ECOLOGICAL CONDITIONS

strategies and structures
in
environmental planning

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CONTENTS

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To my father
who kept inspiring me

PREFACE

This book is about the making of plans and the taking of decisions, with town and country planning (also called physical planning or spatial planning here) as its central field. The central question it adresses is the role of ecology in planning, a role that is accepted but by no means undisputed. The Ecological Conditions Strategy, which is the pivot of the book, provides an answer to this central question in offering a set of motives and means, to be used as a toolkit by all actors involved in the planning process: planners, researchers from the natural, the social and the technical sciences, policy-makers, politicians, enterpreneurs and citizens.

The actors concerned with creating ecological conditions face a number of awkward questions such as: "how may we combine prevention of pollution with diversity of lifestyles and economic activities"; "how may urban plans do justice to the diversity of plant and animal life"; "how may we use the natural resources of our planet in a sustainable way and how may we share these resources among the rich and the poor and between the present and the future generations." To what extent and how do these questions matter in day-to-day decision making at the local and regional level? This question poses itself in decision-making on a variety of issues, such as spatial plans, plans on environmental regulations, housing, urban design, infrastructure, rural land-use schemes, management and maintenance of public open space, green areas and water. In all these planning situations one may ask how ecological conditions can and should be made part of the decisions? Discussions about these issues are the starting pont of this book.

In a nutshell this is what the Ecological Conditions Strategy is about and to whom it is addressed. Before turning to a short outline of the book I will first introduce some essential terms.

ECOLOGICAL

Ecological may have different meanings. Is it about endangered species of plants and animals, about human health or about survival or is it about all these aspects? In the first part of this book I will discuss different approaches to planning that use different interpretations of ecology. These approaches are related to different languages or *discourses*; their interpretations of ecology are linked with concepts, ideas and categorizations of planning issues. In the second part of this book I will search for basic ecological conditions that may be developed into a common frame that is both ecologically sound and capable of carrying cultural differences. This leads to a broad interpretation of *ecology*: the study of interactions between society and its physical environment. The planning for these interactions I will call *environmental planning*; here too, I adopt a broad meaning of *environmental*. *Interactions* in this context include polluting and squandering activities and, reacting to these, ecological strategies. I take the decisions of the UN conference on Environment and Development in Rio, 1992 as a general point of reference for the discussion of ecological strategies. This means that my point of departure is concern for future generations and for biodiversity; the two main issues in Agenda 21

(UNCED, 1992), the programme resulting from the Rio conference. This programme requires ecological *conditions.*

CONDITIONS

Conditions are physical and organizational structures: roads and rules. Institutional conditions form an important category, in particular those that stimulate *learning processes.* Learning here is used in a social context: learning for change towards a more sustainable interaction with our physical environment. The central concern of Agenda 21 is to make development sustainable. In the words of the Brundtland Committee: "... to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED, 1987, p.43). In this book, the concept of sustainability is made more operational in three dimensions, linking it to local conditions and to environmental quality. The three dimensions are *decision fields,* related to *areas, flows and actors.* It is in these fields that actors should be answerable for their decisions. A decision may be called ecologically justified or ecologically sound if ecological criteria are used in these three fields.

ACTIVITIES

Conditions are the carriers of *activities,* a concept used to indicate forms of land-use, or rather environment-use, including agriculture. industrial production, building and different types of environmental management. The strategy described in this book aims to create conditions for making activities ecologically sound. This approach fits in with the tradition of *ecological modernization.* In the words of Hajer (1995, p. 32) "...the discourse of ecological modernization puts the meaning of the ecological crisis upside-down: what first appeared a threat to the system now becomes a vehicle for its very innovation."

A DUTCH PERSPECTIVE

The aims and the key concepts demonstrate the global context of the issues discussed in this book, which addresses an international audience. My point of departure, however, is the Dutch situation, in which I live and work. It is the situation of one of the most densely populated and urbanized areas of the world, which also has the highest agricultural production per hectare and the highest car density. Perhaps this may account for the importance of *nature* to most citizens in this country. Wilderness does not exist here. *Nature* refers to the small patches of spontaneous plant and animal life or to the result of a long cultural history of now obsolete agricultural practices. As a result of the intensification of agriculture, *nature* sometimes even seems to be more at home in an urban environment. *Nature conservation* has a long tradition in The Netherlands, but in recent years it also has become popular to deliberately create habitats for spontaneous plant and animal life. Paradoxically the Dutch call this *nature development.*

