FLOWLANDS

BASING PLANNING ON TRANSPORT AND WATER NETWORKS

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Flowlands is one of four 'perspectives', prospective scenarios for physical and social developments in The Netherlands up to 2030. The National Spatial Planning Agency has initiated and guided the making of these 'perspectives' to stimulate public and professional debate that should lead to a policy document providing a framework for decisions on environmental planning in the next decades[1]. This article, written by members of the Flowlands team, summarizes the scenario and discusses the approach.

Introduction

Vision: 'flows' as the starting point for planning
Flowlands explores a new perspective that opts for using transport and water flows as the starting point for Dutch spatial planning up to 2030. It implies a shift in the paradigms on the importance of nature, from 'the value of a green area' to 'ecological processes' important for human activities in town and countryside. The transactions are primarily the management of flows of traffic and water, and these direct local decisions, rather than *vice versa*. This brings about a 'switch in perspective' in the relationship between Man and Nature, between 'red and green' or, more generally, a perspective switch in the relationship between environment and economics. In *Flowlands*, people and nature are both taken seriously, which means taking account of both. Will the result of this be the economy being hamstrung in the name of nature and landscape? Or will it be a semi-urbanised landscape? Is this the dilemma *en route* to 2030? *Flowlands* opts for a different route, as will be explained below.

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[1] The four perspectives for The Netherlands in 2030 are *Stedenland* ('city-land', the compact city approach), *Parklandschap* ('parkland', interweaving of town and countryside), *Palet* ('palette', a free market approach to suburbanization), and *Stromenland* ('flowlands', the networks of traffic and water as startingpoint for spatial planning). The four 'perspectives' are based on the economic space defined by the three scenarios of the Dutch Central Planning Bureau: *Global Competition*, *European Renaissance*, and *Divided Europe* (CPB, 1992; RPD,1997a).

Opting for managing flows means working on the water and transport infrastructure. This structure creates the basic conditions for satisfying as many of society's wishes as as possible in a sustainable way while showing due respect to nature. Society's wishes include mobility, production, consumption, recreation and pleasant surroundings. As regards nature, it is both the intrinsic value of nature and the relationship between people and the plant and animal world that are involved, with the interaction between people and natural processes being paramount. In a broader sense, this interaction can be called technology. It is this technology that plays the main role in the perspective of *Flowlands*. In this context, Man and Nature are seen as partners, which means an emphasis on active interaction rather than on major interventions and stringent control. The aim of this approach to technology is to create the conditions for diversity in social and economic terms as well as for the plant and animal world[2].

From vision to strategy: water and traffic as starting points

This perspective is called *Flowlands* because transport and water flows were chosen as its starting point. These flows were initially examined independently while this perspective was being worked out, which led to a transport strategy being developed with the aim of improving efficiency and averting the devolution of responsibility. The strategy developed for water is aimed at working with natural processes of retention an purification. There is an obvious link to be made between transport, economy and industry on one hand and water, ecology and nature on the other. This fits in well with the distinction between material needs (goods and services) and the spiritual need to enjoy nature. As we approach 2030, water is also a key economic factor, however. It is essential for agriculture and for human consumption. Furthermore, most of the world's goods are transported by water. On the other hand, transport is a key factor for ecological (habitat) management. Transport networks are essential instruments for creating tranquillity in nature conservation areas. And just as every road is part of the water system because of its runoff, so navigable waterways are part of the transport system. In short, in real life the water and transport flows run through areas designated for industry, as well as through areas designated for housing or for nature conservation. The synergy of the combination of principles for regulating water and transport became clearer while the *Flowlands* perspective was being elaborated.

Guiding models as strategic tools

In *Flowlands* the strategy for water and transport as carrying the development of areas has been translated into *guiding models* that indicate solutions to problems of flow management and land use.

[2] The basic philosophy of *Flowlands*, the strategy of the two networks, has developed from *Ecopolis* (Tjallingii, 1995) and *Ecological Conditions* (Tjallingii, 1996).

Guiding models point the way to a basic quality, but allow a large degree of freedom to seek for a solution appropriate to a given area and its inhabitants. There are two general guiding models. These can be applied at all scales, but their outcomes may differ, depending on the scale and the situation.

Transport guiding model (figure 1)
The aim is to improve efficiency and limit the devolution of responsibility, under the motto 'sustainable mobility'.The following principles have been elaborated in this guiding model[3]:

- traffic (cars, trains, boats) will be channelled in *corridors*. Town centres and tranquil green areas will be protected against traffic; This will restrict spatial problems and promote investment in through traffic, safety and environment;
- making *segregation* possible *of short haul and long distance flows* will promote throughflow;
- a *multi-modal structure* will be achieved, making it possible to change from road to rail to boat;
- *collective transport* will be promoted between nodes, and *individual transport* around nodes.

