the Delft Cluster and Ruimte en Klimaat.
- Fun at the river of NCR.
- Chances leading to risks and subsequently to chances again (KURK) of WL | Delft Hydraulics.
- Socially responsible protection against floods of WL | Delft Hydraulics.

49 Managing information flows and user participation in water management in Europe

Knowledge questions and objectives

The water quantity and – ecological – quality in the Netherlands is managed through a complex network of regulatory bodies and private organisations with a diverging range of interests at alternatively local, regional and/or (inter)national level. The distribution of tasks and responsibilities between these organisations is complex. Presently manifest effects from changes in climate and soil levels put pressures on the water system that increasingly exceed the coping capacity of the existing water management infrastructure. Similar climate induced pressures and effects are visible all over Europe (think of the heavy floods in Germany, Poland, Italy and France over the last years). However, some of them tend to accumulate towards the Netherlands where – as a typical delta-country – the outflow from multiple river basins in neighbouring countries comes together. This trans-boundary character adds additional complexity to the present demands on the existing water management infrastructure. In addition these various demands require a more 'entrepreneurial' attitude, for instance for drinking water companies to approach the market, or in regard to public private partnerships for nature development requiring new modes of governance. Finally, public awareness is growing for the threats from recent water management problems on the safety of built-up areas, as well as for the possibility to intervene in the water system for purposes of nature conservation and development. Non-governmental organisations and the public in general therefore increasingly demand a participatory role in the management of specific water areas and projects. The diverse and complex demands posed to water management described above urges to a careful evaluation, and transformation of the existing infrastructure to a modernised form of water management in the Netherlands that facilitates participation of multiple stakeholders and the general public. The program proposed here will contribute by applying a coherent set of methods to organize the knowledge on experiences and demands in this complex situation.

This program address the following research issues and questions:

1. Many international agreements and national regulations include sections on public access to information and the need of public participation in management plans. On what assumption do these declarations rest? How are they implemented in different institutional settings at the various scale levels?
2. An essential cornerstone of future policy plans is an adequate coordination within the complex water management system on the one hand, and between water management and other policy areas such as safety and environment on the other hand. This leads to the question of how the structure and expertise (including knowledge from, and access to analytical tools) of the network of water organizations does fit with the new challenges of (international) water management.

3. The communication with external parties outside policy requires new tools, however these are only useful if they include attention to the dominant issues in the perception of different stakeholders and the general public. How do new water management aims fit with the public image and communication efforts of water management organisations? Which processes of participation are effective in integrating various stakeholders in decision-making processes?

In this program an interrelated set of projects is proposed that addresses the relation between the water organisations, their expertise centres, their constituencies and the general public. These projects will help to understand the fundamentals of processes of organisation, participation and communication in water policy and management. This knowledge will be crucial for a framework for the transition to a participatory form of water management in the Netherlands.

Contents of the project

The program aims to design a framework for the transition to a more participatory form of water management in the Netherlands. The emphasis will be on the social dynamics in the transition process caused by the multiple stakeholders, and, on the processes through which participation and transparency can be assured. The success of the process depends on the regulatory conditions on the one hand, and the access to relevant technical information and modelling tools on the other hand. The project will therefore also address these issues and locates them in the international context.

The participatory transition framework will be developed and applied in three projects that cover two broad case studies, the logical choice would be coastal zone management and the management of rivers. The ambition is to use these case studies as a basis for generalising the framework such that it becomes feasible at different spatial scale levels.
The issues addressed above are studied in three projects. We separate the issues according to the expertise of the partners involved. The emphasis in our analysis above is on the dynamics of the transition and the increase of public participation. These projects will be joined in the mid phase through a coordinated study of two extended case studies. This is depicted in the project scheme.

1. *Communication, integration and information flows: a social and cognitive analysis of networks of actors and experts (FSW VU Groenewegen)*

This project is divided into two subprojects internal structure and communication. In social network analysis, it has been demonstrated that a careful social mapping of the organisations and communication linkages helps to understand the crucial issues of integration and powerful barriers to coordination and joint actions. Among these barriers are culture and cognitions of the management and experts of these organizations. In this project we will follow the connections between various organisations in the old and new policy domains, the background of the management system and experts of the organisations and the issues that influence their understanding. A mix of methods from social network analysis such a mapping of the contacts as well as the analysis of cognitive structures employed in understanding strategic issues. Such an analysis helps to understand the manner in which the need for expert knowledge and the manner in which this knowledge is organized maps on the strategic decision-making needs of the core organizations.
The relations internally cannot be regarded separate from the external image of organizations and the issues on which anticipation of the networked organizations is required. In current studies such issues are often not considered explicitly. In this project we will chart the way in which issues are perceived externally outside the domain of water management. One element will be content analysis of the water related issues in the national press, focused on the way in which issues such as flooding, and other risks central to water policy are perceived. In addition the association of the press of this news (positively or negatively) with the responsible organizations will be measured. The assumption is that news presentation is important in forming public opinion and that it is to a degree possible to develop communication instruments that help to form such opinions. The outcomes will be related to the intended goals of the organizations and through a survey of (local) public opinion on the same issues with outside perceptions.
The Department of Public Policy and Organization of the Faculty of Social Science has a research program in which network analysis and external stakeholders are the central elements. Within the faculty the joint responsibility for PhD training and a masters program in Policy, Communication and Organization guarantee close cooperation with the Department of Communication Science.