Because there are few natural barriers in this flat country, and because many people also have many claims on the land, a system of *physical planning* or spatial planning developed with extensive regulations and agreements about land use. In recent decades, a tradition of *environmental policy* has also developed, starting with regulations to curb pollution, but gradually becoming more integral in its approach to planning. In The Netherlands *water management* also has a long history; traditionally this involved the fight against water, but in recent years falling water tables have also become a problem as a result of drinking water production and agricultural drainage. Needless to say *traffic planning* has also developed extensively. In recent years the planning efforts of spatial planning, environmental policy, water and traffic planning have converged. *Environmental planning* is used in a wider meaning to indicate this broad field. As mentioned above, this is the way I use environmental planning in this book. Does the convergence of policy sectors merely lead to more regulations, or will it be possible to develop an ecological conditions approach? This is one of the questions that triggered the writing of this book. This question is not limited to the situation in The Netherlands.

GUIDING PRINCIPLES, GUIDING MODELS, PLANS

I developed the strategic concepts described in this book in the course of a 25-year period of research and making plans. Being an ecologist with a biological background and trained in vegetation and soil science, I joined planning teams who were making plans for urban areas. In doing so I found a need for *guiding principles*, indicating the direction of the planning, and for *guiding models*, solutions-in-principle that save us from re-inventing the wheel in every project. Guided by these models the *individual plan* may be tuned to the local conditions. Guiding models reflect different disciplinary points of view and may be compared with integral planning concepts. They may themselves play a role in a research programme for improving integrated concepts. The Ecological Conditions Strategy, being a framework for guiding principles and guiding models, developed from the experience of working with guiding models. Naturally, discussions on values and interpretations contributed significantly to this experience.

OUTLINE OF THE BOOK

In the book I do not follow a chronological path. Instead I start with the practical context, then I go to fundamental questions and finally return to practice.

The *first part*, CONTEXT, starts with my personal background in the situation of teaching and practice. Then it describes the origin of the Ecological Conditions approach in the context of landscape ecology research and regional planning. The first part of the book ends by positioning the ecological strategies among other approaches to ecology and planning.

The *second part*, FUNDAMENTAL ISSUES, discusses underlying questions of ethics and aesthetics, epistemology and planning methodology. Two major discourses emerge from the discussions on fundamental issues, representing two different ways of looking at the role of ecology in planning: the *language of control* and the *language of interaction*.

The *third part*, FROM STRATEGY TO PLAN, incorporates the conclusions of the analysis of fundamental issues in a new version of strategic concepts and guiding models for areas, flows and actors. This new version I call the Ecological Conditions

Strategy. It developed from the basic ideas described earlier in Ecopolis (Tjallingii, 1995). Finally the use of strategic guiding principles and guiding models is illustrated by the making of a plan, taking the water structure plan for a new residential area as an example.

I CONTEXT

1. A PERSONAL QUEST

INTRODUCTION

In this first cycle I will follow my own quest for a sensible role of ecology in environmental planning. At the outset of this quest I encountered a wide gap between ecology as a science of biologists and geographers and planning. The challenge was to bridge this gap. In the beginning the question focused on the role of ecology in soil and vegetation surveys. Later, the issue became the interpretation and evaluation of these maps for planning purposes. But soon the question was asked more directly: "How can ecology be applied to the design of a good city?" By way of reconnaissance, this chapter provides the context in which the Ecological Conditions Strategy developed step by step.

FROM BASIC TO APPLIED RESEARCH

For the roots of this book I have to go back to the late 60s. As a biology-student at Utrecht University I was active in the *nature conservation movement* which, at that time, was evolving into an *environmental movement*. Ecological issues of pollution, resources and *limits to growth* became topics of public debate. Yet, it was hard to see the relevance of academic ecology to these issues.

Science and practice came much closer together for me when in 1969 after graduating, I joined a soil survey project in West Africa. Having specialized in vegetation and soil science, this was an excellent opportunity to experience and analyze the tension between human activities and the carrying capacity of the land in a region where the concept of landscape ecology was born[1]. Timber exploitation and the transition to a market economy were putting pressure on the traditional shifting cultivation systems. These were pushed beyond thresholds, to a point where erosion and laterite formation started to threaten land use potential.

But our experience went far beyond the study of soils. Our remit was to prepare a soil map to be used as a basis for assessing the land and sites for the resettlement of people forced to migrate to make way for a new reservoir. We found the hydro-electric dam already under construction when we arrived for the first investigations to prepare for the massive migration of a 100,000 people. This complicated task of moving so many people was underestimated and considered of minor importance compared with the expected profits from the dam. Walking through the rainforests and savannas and visiting their villages we found it impossible to explain to the villagers that their land would become the bed of a huge lake in the near future. Ecological research was obviously relevant to many aspects

1 *The concept of* landscape ecology *was introduced in 1939 by the geographer Carl Troll, who reported on the use of aerial photographs in an ecological survey of soils in African savanna landscapes (Schroevers, 1981).*

of the dam project, but we were late[2].