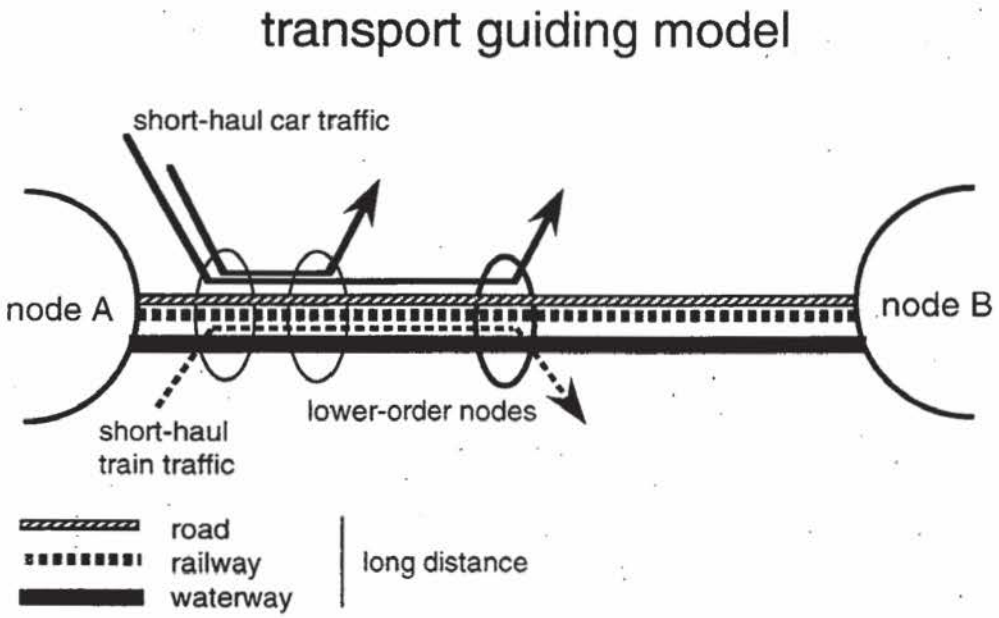

Figure 1. Transport guiding model

[3] The guiding model is partly based on a Dutch study of transport developments and perspectives: *Kiezen voor bewegingsruimte, eindrapport project Ruimpad* (Choice for mobilityspace, final report of the 'Ruimpad' project), Ministry of Housing, Spatial Planning and Environment, The Hague, 1997b.

Water guiding model (figure 2)
The aim is to work with natural processes, under the motto 'keep it clean and keep it longer'. The following principles have been elaborated in the model for this guiding model. They illustrate how the 'battle against water' paradigm has given way to 'living with water' - the *resilience principle*[4].

- water management will be attuned to the natural action of*water systems*; the combination of natural water storage and natural water purification (the relationship between quantity and quality) will be strengthened. The devolution of responsibility to downstream areas will be prevented;
- the storage of clean water is paramount for the policy on *managing water quantity* assuring sufficient amounts of water and preventing floods. This will enhance the role of autochthonous water (i.e. water natural to the area) and thereby counter problems associated with the nation-wide fall in hydraulic head;
- *managing water quality* focuses on preventing pollution, separating polluted water at source and purification after use. This will avert eutrophication and pollution of surface and groundwater;
- *sediment management* includes preventing erosion, limiting sedimentation in river channels and tidal gullies, and also encouraging deposition to strengthen the coastline. In this way, security will be combined with habitat development.

As illustrated by these guiding models, *Flowlands* primarily adresses physical and social processes related to flows. This distinguishes the approach from others that start with spatial patterns of land-use.

Further guiding models for area-flow interactions
As a next step, some second order guiding models were designed, involved in the relationship between areas and flows, considering four categories of commonly occurring situations.

- *lines and nodes*: a set of transport nodes with optimal facilities for passengers or goods to change from one form of transport to another. As well as being in town and city centres and on the edges of conurbations, these nodes will also be 'en route', to allow people to transfer from car to train or vice versa;
- *water and land use* (figure 3): nature conservation, agriculture, housing and other forms of land use will be combined with water system functions such as water storage, natural purification and water supply, such that clean water will flow into less clean water, rather than vice versa[5];

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4. The guiding model is based on recent developments in water planning. See for example *Hydropolis*, Van Engen, Kampe & Tjallingii 1995 and Plannen met Stromen (Planning with flows), Kamphuis et al. 1995.

5 This guiding model is based on Tjallingii 1996, p. 203-213 and on *Plannen met stromen* (Planning with waterflows), Kamphuis et al. 1995, Spatial Planning Agency, The Hague.