2. Public Participation Frameworks (IVM-Hisschemoller/Gupta)

The external pressures on organizations with public responsibilities are in the current age through public exposure a significant factor in their strategic choices. Many international agreements and national regulations include sections on public access to information and the need of public participation in management plans. On what assumption do these declarations rest? How are they implemented? The hypothesis is that many contradictory assumptions as regards the value of participation are reflected in these international agreements and national laws. Organizations responsible for water management are no exception. The need for water management organizations to understand their social environment and communicate with relevant groups is dominant. The choices that can and need to be made require timely interaction with important stakeholders takes place. The external pressures are direct, but also mediated through stakeholders. In the execution and design of policies moreover interests of other policy areas and societal domains needs to be taken into account. These pressures lead to experimentation with a number of different issues. One is the design of the policy process. The second is the degree of interaction with stakeholders and constituencies with regard to critical technical and management issues. This explicit acknowledgement of the need for interaction with the external context has led to a broad array of national and international experiments and participatory decision making and assessment projects. There are good arguments both in favour and against participatory monitoring. So, the study also assesses to some extent the conditions under which participatory monitoring becomes acceptable. However, this participatory practice is still emerging and insight in the necessary conditions and the type of (process and technical) instruments required in order to support the process and its contents is patchy. In the project proposed to deal with this issue the core is an analysis of the experiences with the combination of participatory decision making processes and the satisfaction with the results obtained.The core of this project is thus an evaluation of experiences in different cases of participatory policy making and monitoring in European countries. In the IVM specialisation in this area is at the core of many projects on environmental and water issues.

3. Access to information and analytical tools (IVEM-Potting)

A considerable body of information and analytical tools is available to evaluate water problems and to explore their solutions. Many of these tools have been developed in iteration with a specific field of water policy and management that they support (e.g. quality and quantity aspects at different scale levels). These tools look from very different angles and consequently explore very different aspects of water management that have to be implemented through very different regulatory and management processes at local, national and international level. Water managers are thus confronted with a complex, and sometimes even conflicting mix of tools and models. This subject aims to make present information and modelling tools available to stakeholders as a user-supported toolbox on internet for interactive consultation and evaluation.The project takes her basis in existing analytical tools and information. From a user point of view, it is of high interest to compare analytical tools with different modelling purposes and at different spatial scale levels in order to identify overlaps, differences and inconsistencies that first become visible in such a meta-level analysis. A meta study of available information and analytical tools for water management will be made. The overlaps and conflicts as well as the experiences with the various models will be taken into account and a proposal for adjustment and potentially integration in computer supported decision tools will be made. The latter will be tailored to the desired information flows and format requirements of the other two projects. IVEM will be the lead partner for this subproject. IVEM has a broad experience in system analysis at different and integrated levels, as well as in building user-supported computer-tools. The available information and analytical tools will be made available by active co-operation with water-experts and water-expert organisations in the field.

Intended result

PhD theses, workshop reports and a comprehensive book

50 Meanings of water

Knowledge questions and objectives

Water is associated with both positive and negative meanings. Positive meanings of water include not only beauty and recreation opportunities, but also health benefits, environmental quality and unique cultural values. Negative meanings of water include diverse threats such as pollution, drowning, and flooding. These meanings of water are to a large extent social constructions, determined by cultural processes. Therefore, meanings of water may change over time as circumstances change. For example, until the first half of the 20th century, water was predominantly associated with negative meanings. Due to government policy aimed at guaranteeing safety, water has become more and more associated with positive meanings.

Water can have different meanings for individuals and communities. Individuals tend to emphasize positive meanings of water, while communities are generally more concerned with negative meanings of water. These diverging perceptions may lead to conflicts between groups and individuals. For example, although it may be in the interest of a community to construct large barriers to protect an area from flooding, individual citizens may oppose against it because they regret the damage to the scenic quality of their living environment.

The proposed project aims at studying the positive and negative meanings of water at an individual and a collective level. In particular, the project will focus on situations where individual meanings conflict with collective meanings. In these situations, insight into the personal and cultural determinants of differential meanings of water is crucial to find effective solutions that combine the interests of individuals and communities.

Contents of the project

The project consists of four phases:

1. *Phase 1: Literature survey*
   Prior to the start of the emperical phases of the study a survey of relevant literature will be conducted. This survey will focus mainly on the state of the art of knowledge on the different positive (healt, recreation) and negative (danger and fear) values of water, cultural theory and theory on the social construction of values, and the link between individual attitudes and cultural and social values in general.
2. *Phase 2: Longitudinal diary study*
   The second phase aims to explore the meanings of water in the individual lifes of Dutch citizens. Respondents from different areas (e.g. coastal, river area, dry area) will be asked to record their water-reated activities and emotional states for a longer period of time (according to specific instructions). This phase will result in the identification of factors that underlie the positive and negative meanings of water in the lifes of individuals.
3. *Phase 3: Analysis of cases*
   The third phase is aimed at identifying the meanings of water at a community level. A number of cases in the past and present will be selected and analyzed. These cases will consist of 1) analyses of the meaning and use of water in the Netherlands in popular (film, songs) and high art (literature, paintings); 2) content analyses of policy papers and interviews with community representatives; 3) content analyse of newsitems in the media. This phase will result in the identification of factors that underlie the cultural meaning of water in Dutch society and positive and negative meanings of water for communities.
4. *Phase 4: field studies and simulation-games*
   In order to gain more insight into the combined meanings of water on an individual and collective level, we will conduct a field study in selected areas, linked to pilot projects from the program "living with water". Based on the results of previous phases, we will select 2 or 3 cases where watermanagement is to be implemented. These areas will differ in relevant social and physical characteristics. Individual and collective meanings of water will be analyzed by attending consultating meetings and conducting interviews with residents and community representatives (local policy-makers etc.). Based on the result form previous fases, a simulation game will be developed for a group-decision room. In this simulation strategies for coping with differences in meaning between individuals and communities will be examined.

