

## **Summary of Background study 18**

### **Flow or flood. Knowledge and innovation challenges for a watery Netherlands**

#### **Foresight report**

This report is the result of a foresight study, the motor for which was a project group comprising the National Council for Agricultural Research (NRLO), the Advisory Council for Science and Technology Policy (AWT) and the Advisory Council for Research on Spatial Planning, Nature and the Environment (RMNO) supervised by a broad-based think-tank. Many parties inside and outside the world of water contributed. The outlook developed and action proposed are based on interviews, brainstorming sessions, essays, an inventory of the water-related knowledge infrastructure and a concluding conference. These sources have been published in a background document.

#### **SUMMARY**

##### **Framework and objective**

The central issue in this foresight report is which changes – substantive and organisational – are necessary in the knowledge infrastructure to provide adequate support for water management. This is what distinguishes this foresight project from other initiatives, e.g. the Committee on Water Management in the 21st Century, which focuses on providing advice in the sphere of water policy and water management, and the Rathenau Institute's project, which is engaged in getting administrative issues relating to water management on the political agenda. The three projects also differ on content: integral water management (this study), flooding (Committee on Water Management in the 21st Century) and watershed management (Rathenau). Coordination on the content took place with the other two initiatives.

This report does not pretend to generate an all-encompassing agenda for the water-related knowledge infrastructure in the next few decades, but it does put forward knowledge themes that have priority in the light of a necessary switch in water management. It also proposes action for achieving a fundamental change in the functioning of the water-based knowledge infrastructure.

##### **Paradigm change**

Water management in the Netherlands is in transition. The centuries-old strategy of draining off water rapidly appears to lack possibilities for performing the present, three-pronged task of water management: preventing flooding, combating groundwater depletion and guaranteeing good water quality. A different method of approach, based on retaining water native to an area and

giving rivers room, is necessary. Water should come first rather than second in the spatial planning of the Netherlands. The switch from “stemming the flow of water” to “accommodating water” not only has great potential for water quantity and quality but also creates new opportunities for water recreation and nature and contributes to an attractive residential and living environment. The new paradigm “space for water” essentially demands new forms of multiple space use.

Realising this sweeping turnaround is for the moment hampered by the fact that in the Netherlands land that really constitutes part of the country’s natural water system (polders, flood plains) has since time immemorial been built on. Fleshing out the new paradigm therefore has an impact on the vested interests of diverse parties, while the urgency of a sweeping turnaround is not appreciated by all those concerned. Added to this, the important task of safeguarding the Netherlands from flooding remains an undisputed priority. Links need to be made between the old and the new paradigm. These factors complicate matters when it comes to realising the switch outlined. However, there are initiatives at central as well as regional government level for an approach which leaves more space for the natural resilience of water systems. This different method of approach, which results in numerous new challenges for knowledge generation and innovation, is central to this foresight report.

### **Priority knowledge themes**

The paradigm change “space for water” outlined above means that water will literally and figuratively burst its banks, and on these banks there are people. This turnaround demands new knowledge and understanding, mainly in the relationships between water management and the social environment. It is at this very interface between water management and society that lie the knowledge themes which have been identified in this report as having priority. This does not alter the fact that this turnaround could also result in a need for specific technical (in the meaning of exact sciences) knowledge, e.g. regarding farming with water, flexible living and the ecology of rising water levels. These themes can, however, be relatively easily absorbed by the current knowledge infrastructure, but those mainly in the social sciences sphere cannot, or to a much lesser extent.

### **Perception of water**

Water will become a major part of people’s perception of the environment - certainly in the new paradigm. More and more people will start to use water for increasingly diverse social activities. Spatial planning and water management will therefore have to take greater account of the cultural and emotional significance of water for various groups of users. Knowledge about these aspects and the way in which they can be used in planning is seriously inadequate.

### **Value of water**

In order to be able to indicate and allow for the costs of and revenues from specific interventions in water and space, it is essential that the proper value of

water be estimated. This value is manifold, water having a use value, a perception value and a future value. Also, its value varies as a function of place, time and manifestation (rain water, soil water, ground water, surface water). The knowledge for establishing this differentiated value and incorporating the results in decision-making is still in its infancy.