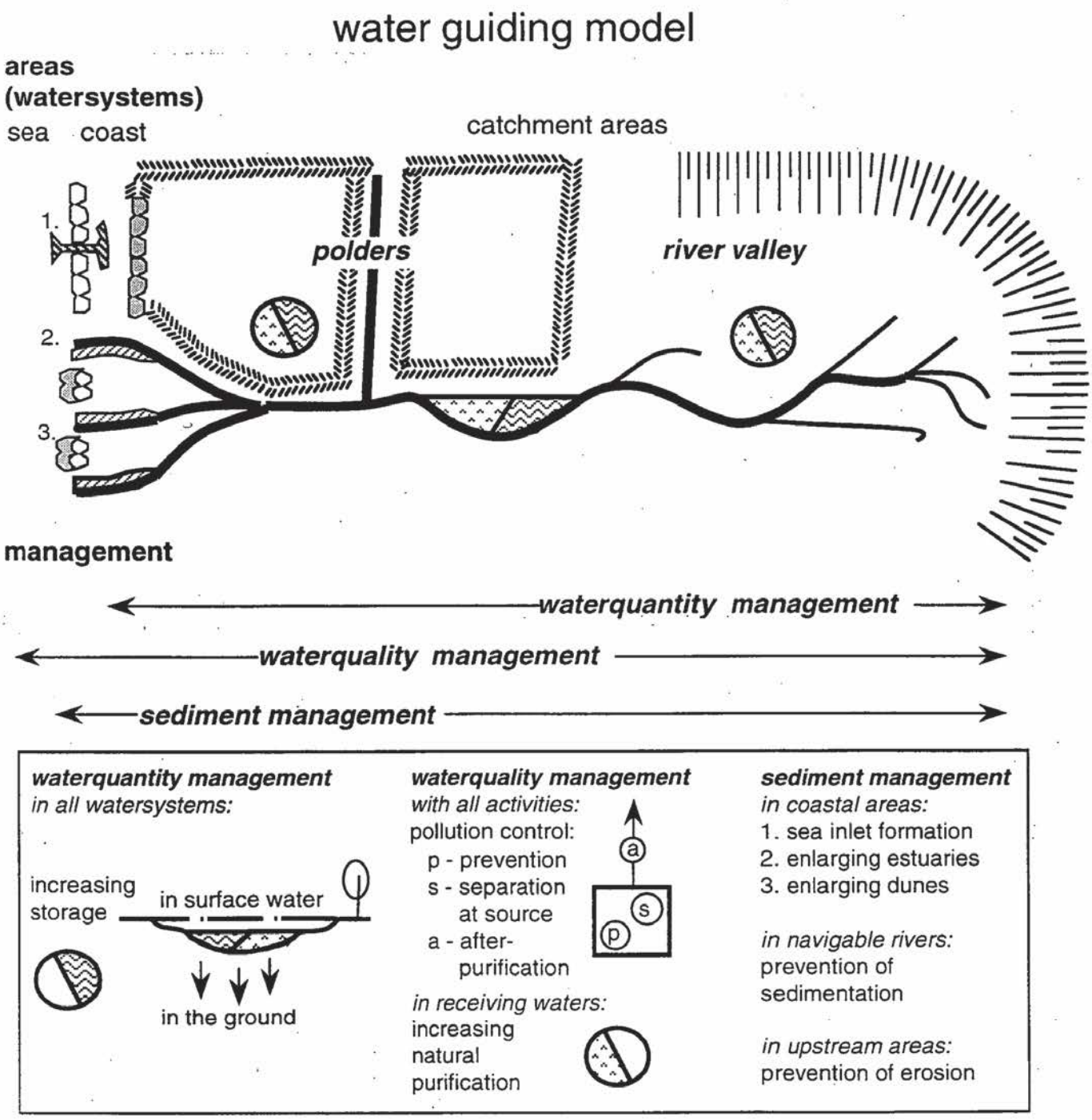

Figure 2. Water guiding model

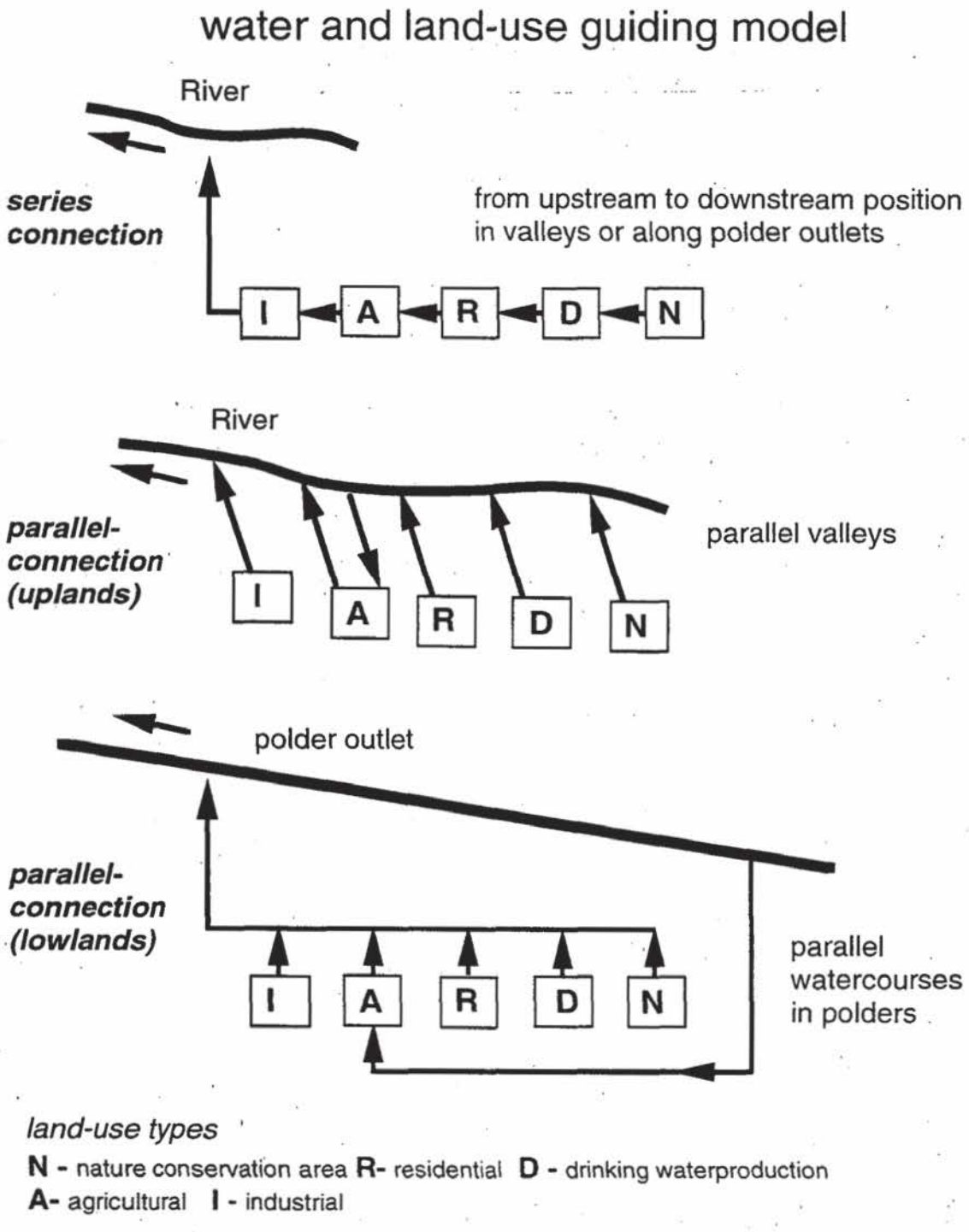

Figure 3. Water and Land-use guiding model.

- *border length and 'string of beads'* (figure 4): urbanisation will take place in 'strings of beads' along the public transport axes.The border between red and green will be enlarged. Access to public transport and distance to nearby urban centres are equally important here. The distance between the 'beads' can be used to allow

vulnerable green zones with water functions (infiltration areas, or areas with water courses) to cross the axes;