Intended result

Knowledge based system containing conceptual framework and positive and negative meanings of water for individuals and groups. The knowledge based system can be used in interactive planning and will be complemented by a professionally made video documentary in which the findings will be illustrated to a broad audience of policy makers, water managers and the general public.

APPENDIX 7 BRIEF DESCRIPTION OF OTHER PROJECT PROPOSALS

In order to give an impression of the intended width and depth of the Living with Water programme, this Appendix includes brief description of the other project proposals that have been submitted in addition to the bait projects more extensively described in Appendix 6. The numbering of the projects is the same as the numbering used in the previous Appendices.

1. 2x3 project (two sectors, three layers)

This objective of this project is to create a Decision Support System to improve the introduction of spatial planning elements into water management. The correct tool will also advance the collaboration between the two sectors. Moreover, it will ensure the correct link between the three relevant layers of underground, infrastructure and functions.

2. Aquasauris

Aquasauris is an intelligent library system for the development and implementation of river basin management plans. Data, knowledge, and results of previous studies for a specific area can easily be stored, retrieved and analyzed in Aquasauris. The data required for river basin management is diverse, varies in spatial and temporal resolution, is contained in a variety of data carriers and is widely distributed. Furthermore the development and implementation of management plans generally takes several years and involves a number of people. Auqasauris is being developed to assure that the data and knowledge used for the development of these plans is consistent in time and is based on all available information. Planners, policy makers and scientists will use the system extensively. Applications for other areas of water management is clear.

4. Transferring functions to the sea

This project includes three topics related to the transfer of functions to the sea:.

- **Sustainable energy**
  An investigation into the possibilities and the consequences of various forms of energy generation at and in the sea.
- **Marine construction**
  An investigation into the social, economic and ecological pros and cons of marine construction versus construction on land.
- **Marine farming**
  An investigation into the possibilities for the sustainable production and use of aquatic biomass along the coast, in estuaries and in the North Sea.

5. Innovative water management in the Betuwe area

The objective of this project is to develop one or more pilot projects with resilient and innovative water systems by adequately incorporating new economic opportunities and values into them.

8. Decision support for participatory water management in the Netherlands

Decision support systems have been developed to support such processes in the field of water management. The use of these systems in participatory decision processes is not always successful. There is a need to better tune the development and use of decision support tools with the design and management of the participatory processes they aim to support. This research will focus on the role of the 'Planning kit flood management Rhine branches' in the planning process in order to improve the design and management of both the participatory process and the decision support tool. The input of TU-Delft will focus on process design and process management (viewpoint of policy sciences, multi actor systems), IVM will focus on the set-up of decision support (view-point of plan design, evaluation and comparison) whereas the input of WL | Delft Hydraulics will focus on the development and use of decision support systems (viewpoint of 'consultancy practice').

9. Ilperveld integral

The goal of this project is to establish a new water level management in the peat-meadow area of the Ilperveld in order to comply with the ever increasing bottlenecks in agriculture and nature.

10. National and regional, in interaction optimal
The goal of this project is to establish an adequate connection between national investigations and regional planning processes. One important tool is the *Building blocks concept*, with which relevant information from national studies will be systematically stored and made available to stakeholders who are involved in planning in the framework of 'Space for the Rivers'.

13. Knowledge networkMultiple use of space with water in the West of the Netherlands
The knowledge network is a collaboration of a group of water management experts who, though they all have their own interests, share a common interest or passion. The objective is to exchange knowledge, insight and experience based on specific projects and thus learn together and develop a new common practice on the basis of the amassed knowledge.

16. Perspectives in integral water management
The main objective of this project is to analyze various water management strategies in relation to varying future climate and social conditions, in order to be able to identify robust water management strategies.

17. Pilot projects for Multiple use of space with water in the West of the Netherlands
The primary objective of this project is to develop and the exchange knowledge and experience regarding implementation projects that focus on the multiple use of space with water storage between the parties involved in the provinces of Utrecht, Noord-Holland and Zuid-Holland.

18. Using processes and technology for a best possible water system
The goal of this project is to facilitate the planning process with an integrated selection of the model or the decision-making tools to be used in the planning process as the central theme.

20. Statistics regarding extreme precipitation in the Netherlands
A description of the present precipitation situation in the Netherlands in spatially relevant parameters. This is relevant for practical applications such as the design of dikes, the dimensioning of discharge systems and sewers, the implementation of infrastructure components and the design of rural areas.

23. The values of water: a basic principle for urban and rural water management
This project is designed to create a structure for the valuation of water management measures at various scale levels. This project regarding water as a base for urban and rural water management is a sequal to the NIDO project 'values of water'. The values of water will be made explicitly clear on the basis of a case study of the city of Leeuwarden.