### **Participatory planning in water management**

Making the switch from “stemming the flow of water” to “accommodating water” is impossible without the collaboration of many parties outside the world of water. The challenge is to integrate the many and varied interests involved in water into planning processes and to allow these interests ultimately to be conveyed in water management. This requires different processes from the current “open planning processes”, in which the experts endeavour to get sectors of industry (e.g. agriculture and transport) and private citizens to agree to the solutions they have thought up in advance. Knowledge of and experience with such participatory processes is, to the extent they exist, highly fragmented.

### **Interdepartmental management of water and space**

Water-based spatial planning requires collaboration and coordination between various policy spheres and tiers of government. The logic of the present administrative organisation and its functioning is little tailored to the logic of water systems. A major challenge is to arrive at cohesive management per catchment area. There are also great challenges in the sphere of drinking water supplies and water purification (the water chain), where social developments involving utility functions require the market to play a greater role. It is necessary to mobilise current scientific and empirical knowledge in order to arrive at new administrative arrangements and forms of public/private partnership both in the water system and in the water chain.

### **The water-related knowledge infrastructure**

The change of paradigm in water management not only has consequences for the content of the knowledge agenda, it also has consequences that are at least as great for the functioning of the water-related knowledge infrastructure: the complex of those that fund, carry out and use research. From the inventory of the present water-based knowledge infrastructure carried out in the context of this foresight study there emerges a picture of a fragmented, sectarian and technocratic infrastructure which reveals a large gap between the researchers on the one hand and policy and practice on the other. This is a consequence of the traditional perception of water issues: social goals and resources were clear (safety secured by engineering means) and the finding of solutions could be left to technical specialists. This arrangement of the knowledge infrastructure may have been effective in the past, but with the future, broader perception of issues in the sphere of space and water in mind, this approach no longer suffices. In general, issues in the field of water have increasingly become social issues. Tackling water issues is therefore no longer primarily a question of scientific knowledge and technical ability; the empirical knowledge of those social actors

directly involved and administrative considerations play a role that is equally as important. In this light, the water-related knowledge infrastructure is facing three major challenges:

### **Towards greater interaction between research, policy and practice**

In the world of water, interaction between research and policy and management practice is laborious. This makes it difficult on the one hand to utilise scientific innovations in policy and practice, while on the other, innovations in policy are not scientifically elaborated in sufficient depth in practice. Much research initiated by the policy sector and practice is of an ad hoc nature and mainly follows developments. The fact that the paradigm change from “stemming the flow of water” to “accommodating water” has hardly been picked up at all in the water-related knowledge infrastructure illustrates this.

### **Towards increasing knowledge in the social sciences sphere**

In the current knowledge infrastructure the emphasis is placed mainly on a technical and scientific method of approach based on the physical water system. The switch to “space for water” requires socio-scientific expertise alongside technological, as is illustrated by the themes mentioned above. Social science knowledge appears to be thin on the ground in the water-related knowledge infrastructure, although this type of knowledge *is* generated outside it.

### **Towards interdepartmental funding and control**

The programming and funding of knowledge generation are organised by sector (water, agriculture, nature, environment, space) and by branch of industry (water management, drinking water, waste water, sewage). Collaboration and control that transcends sectors and branches is found only occasionally. Funding is very much department-based, with the Ministry of Transport, Public Works and Water Management (V&W) furnishing by far the largest part of the research budget. Each sector wants to develop its own total water management system internally, resulting in a hard core of in-house expertise and amateurism on the fringes. Water-based spatial development requires funding and controls that transcend departmental interests.

### **Proposed action**

The conclusion of this foresight report is that, besides the substantive knowledge agenda, the functioning of the water-related knowledge infrastructure also needs reviewing. Modifications in the way the water-based knowledge infrastructure works have first priority, seeing that they are necessary in order to be able to tackle the new knowledge themes adequately. This different method of approach for the water-related knowledge infrastructure requires a cultural change. In particular, experience needs to be gained with other, more interactive and interdisciplinary methods of knowledge generation.