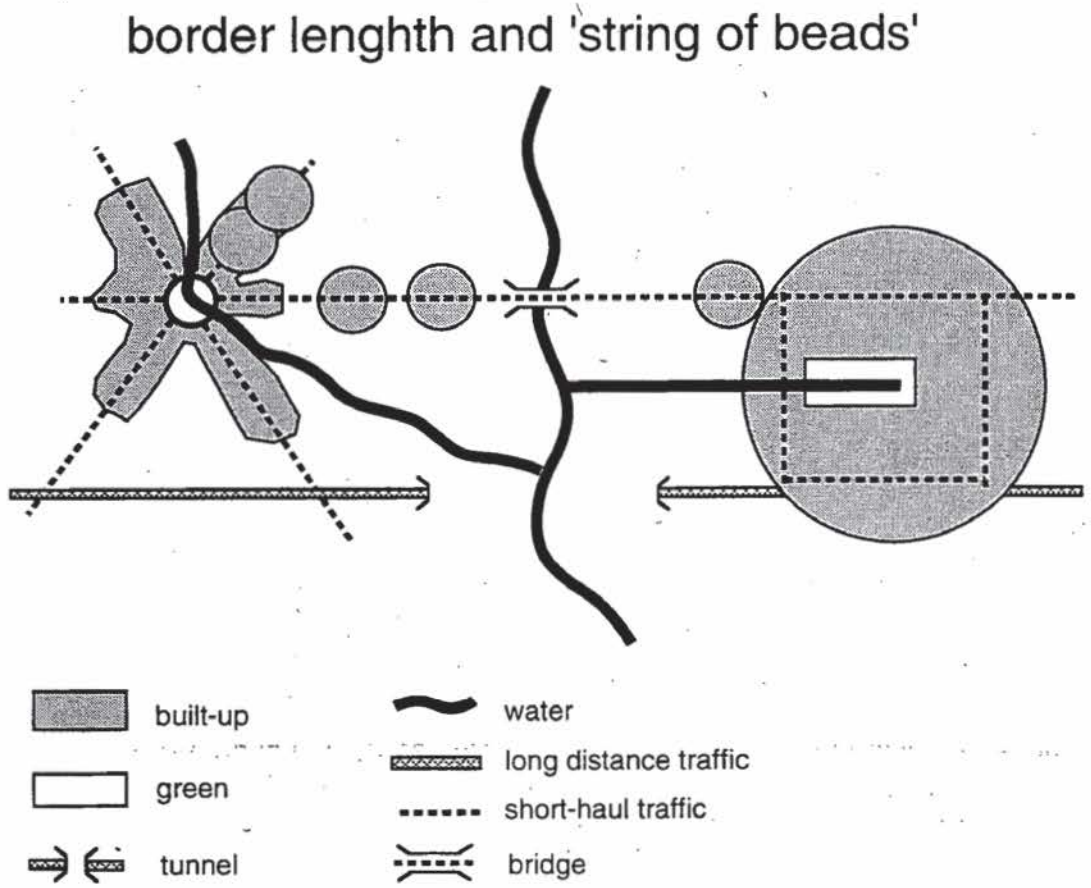

Figure 4. Border length and 'string of beads' guiding model.

- *zoning and the two networks*: the use of space will be restructured to make optimal use of location in terms of the two networks; the combination of transport with industry and agriculture, the combination of clean water system with nature conservation and recreation, and the two sides of residential areas - the tranquil green side and the dynamic side of transport and urban facilities.

What distinguishes the Flowlands' spatial perspective from other approaches such as the 'compact city' or 'new estates in the countryside' is the picture of residential areas along contrast-rich borders.

Policy guiding models

The strategic tools for policy-guiding are based on the vision that economic and ecological processes can be regulated by decisions about the management of water and transport flows and, concomitantly, decisions about the spatial networks of both these flows. These networks reinforce each other at strategic

points and form the backbone of infrastructure. Government has an important role in providing and maintaining this infrastructure. The guiding models here are:

- *investing in projects*: purposive and substantial investments in strategic projects that fit in with the guiding models from the *Flowlands* perspective. Support for this will be enlisted by negotiating with users and financiers. During the negotiations the government will stand up for security and environmental aspects.
- *pilot projects*: an important guiding strategic tool is directed at 'internalising' the principles from the guiding models. Experimental projects and sample plans can be initiated and encouraged to illustrate the potential of the dual-network approach, thereby stimulating all actors to apply the principles. Even those solutions that do not have widespread support, such as car-free neighbourhoods, should be developed in small experiments, so that if support for them grows (for instance as a result of dramatically increased congestion), there will be tried and tested alternatives available.

It is this project approach, characterized by joint investment and 'learning by doing' that distinguishes *Flowlands* from other guiding principles such as drawing contour lines around urban areas and protecting green areas. In *Flowlands* the government is primarily the instigator of joint projects, rather than the protector of boundaries.

The issues

The process of scenario-building included five steps:

- interpreting data on social and economic development;
- interpreting data on the environmental effects (resources, pollution, wildlife) of these developments;
- interpreting the data on the effectiveness of policy measures addressing environmental and spatial issues;
- deciding about the choice of policy measures; the guiding models resulted from this step;
- predicting the extent to which *Flowlands* fulfils the issues deemed important for the development of the Netherlands up to 2030.

The last point is discussed in this chapter.

Mobility

In order to accommodate the massive increase *passenger transport* and the travelling public without substantially expanding the road network, *Flowlands* opts for greater use of public transport and bicycles, an increase in the capacity of existing roads, and more passengers per vehicle. Public transport will be made attractive by developing efficient transfer points for attuning the first, main and last stages of the journey. The car will initially be allowed to remain a form of

transport for the main part of the journey, but its major role will eventually be switched to the first and last stages of journeys.
The roads will not be able to accommodate the massive increase in *transport of goods*. The capacity of vehicle transport will be enlarged by logistic improvements and this form of transport will continue to be important at regional level. However, to cope with the increase, waterways and rail transport will have to be used for longer distances between nodes. This switch will be made easier by ongoing developments in the techniques for container transshipment.