25. Influence of water storage on the quality of water, soil and spatial planning
The goal of this project is to investigate the influence of water storage on the quality of both water and the soil by mapping possible bottlenecks and solutions qualitatively and ultimately quantitatively in a number of concrete pilot projects.

26. Platforms for regional water management
This investigation will focus on the monitoring of five pilot platforms. The investigation will consist of a combination of practical studies and theoretical/scientific knowledge regarding communication and innovation.

27. The influence of a green harbour on a blue flag
This project focuses on linking coast-oriented investments for tourism, for example, to the availability of clean beaches, eventually leading to the optimum implementation of a new EU directive for ship-related waste.

28. Creative dredging
This project will provide insight into the extent to which certain new forms/strategies of mineral extraction at sea (sand and gravel) may contribute to higher natural values on the North Sea and in the coastal area. The possible positive effect on shellfish and fishery on the bottom is one of the specific points of attention.

29. Health of the North Sea and the Wadden Sea
Elaboration of the indicators that reflect the 'health' of the North Sea and the Wadden Sea to be used to illustrate the effect of interventions.

30. Nature, safety and shellfish
Creating new function combinations: nature compensation, safety and marine culture.

31. Water retention and nature
This project focuses on the combination of water retention and nature. This may involve converting agricultural areas into nature/retention areas as well as allocating water retention as an addition function for existing natural areas. The central issue is how can nature be best protected and/or developed in these areas?

32. Future exploration "Ocean farming – sustainable use of the sea"
The goal of this project is to create space for the resources of the North Sea and the coastal areas. How can the natural dynamics and the enormous variety of marine processes and raw materials be converted into 'sustainable salty values' for consumers and citizens?

34. Low water country ICES/KIS RvW|WvW
The goal of this project is to provide water managers with tools for adequate decision-making in times of extreme drought. The project is also intended to provide tools and instruments to address the effects of drought with measures used in regular water management. During low-water periods decisions have to be made regarding water distribution (values of water) and when making decisions regarding the policy, design and management of water systems choices have to be made regarding water distribution (value of water) and the way in which the use of space can be integrated (space for water).

35. The Blue Head
Design and implementation of a water-rich nature and recreation area of approximately 60 ha in the 'Waterlandse veengebied', bordering the north of the city of Amsterdam.

37. Fun at the river (Freude am Fluss)
The goal of this project is to contribute to the acceptance of 'Space for Water' measures in the river area at the international level by setting up an interactive planning process together with all stakeholders.

40. From opportunity control to risk control in case of flooding of the rivers upon increasing risks of high river discharges.
Elaboration of the possibilities for anticipating 'Living with Water'. How can river management be shifted from thinking in terms of chances (applying safety standards) to thinking in terms of risks (take flood damage into account) and how can we identify and use the new opportunities that emerge as a result?

41. Socially responsible protection of dams and dikes along rivers in view of the increasing risks of high river discharges
Determining the optimum protection level of dams and dikes along rivers with the risk of increasing discharges (as a result of climate changes) taking into account the costs of measures on the one hand and the benefits (economic and other damage that can be avoided) on the other.

42. Integral measures for controlling the problems related to the contaminated sediments in the Bitterfeld/Wolfen region
This study involves a case study into high water problems in the Bitterfeld/Wolfen area (Germany). It will focus on solutions to the problems caused by contaminated sediment in case of flooding during periods of high water as well as on reducing the migration of contaminated compounds from the groundwater and on the possibilities for creating a peak retention area for the high water wave in the context of the measures chosen.

43. Evaluating urban water plans
The objective of this project is to evaluate urban water plans. Increasing urbanization and climate changes demand an integral approach to water management now more than ever. Therefore the synergy between water management and other fields of policy as well as the collaboration between public and private parties is high on the agenda. In this respect quite a number of urban water plans have been implemented in recent years. The research project will describe the practical experiences gained with these plans, assess them and make them

available with the help of a framework for evaluation that has been developed by the same stakeholders in a prior Delft Cluster project.

44. Transition to sustainable urban water systems
An analysis of the need for water and water systems in urban areas and the possibilities for providing these in a sustainable manner, taking into account the shortage of water in an area and/or the value of water for other applications.

45. Farming with water
We propose a possible pilot for ICES/KIS-3 in the region of Vallei and Eem. In this region the Platform Vallei en Eem, a platform of local farmers, and the Waterboard Vallei en Eem are looking for possible combinations of water management and agricultural use. The intention of the project is to formulate a concrete proposal for multiple use of limited space by farmers and water managers. A quick scan of possible locations for water reveals that near the eastern border of Leusden a location exists with potential for this pilot. Local farmers are willing to cooperate under certain conditions.

46. FEAST (administrative and legal FEASibility Tool)
Within ICES/KIS 'Values of Water' a range of proposals is being developed that will improve ways to deal with the challenges in modern water management. The feasibility of these proposals is determined by various aspects, obviously including technological and economic ones. We assume that the proposal developers are already taking these aspects into account.

47. Space for new administrative arrangements
Space for water cannot be realized without adequate institutional arrangements and without room for daring initiatives that loosen the constraints on existing institutions. A lot of things are happening in this respect, as demonstrated by a multitude of policy efforts and new forms of collaboration and participation.