This new method of knowledge generation also requires modifications in the financing, organisation and arrangement of the knowledge infrastructure. For

example, in addition to the research funded by the individual departments in “their” institutes, a substantial portion should be used interdepartmentally and for specific problems using varying combinations of institutes. A rigorous rearrangement of budgets and institutions is not wise, however. Too little experience has as yet been gained with knowledge generation in the light of the new paradigm to do this. Furthermore, the financing and arrangement of the knowledge infrastructure is partly geared to old tasks that remain important. The shift from the old to the new paradigm will need to be gradual. This process of growth, aimed at broadening, deepening and linking up knowledge generation in the water-based knowledge infrastructure could result in a more structural change in this infrastructure. During the course of the foresight study it emerged that this approach has broad support from key actors inside and outside the world of water. The growth model proposed here is four-track:

- a. Improve the interaction between policy and practice on the one hand and knowledge institutes on the other by encouraging knowledge generation in innovative practical projects at watershed level;
- b. reinforce the social sciences knowledge component in water issues by initiating strategic programmes of research focusing on this;
- c. increase the long-term orientation in knowledge generation by establishing a breeding ground for long-range outlooks and innovative plans;
- d. train people who combine a thorough knowledge of one or more specialist fields with an affinity for a broad range of cultures and disciplines.

The elements of this growth model have been detailed in four interconnected proposals for action.

#### **a. Knowledge generation in innovative practical projects at watershed level**

Water-based spatial planning requires knowledge from various disciplines (exact and social sciences) which is developed cohesively and utilised in the context of interactive planning processes. This means the co-production of knowledge by participants (public bodies, companies, social groups and knowledge institutes) within strategic practical projects in which spatial interventions shape how we deal differently with water (learning by doing). International expansion and collaboration within these practical projects needs to be encouraged. In view of the nature, scope and desired pace of the changes in water management – both in planning development and in execution – it seems realistic to make a budget of 150 – 200 million Dutch guilders available in the next five to ten years for this practice-driven knowledge generation (public/public and public/private funding).

#### **b. Strategic research programmes**

To create a sound knowledge base for feeding innovative practical projects a strategic knowledge impulse is required, targeting the prioritised themes of perception of water, value of water, participatory planning in water management and interdepartmental management of space and water. These knowledge themes run largely parallel to the GAMIN programme, a programme of the Netherlands Organisation for Scientific Research (NWO), with interdepartmental

funding aimed at increasing social sciences knowledge in environmental and nature research. By reinforcing this programme it will be possible to remove backlogs in the knowledge fields mentioned.

**c. Breeding ground for new outlooks and innovative plans**

In addition to practice-based innovation projects and fundamental and strategic research programmes, investment is necessary in developing new outlooks and ideas in the sphere of water and space, with a time horizon of 20 to 50 years. We have in mind a breeding ground for thinkers and doers from government circles, the business community, social groups and knowledge institutes who come together in varying combinations to develop outlooks and innovative plans for the future in the sphere of water and space.

**d. Different way of educating and training**

Broadening the scope of water management stands or falls with the availability of people with a broad outlook, who combine a thorough knowledge of one or more specialist fields with an affinity for a broad range of cultures and disciplines.

There are many opportunities for shaping this increase in scope in educational and training courses, from multidisciplinary study and work groups to industrial placements and taught research into social problems. There are also prospects for expansion in the development of a social specialisation in courses in the natural sciences, as well as in combining an exact sciences major with a social sciences minor (and vice versa). The plans for a bachelor's/master's degree also present opportunities for broader combinations of this kind. The ministries of Transport, Public Works and Water Management (V&W), Housing, Spatial Planning and the Environment (VROM) and Agriculture, Nature Management and Fisheries (LNV) should create the financial and organisational conditions for realising the actions proposed in a, b and c. In the case of action d, the various universities in particular should take the lead.