Sustainable economic development and traffic
Economic development, employment, emissions and regional quality are all facets of sustainability. *Flowlands* is founded on the principle that a good transport infrastructure will create the right preconditions for *economic development*. Linking added-value activities to the flow of goods will be stimulated by building larger transshipment facilities, and by earmarking areas for industrial estates along the transport axes. These preconditions for economic development can be expected to have a positive effect on *employment*. The steady growth in the transport of people and goods will lead to a rise both in CO_2 emissions (thereby exacerbating the greenhouse effect), and also in other emissions. Although technological advances will bring about considerable reductions in emissions per vehicle, we can only note that, in the past, the benefits of such advances have consistently been cancelled out by increased traffic volumes. The only means by which the environmental effects of traffic can be reduced in the short term is by a shift from the use of cars towards public transport and bicycles. Future transport policy will therefore have to increase the attractiveness of environmentally-friendly alternatives, although in the long term significant advances can be expected with regard to electrically-powered vehicles and to hydrogen technology. Even then, car traffic will still represent a threat to human and animal safety, especially on the roads providing access to transport axes and transport nodes. Protecting (decoupling) vulnerable *areas* from traffic will thus remain an important objective, both in urban areas and in nature conservation areas.

Sustainable economic development and water
The abstraction of groundwater for purposes of *economic development*, for industry and for use in agriculture will gradually be phased out. Switching to surface water will supply sufficient water to meet these needs, and it will nonetheless be possible to reduce parching in nature conservation areas. The increased use of surface water will increase pressure to reduce *emissions*; such reductions will be made possible both by the developments in agriculture (environmentally-efficient industrialisation and a more extensive method of farming using less fertiliser and pesticide). Security and quality at *regional level* will be guaranteed by river management and coastal management conducted according to the 'resilience principle'. Despite the rise in sea level, it will still be possible to assure security from flooding without the need to resort to a new round of dike reinforcement. Water will make a significant contribution to the sustainable quality of residential areas, nature areas and recreation.

Nature, landscape and biodiversity

Rather than stressing species management, *Flowlands* will emphasise a great habitat richness. Wet habitats will be stressed. Parching and eutrophication will be combatted, and the effects of allochthonous water will diminish. In this way, greater justice will be done to the diverse qualities of diverse landscapes types. Larger areas of tranquillity will be created by decoupling currently fragmented green areas from the transport network. The 'string of beads' principle will allow greater attention to be paid to wildlife corridors, thus creating more stable plant and animal populations.

Social diversity

Flowlands will create the preconditions for clean and efficient transport (together with the allied social functions), and for sufficient quantities of clean water (with the concomitant agricultural, industrial and domestic functions and its value for nature conservation). Furthermore, by following the dual-network approach to spatial planning, the preconditions for personal human development will be enhanced. Not only will this allow the mobility that creates conditions for economic and cultural development, it will also create the space for quiet and inspiration. Many people will be able to live at the waterside or in green areas, and there will be an abundance of greenery in residential areas. Under such conditions, environments for a great variety of lifestyles will come into being.

A great deal of employment will be created by having the accent on investment in projects such as transport infrastructure, nodes, hydrological projects and a combination of urban reorganisation and tunnel-building. Indirectly this will contribute to decreased social divisiveness, i.e., to a reduction in an unwelcome form of social diversity.

Spatial claims

In principle, areas for housing and for industrial estates will be made available by the expansion of existing towns along public transport axes, and by the creation of new living and working areas along these axes. Both this and the 'string of beads' principle will allow space to be reserved for green and tranquil areas and for linking zones for wildlife and recreation. In these areas, the hydrological system will provide a structure and supply clean water. New large-scale *road, rail and waterway infrastructure* will be limited to the corridors; it is primarily rail connections that will be added. Necessary additions can be made both above and underneath existing roads.

The situation with regard to farm management is of relevance to *agricultural* land that becomes vacant, and to those forms of nature conservation and recreation that require more space. Agriculture will develop in two opposite directions: further industrialisation on one hand, and on the other the development of extensive management methods in which nature management techniques will also have a place. Farms in the first category will be linked to the transport axes and industrial estates, while those in the second will fulfil an important function in the management of the large green spaces lying between these axes. The latter

spaces include the National Ecological Network (NEN) proposed in the government's Nature Policy Plan. *Hydrological management* will require more space within the framework of *Flowlands*. It is largely in multiple land-use that such space will have to be found, however.