48. Rolspellen en communicatie: de water voor ruimte methodiek als middel voor communicatie
In besluitvorming zijn op hoofdlijnen twee manieren aan te wijzen: decide, annouce & defend (DAD) en dialogue decide & deliver (DDD). In het eerste geval wordt het initiatief door de besluitende partner bedacht en besloten. Vervolgens wordt geprobeerd draagvlak te verwerven in een communicatietraject. In het tweede geval wordt eerst een dialoog gestart met een aantal stakeholders.

APPENDIX 8 CONCEPT OF THE ASSESSMENT FRAMEWORK FOR PROJECT SELECTION

Table 8.1 Assessment criteria for the selection of Living with Water projects

No	Project name	Brief survey	Contact		
1					
	Additional information				
	Theme	Steering/communication/appreciation/physical systems			
	Assessment criteria		Scores		
			1	2	3
	Factual assessment				
	Social relevance	The topic is very relevant			
	Demand-driven	Not quite; knowledge-requiring parties are not sufficiently involved			
	Relevance to the RvW mission	Very relevant			
	Innovative character of the proposal	Limited			
	Scientific standard	Will be o.k. with Ph.D. students and adequate supervision			
	Integration of technical, natural and socio-economic sciences	The consortium leader is capable of achieving this, but it is not sufficiently clear from the proposal			
	Citizen participation	Not yet included			
	Feasibility of the possible solutions	Should be possible			
	International component				
	Foreign partners	None			
	Export position	Only if international partners are involved			
	Risk profile				
	Chances of success	Fairly good			
	Chance the results will be implemented	Fairly good			
	Consortium composition				
	Quality of the consortium leader	Good			
	Consortium coverage	Not yet included. Province has been specified but not yet involved. Input primarily from Ph.D. students			
	Consortium capable of realizing project results	Depends on the definitive composition and specifically on the input of knowledge requiring parties			
	Financing				
	Is the financial commitment sufficient?	Not yet clear			
	Project relevant to the ICES stimulus	Stimulus useful to get the right parties to the table			
	Knowledge transfer				
	Is the knowledge transfer sufficient?	End users have not committed themselves yet			
	Quality of the proposal	*Proposal needs to be refined*			
	Selection				
	Selected as Decoy project	No			
	Other remarks	Overlaps and fits in with the 'Watertest'			
		Should be linked to one of the planning process projects			

N.B. Scores ranging from 1 to 10

APPENDIX 9 DESCRIPTION OF THE BRIDGE PROJECTS

The Delft Cluster, Ruimte voor klimaat and Living with water agreed to harmonize their projects regarding a number of area types. In case of a 20% overlap of fields of attention it has been agreed to identify a so-called bridge programme for this part. Four area types qualify for this, namely:

- Coast and sea.
- River area.
- Peat-meadow area.
- Urban areas.

For each of these areas the knowledge themes and the research questions have been exchanged and harmonized. These can be found in Chapter 3 and in Appendix 3. Because of the special character of these bridge programmes the common field of attention has been elaborated in the Appendix at hand.

Coast and sea

The problem definition for the bridge projects in the Coast and Sea areas has been described in Appendix 3 and in project 15 in Appendix 6.

The objective of the Coast and Sea bridge programme

The objective can be describes as:
Strategic knowledge development to obtain social support for decision-making and measures regarding the sustainable use and design of coastal areas.

More specific:
Developing integral weighing frameworks and weighing methodologies for:

- Strategies for multiple use of space in the coast and sea areas and in the estuaries, which are robust in the light of climate changes and the rising sea water level.
- Adaptation strategies for the effects of the rising sea water level in the coastal areas.

Contents and results of the Coast and sea bridge programme

With respect to the coastal area the bridge programme will have to address the following issues:

- Integrated Assessment: a participatory process of dealing with complex issues, which involves combining, interpreting and communicating knowledge from scientific disciplines and stakeholders, such that integrated insights are made available to decision-makers. The following elements are foreseen:
    - Participatory (planning process) techniques and methods.
    - Socio-cultural and socio-economic appreciation techniques and methods for the long term, which will put climate-driven changes in perspective with relation to other developments.

  Resulting in:
    - Integral participatory assessment frameworks
- Strategy / scenario development for:
    - Multiple use of space at sea, in coastal areas and in estuaries as an answer to spatial pressure.
    - Adaptations in the coastal area as an answer to climate pressure.
- An analysis of the robustness of these strategies.
- The nature and the perception of various time and space scales in the natural coastal system and the socio-cultural, socio-economic and political-administrative coastal system, including:
    - A further analysis of various phases in the policy cycle from development to implementation and evaluation.
    - Regional differentiation.
- The role and the responsibilities of - plus the interaction between - the various stakeholders.
- An accessible information infrastructure as a tool for communication and data and knowledge management (link with the Ruimte voor Geo-informatie programme).

Summarizing the objective of the bridge programme coastal areas is to produce:
- Common understanding.
- Lessons learned in participatory policy making.
- A negotiated knowledge base.
- A frame of reference / framework for valuation.
- Strategies / scenarios for adaptation.
- Strategies / scenarios for multiple use of space.

Bridge projects Coast and sea
So far the following bridge project has been identified for the Living with Water, Delft Cluster and Ruimte voor Klimaat programmes: *Participatory Integral assessment of the Multiple use of space at sea* **MeRGe:**
This project has been described in Chapter 6 under number 15. This project could be combined with project number 4 (see Chapter 7).
Following the start of the programme, the project ideas as described under numbers 1 and 8 and perhaps 28, 29 and 32 may possibly be included in the coast and sea bridge programme, as well.

River area

An extensive problem definition of the river area can be found in Appendix 3.

The objective of the River area bridge project

Within these bridge projects researchers from various disciplines, users of the developed knowledge, managers and interested parties are brought together to jointly identify the possible solutions for a sustainable design of the river area and to prepare the required knowledge for decision-making and elaboration of these solutions.
The initiators are invited to form consortia for the elaboration of visionary projects regarding the possible future (re-)design of the river area in relation to the social problems regarding safety, mobility and liveability.

Contents and results of the River area bridge programme

In its turn, each of the bridge programmes will contribute to:
- Continuous identification of questions regarding the development of fundamental technical, scientific and socio-economic knowledge.
- Visionary solutions for future problems.
- Integration of the α-, β- en γ-components in δ-competencies and integration into research/the field.
- Study and design at the feasibility level for infrastructural solutions, devoting attention to participatory and political decision-making, social and spatial integration, the economy, environment, technology and implementation.

The bridge projects are realized in mutual collaboration from the various programmes. The bridge groups are responsible for the harmonization.

Topics for bridge projects include:
- Multiple use of space in the river area.
- The risks and acceptability of flooding.
- The arrangement of retention areas and emergency overflow areas.
- Ecological main structure rivers.
- The relationship between climate and river discharge, the origin of high water levels.
- Floating infrastructure.
- Omputten and re-use of soil.

So far the following project proposals for bridge projects have been identified:
- Fun at the river (Freude am Fluss) project number 37.
- Living with rivers, project number 39.

Furthermore project 41 also qualifies for collaboration in this field with the Delft Cluster.

Peat meadow areas

The problem definition for peat meadow areas can be found in Appendix 3.

The objective of the Peat meadow area bridge project

Each of the three programmes includes projects regarding peat-meadow areas. There is a common problem definition, but the knowledge questions and the objectives are accented differently per programme:

- Ruimte en Klimaat investigates the influence of design variation on CO_2 and CH_4 emissions and thus on the climate.
- Living with Water focusses on integral scenario development, the value (economic and social) of the design varieties, the process development for and the communication with the parties involved (including farmers and citizens), the administrative organization and the development of tools.
- The Delft Cluster investigates technical scientific issues: Knowledge of the relation between water level management, land use, groundwater flow and soil processes in peat areas, in relation to possibilities and threats for agriculture, and nature, and knowledge regarding construction options for water-neutral forms of construction and infrastructure in peat areas (such as eco-engineering).

This shows that the output of one programme becomes the input for another programme.

Contents and results of the Peat meadow area bridge programme

The bridge projects often include a systematic comparison of design varieties in order to shine a clear spotlight on the long-term options on behalf of all the parties involved. On the one hand, this implies a scientific inventory of the effects in terms of climate, nature, and water. On the other hand it implies an open dialogue dealing with planning possibilities with the (local) parties involved based on scientific insights. This dialogue will make clear what the dilemmas regarding the spatial arrangement involve. Moreover, it will facilitate a process of substantiated selection. A structured approach that focuses on the long-term perspective is expected to contribute to gaining support for an open dialogue among social organizations and the local parties involved.

The results are often long-term scenario studies (including spatial designs) for the peat areas in the western part of the Netherlands, with which insight is obtained into the long-term effects of various dehydration strategies on the landscape, water management, nature and the environment. The scenarios plus the accompanying spatial developments are described and evaluated interactively with the stakeholders in the area. Communication and the visual imaging of the landscape of spatial scenarios are an essential element in this process.

It will be possible to apply the results as a basis for a fundamental social and political discussion regarding wishes, opportunities and constraints for preserving and developing peat-meadow areas as landscape and the role of the stakeholders in this regard.

So far the following project proposals for bridge projects have been identified:

- What about the peat areas? Project number 24
- Possibly in combination with Ilperveld Integral (project number 9) and The Blue Head, project number 35.

Urban areas

The problem definition can be found in Appendix 3. No extensive bridge programme has been described for this area type. However, the 'Floating City' knowledge project, project number 19 (see Appendices 3 and 6), does give an adequate idea of the objective, the contents and the results of bridge projects for this area type. Consequently this project has been selected as a bridge project for the Delft Cluster and Living with Water. This will also involve collaboration with Habiforum.