The image of the Netherlands; proposed projects

Strategic map of the Netherlands in 2030

Flowlands' image of Netherlands in 2030 has been created by analysing transport and water flows in relation to land use, and then by using the guiding models in the development of proposals. An exceptional feature of the Netherlands with regard to *transport* is the position of the 'main ports' of Rotterdam and Schiphol Airport *vis-à-vis* the industrialised hinterland. This will give rise to the further development of the principal east-west corridors and of the less important corridor to Antwerp. Traffic flows in these corridors will become yet more concentrated. Multi-modal nodes will be developed. In addition to the international corridors, there will be north-south axes of importance at a national level; at certain points in these, rail connections will be established. Along the national transport axes, too, nodes will be developed into multi-modal transfer and transshipment stations.

With regard to *water*, the Netherlands is exceptional not just by virtue of its coast, Rhine/Meuse area and small rivers areas, but especially by virtue of the *blue zone*, the low-lying area in which the sea and the rivers meet (figure 5). In these areas, water storage, natural purification and the improvement of recreative links will be accentuated.

The function of the *rivers* as linking routes for plants and animals will be reinforced, both by allocating more space to the rivers and by strengthening national and international policy with regard to cleaner river catchments.

Space will be made available in the *coastal zone* for sediment management conducted according to the 'resilience principle'.

In the higher-lying areas of the Netherlands (i.e. the area of *small rivers* and natural brooks), the guiding principle will be that water must flow from cleaner areas to less clean, rather than the reverse. This will be combined with brook restoration work.

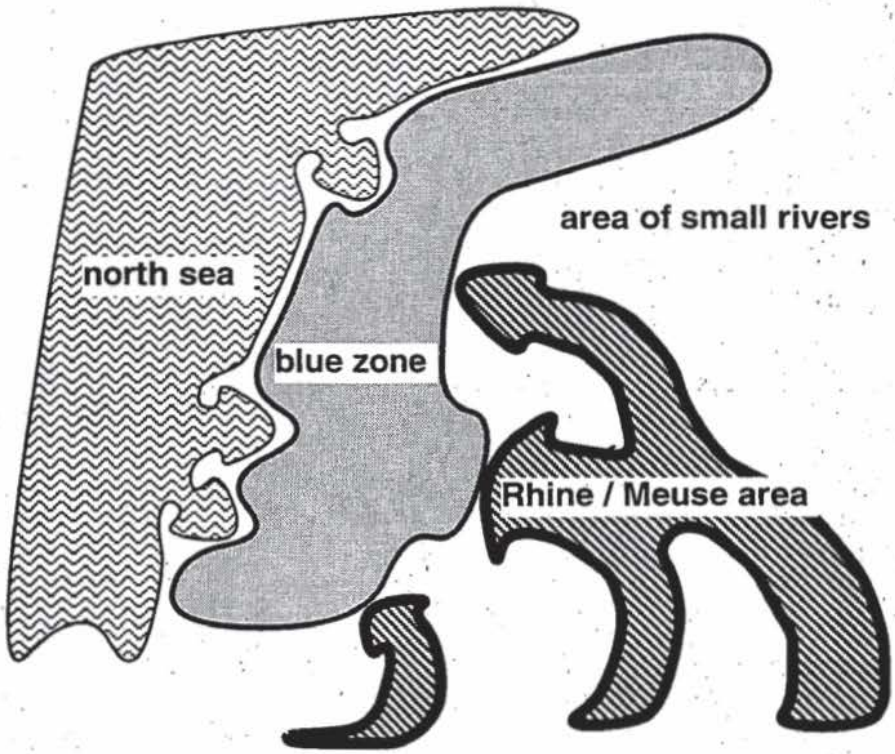

Figure 5. Specific qualities of watersystems in the Netherlands

On the map of the Netherlands a great deal of attention has been devoted to the places at which the blue zone (one of the carriers of this perspective) crosses the most important corridors and transport axes: between Amsterdam and Muiden, between Gouda and Utrecht and around Dordrecht. Here the beads have been kept separate, and only the thread continues. At these points the barrier effect of these intersections is diminished by cuttings, tunnels and wildlife viaducts. The same principle will apply to national and regional transport axes that cross nature conservation areas.

The guiding models provided by *Flowlands* can indicate approaches to solving problems in a number of currently debated projects. It is important in this regard that projects have a dual objective: while they should contribute to reinforcing transport and water flows, they should also contribute to economic and ecological development.

Projects

Flowlands proposes a number of projects, both small and large. Of these, some are new, such as the project to make the northern part of the Netherlands more independent of throughflowing Rhine water by drawing on its own reserves.