APPENDIX 10 FINANCIAL OVERVIEW

1. Loonkosten			**Jaar :**	**-- 1 --**			**Jaar : -- 2 --**				**Jaar : -- 3 --**			
Functie	Aantal uren	Tarief	p u/p d	Totaal	Aantal uren	Tarief	p u/p d	Totaal	Aantal uren	Tarief	p u/p d	Totaal
Programmadirecteur	950	77	p/u	73.181	950	80	p/u	76.032	950	83	p/u	78.883
Programmasecretaris	1.056	70	p/u	73.920	1.056	72	p/u	76.032	1.056	75	p/u	79.200
1e technisch secretaris	1.155	58	p/u	66.990	1.155	60	p/u	69.300	1.155	62	p/u	71.610
2e technisch secretaris	495	64	p/u	31.680	495	66	p/u	32.670	495	68	p/u	33.660
3e technisch secretaris	495	64	p/u	31.680	495	66	p/u	32.670	495	68	p/u	33.660
Secretariele ondersteuning	1.650	36	p/u	59.400	1.650	37	p/u	61.050	1.650	38	p/u	62.700
Secretariele ondersteuning	825	28	p/u	23.100	825	29	p/u	23.925	825	30	p/u	24.750
Financiele ondersteuning	800	36	p/u	28.800	800	37	p/u	29.600	800	38	p/u	30.400
Communicatie	200	36	p/u	7.200	200	37	p/u	7.400	200	38	p/u	7.600
Facilitaire dienstverlening	75	28	p/u	2.100	75	29	p/u	2.175	75	30	p/u	2.250
		- Jaar 1 -		398.051		- Jaar 2 -		410.854		- Jaar 3 -		424.713
2. Arbeidskosten												
Functie	Aantal dgn	Tarief	p u/p d	Totaal	Aantal dgn	Tarief	p u/p d	Totaal	Aantal dgn	Tarief	p u/p d	Totaal
- Bestuur	60	480	p/d	28.800	60	500	p/d	30.000	60	520	p/d	31.200
- Wetensch Adviesraad	130	480	p/d	62.400	130	500	p/d	65.000	130	520	p/d	67.600
- Kennismotor	34	580	p/d	19.720	34	600	p/d	20.400	34	620	p/d	21.080
					0							
		- Jaar 1 -		110.920		- Jaar 2 -		115.400		- Jaar 3 -		119.880
Opslag voor algemene kosten												
Omschrijving	Kstn 1 en 2		Opsl %-age	Totaal	Kstn 1 en 2		Opsl %-age	Totaal	Kstn 1 en 2		Opsl %-age	Totaal
Totaal loonkosten	398.051		50%	199.025	410.854		50%	205.427	424.713		50%	212.357
Totaal arbeidskosten	110.920		50%	55.460	115.400		50%	57.700	119.880		50%	59.940
		- Jaar 1 -		254.485		- Jaar 2 -		263.127		- Jaar 3 -		272.297
Totaalbegroting Programmabureau Leven met Water			- Jaar 1 -	**763.456**			- Jaar 2 -	**789.381**			- Jaar 3 -	**816.890**

Programmabureau "Leven met Water"		
Begrote Kosten :	- Jaar 1 -	763.456
	- Jaar 2 -	789.381
	- Jaar 3 -	816.890
	- Jaar 4 -	841.039
Totaal begroot :		3.210.766

Projectcommitment met financiën

Nummer	Projectnaam	Bedrijfsnaam	Bedrag (€)
3	Bergen aan de bron	Waterschap Mark en Weerijs	55.000
3	Bergen aan de bron	Provincie Noord-Brabant	55.000
3	Bergen aan de bron	Hoogheemraadschap van West-Brabant	55.000
3	Bergen aan de bron	Nederlands Instituut voor Toegepaste Geowetenschappen	135.000
3	Bergen aan de bron	Ministerie van landbouw, natuurbeheer en visserij	
4	Duurzaamheid in de Nederlandse delta	Nederlands Instituut voor Toegepaste Geowetenschappen	120.000
7	Grenzen aan de burgerparticipatie?	RIZA	
11	Water vraagt besturing & Interactieve uitvoering	Universiteit Twente	
12	Interactieve planvorming en kosten-baten bij GGOR	Nederlands Instituut voor Toegepaste Geowetenschappen	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Provincie Drenthe	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Provincie Overijssel	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Provincie Fryslân	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Provincie Groningen	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Waterschap Noorderzijlvest	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Waterschap Hunze en Aa's	65.000

12	Interactieve planvorming en kosten-baten bij GGOR	Waterschap Reest en Wieden	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Waterschap Velt en Vecht	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Waterschap Groot Salland	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Wetterskip Laurenswâlden	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Waterschap Sevenwolden	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Wetterskip Boarn en Klif	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Wetterskip de waadkant	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Wetterskip Fryslân	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Wetterskip Marne-Middelsee	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Waterbedrijf Groningen	
12	Interactieve planvorming en kosten-baten bij GGOR	Waterleiding maatschappij Drenthe	
12	Interactieve planvorming en kosten-baten bij GGOR	TAUW	65.000
12	Interactieve planvorming en kosten-baten bij GGOR	Royal Haskoning	65.000
13	Meervoudig Ruimtegebruik met Water in West-Nederland	Provincie Noord-Holland	
14	Ruimtelijke planvorming en watersystemen in het Regge en Dinkel gebied	Nederlands Instituut voor Toegepaste Geowetenschappen	185.000
14	Ruimtelijke planvorming en watersystemen in het Regge en Dinkel gebied	Accanto	
14	Ruimtelijke planvorming en watersystemen in het Regge en Dinkel gebied	Waterschap Regge en Dinkel	123.000
14	Ruimtelijke planvorming en watersystemen in het Regge en Dinkel gebied	WL|Delft Hydraulics	
15	Duurzaam meervoudig ruimtegebruik op zee	Alkyon	200.000
15	Duurzaam meervoudig ruimtegebruik op zee	TNO	75.000
15	Duurzaam meervoudig ruimtegebruik op zee	RIVO	75.000
15	Duurzaam meervoudig ruimtegebruik op zee	TNO Inro	300.000
15	Duurzaam meervoudig ruimtegebruik op zee	Universiteit Twente	40.000
15	Duurzaam meervoudig ruimtegebruik op zee	RIKZ	1.250.000
15	Duurzaam meervoudig ruimtegebruik op zee	Hulsbergen Hydrailic Innovation and Design	60.000
16	Perspectieven in Integraal Waterbeheer	ICIS/Universtiteit Maastricht	63.340
16	Perspectieven in Integraal Waterbeheer	KNMI	11.000
16	Perspectieven in Integraal Waterbeheer	Universiteit Utrecht, Faculteit Ruimtelijke Waterschappen	295.000
16	Perspectieven in Integraal Waterbeheer	Carthago	72.000
16	Perspectieven in Integraal Waterbeheer	WL|Delft Hydraulics	16.800
16	Perspectieven in Integraal Waterbeheer	Nederlands Insituut voor Toegepaste Geowetenschappen	150.000

17	Pilotprojecten Meervoudig Ruimtegebruik met Water in West-Nederland	Provincie Noord-Holland	
19	Toekomstvisie Haarlemmermeer	Consortium Drijvende Stad	
21	Instrumenten voor (de verbetering van) Transnationaal stroomgebiedbeheer	Cap Gemini/Ernst & Young	30.000
21	Instrumenten voor (de verbetering van) Transnationaal stroomgebiedbeheer	Witteveen+Bos	30.000
21	Ondersteuning transnationale vorming van stroomgebiedsbeheers-plannen	Cap Gemini/Ernst & Young	10.000
22	Verziltingsproblematiek Laag Nederland	Vrije Universiteit Amsterdam	1.212.000
22	Verziltingsproblematiek Laag Nederland	Nederlands Instituut voor Toegepaste Geowetenschappen	455.000
22	Verziltingsproblematiek Laag Nederland	Ministerie van landbouw, natuurbeheer en visserij	
22	Verziltingsproblematiek Laag Nederland	Witteveen+Bos	77.500
22	Verziltingsproblematiek Laag Nederland	Provincie Zeeland	
23	Waarden van Water	Alterra	
23	Waarden van Water	Provincie Fryslân	
24	Waarheen met veen?	Vrije Universiteit Amsterdam	400.000
24	Waarheen met veen?	RIZA	
24	Waarheen met veen?	RIVM	200.000
24	Waarheen met veen?	Uitwaterende Sluizen	
24	Waarheen met veen?	H+N+S Landschapsarchitecten	
24	Waarheen met veen?	In Natura	
24	Waarheen met veen?	Universtiteit Utrecht, Copernicus Institute	576.000
24	Waarheen met veen?	Centrum voor Landbouw en Milieu	
24	Waarheen met veen?	Universtiteit Utrecht, Faculteit Biologie	
24	Waarheen met veen?	Provincie Noord-Holland	
24	Waarheen met veen?	Nederlands Instituut voor Toegepaste Geowetenschappen	
24	Waarheen met veen?	Ministerie van landbouw, natuurbeheer en visserij	
24	Waarheen met veen?	Alterra	50.000
24	Waarheen met veen?	Instituut voor Milieuvraagstukken	
24	Waarheen met veen?	De Stichtse Rijnlanden	
24	Waarheen met veen?	Vereniging Natuurmonumenten	
24	Waarheen met veen?	Royal Haskoning	
24	Waarheen met veen?	Provincie Utrecht	
24	Waarheen met veen?	LEI	10.000

33	Directe en indirecte waarden van multifunctioneel watergebruik	RIZA	
33	Directe en indirecte waarden van multifunctioneel watergebruik	Vrije Universiteit Amsterdam	300.000
33	Directe en indirecte waarden van multifunctioneel watergebruik	Centraal Bureau voor de Statistiek	
33	Directe en indirecte waarden van multifunctioneel watergebruik	RIVM	
33	Directe en indirecte waarden van multifunctioneel watergebruik	NIDO	
33	Directe en indirecte waarden van multifunctioneel watergebruik	LEI	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	DHV	100.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	RWS directie Oost	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	Waterschap Reest en Wieden	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	Waterschap Regge en Dinkel	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	Waterschap Groot Salland	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	Waterschap Velt en Vecht	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	Provincie Drenthe	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	RWS directie Ijsselmeergebied	10.000
36	Hoogwaterstrategieën Vecht/Zwarte Water	Provincie Overijssel	10.000
38	Duurzaam en waterbewust bouwen in Almere Hout	RWS Bouwdienst/WIS	16.000
38	Duurzaam en waterbewust bouwen in Almere Hout	Waterschap Zuiderzeeland	8.000
38	Duurzaam en waterbewust bouwen in Almere Hout	DHV	100.000
38	Duurzaam en waterbewust bouwen in Almere Hout	Gemeente Almere	25.000
38	Duurzaam en waterbewust bouwen in Almere Hout	IHE	4.395
39	(Over)leven met rivieren	Nederlands Instituut voor Toegepaste Geowetenschappen	
46	FEAST	Vrije Universiteit Amsterdam	577.000
Total			**8.777.035**

PROGRAMMA COMMITMENT

Bedrijfsnaam	Bedrag
Alterra	2.500.000
Amstelland Ontwikkeling Wonen B.V.	
Grontmij	160.000
Hoogheemraadschap van Rijnland	
ONRI	
RIZA	2.400.000
STOWA	1.800.000
VROM	
WL|Delft Hydraulics	1.000.000
Water-Front	
Total	**7.860.000**