Many projects are already at the discussion stage, such as one (related to the project just mentioned) which will allow greater fluctuations in the level of the

IJsselmeer and various coastal management projects (including those involving widening of the dune belt and the formation of tidal gullies).
Also under discussion is the construction of new railway routes between Lelystad and Groningen, Utrecht and Breda, and Arnhem and Twente, and the plan for an orbital railway in the Randstad area. In many plans the first steps have already been undertaken, such as the *Ruimte voor Rivieren* (i.e. Space for Rivers) Plan, 'water in the cities' projects, the development of urban distribution centres, transfer points, and roofing and tunnel projects in urban areas and where infrastructure crosses sensitive rural areas. Some projects are effectively an extension of existing policy, such as those with respect to a pro-active technological innovation policy and to linking this with innovative pilot plans.

The discussion on *future airport infrastructure* will focus on the question of whether Schiphol can expand, and by how much. We proceed on the assumption that expansion will be desirable for the flow of air traffic and for the economic development associated with it. Provided noise guidelines are respected, some expansion of capacity at the current location can be accommodated within ecological development. In this respect, the relocation to the village of Zwanenburg is a realistic option. However, should future capacity become insufficient, it is entirely uncertain what the effect of air traffic would be on ecological systems in the coastal area, in the vulnerable 'blue zone' and in other areas. As economic uncertainty is also great, there are no dicisive arguments for a shortterm decision regarding the desirability and integration of a satellite of Schiphol.

The *Tweede Maasvlakte* (the project to further expand Rotterdam Harbour in the North Sea) is seen as a useful reinforcement of the 'main port' of Rotterdam. The timing of the expansion is generating greater controversy than the anticipated benefits of such expansion to multi-modal transport and economic development. However, although the previous harbour expansions have generated some understanding of the ecological effects of this project, this understanding is still far from complete. The Flowlands approach implies that projects should meet both ecological and economic demands. In the case of the harbour expansion further research should clarify the decision situation.

The new railway line through the *Betuwe* district is entirely in harmony with the plan to reinforce the multi-modal corridor through this district. Options for combining the transport corridor and the wildlife corridor were explored in a study at regional level. With its extensive transshipment facilities and the extension of a branch of the Betuwe line to Twente, the Valburg junction (near Nijmegen) will be fully in keeping with the objective of exploiting the flow of goods through the Netherlands for the purpose of value-adding activities. However, the greatest possible care will have to be paid to the proper integration of the railway line into the landscape of the Betuwe district. The guiding models presented in *Flowlands* provide useful tools for the fine-tuning of local plans to local conditions.

Discussion

Flowlands and other perspectives
The leading proposals, ideas and interpretations of the other perspectives have not been discussed here. It is therefore impossible to compare the four approaches systematically. However, we may highlight some arguments the *Flowlands* approach contributes to current debate on spatial and environmental issues.

One of the persistent issues in spatial planning is the debate on concentration versus deconcentration of built-up areas. The first view is represented by the 'compact city' perspective, the second by the 'parkland' and 'palette' perspectives (see note 1). The dream of an increasing number of city dwellers - a suburban house with a garden - is the nightmare of others who fear the loss of openness and quiet of the countryside. The contribution of *Flowlands* to this debate is fourfold:

- *Flowlands* stresses the central role of traffic, that is being disregarded if the discussion is limited to a 'red and green' debate;
- *Flowlands* introduces groundwater and surface water management as a central issue in environmental planning. This leads to a more important role of the local hydrological system and to new carrying structures for green functions.
- By opting for a 'string of beads' strategy, *Flowlands* focuses on the length of the red and green border. The proximity of both public transport and green recreation areas contributes to the quality of this border. In this way, a planning perspective is created that may preserve openness in essential parts of the countryside and prevents us from building in vulnerable urban green areas.
- In this perspective, the role of the government in regulation and control will decrease to the benefit of a project approach with joint investment and joined learning being paramount.

Strategic planning and communication
Flowlands, as a scenario, is neither *projective* (extrapolating trends, forecasting) nor *prospective* in the strict sense of designing a picture of he future and then 'backcasting' to determine the steps to be taken (Jansen, 1994, 503). As a strategic plan, *Flowlands* shows the overall direction and provides the tools, the guiding models. As a consequence, the ultimate result, the map of The Netherlands in 2030, is difficult to communicate. This became evident during the sessions of public debate that followed the publication of the four perspectives. Yet, in a strategic plan, there cannot be a final picture. The map is full of zones, indicating 'space for search' and leaving the concrete planning proposals to local planning with due respect to local conditions. Here, the guiding models are useful in creating imaginative and innovative pilot projects that are vital in a process of learning by doing. At this level communication is easy.

The concreteness of the national map is in its frame of the two networks. These are essential to create conditions for economic and ecological processes. The networks also have a spatial form, but the picture remains abstract, the processes remain invisible. The challenge to communicative planning is to link pilot projects to a general strategy. Possibly, guiding models may play a role in bridging this communicative gap.

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