Back in The Netherlands, as a lecturer and researcher at the Soil Science Institute of Utrecht University, I became one of the organizers of the Kromme Rijn Project, a landscape ecology research project aiming to make a regional planning process more ecological. This project will be described in more detail in chapter 2 of this book. As in the African project, our experiences were enriching in the field but rather disappointing on the planning and decision-making front. It seemed to us that our research merely helped shift some problems to other places. Ecologists and planners were talking different languages: the former were trying to protect nature, the latter were looking for sites for roads and new urban areas.

Still discussing the ways to link ecology and planning in a more fruitful, less polarizing and less defensive way, I accepted a post at Delft University of Technology in 1975. So I went from the world of pure science at Utrecht University to the world of architects and urban designers at the Faculty of Architecture. There I was expected to look at similar problems from a completely different angle. In the pure science world, technology and design were looked upon as only applied science. However, there was almost nothing I could apply from what I had learned and researched so far. The simple question my new students asked was: "How to apply ecology to the design of a good city?" Others simply asked: "Why ecology?" So, from the outset, I plunged into empirical and normative questions in a new field. In this field the leading question was no longer "how does nature work?", but "how can we work with nature?"

Fortunately I became a member of a small but active group of colleagues led by Professor Frans Maas, who was one of the pioneers of ecology and design and had played a major role in the planning of the first ecologically designed new urban extension in The Netherlands: Haagse Beemden (Breda)[3]. As a member of this group and in dialogue with my colleagues, I started working on a theoretical framework that could serve as a basis for ecological strategies and practical advice in urban planning. It was to become a long but inspiring process of learning by doing in which I learned as much from my students as they picked up from me.

As a first result, after some time I could look back at my experience with rural planning with a *planner's eye*. This gave rise to a hypothetical model of the optimal planning - ecology relationship for rural areas: the central issue is to look primarily at *processes* that work at the landscape level rather than at characteristics of individual places only. This led to a central role to be played by infra structure planning: planning for *traffic and transport systems*, and for *water systems* such as drainage, sewerage, drinking water supply, surface water and groundwater. Water and traffic systems create conditions for land use. Making these systems function in

2 *The fundamental ecological analysis was, in fact, a prerequisite for the interpretation of the aerial photographs and therefore, for the reliability of the maps we made. The technical report (Boerma et al. 1970) and the fundamental landscape ecology analysis (Tjallingii, 1976) were published separately.*

3 *See Maas, 1980. Most of his "12 guidelines for a new approach" (Maas, 1971) found their place in the strategic concepts I later developed.*

an ecologically sound way, means creating ecological conditions for all activities that use not only land but also water and the air.

The process-oriented approach cannot address infra structural conditions, without looking at *activities that use the environment*, like agriculture and urban development. Ecological planning should also focus on pilot projects aiming at developing alternatives for destructive practices in these activities. Thus innovative guiding models could be generated that could provide the vocabulary in a new language of ecological planning[4]. This view on planning, of course, generated a new programme of ecological research, in which ecology had to be freed from a narrow biological frame. Planning-oriented research should cope with a wide range of interactions between man and the environment and many disciplines had to be engaged in this new research programme.

FROM RESEARCH TO DESIGN

Very soon I turned to the city itself, to architecture, to urban renewal and to the design of new extensions. I learned to look at the city as an ecosystem. The problem was how to proceed from this still abstract notion to practical tools for urban design.

There appeared to be four fields of experience that contributed to the development of these tools.

1. *Use, management and maintenance.* I set up a course in *ecology, management and maintenance*, including a series of excursions to visit managers of urban projects like buildings, urban trees, open space, parks and other green areas, water systems, recreation sites and farms in the urban fringe. The main purpose was to learn from the managers about the success and failure of designs as seen through their eyes.
   This course also brought us together with groups of residents actively upgrading their district. In some projects we acted as advocacy planners to assist them in their work[5].
2. *Prevention of environmental problems.* Design is the stage of prevention and here ecology may play an important role. In the late 70s a permanent Urban Design and Environment study group was set up at the Faculty by my colleague Kees Duijvestein. Together we tried to learn from practice and from students' projects by developing strategies for the design of buildings and urban schemes. Subsequently we tested these strategic concepts in new student projects[6]. Much of the concepts I am elaborating in the chapters 9 and 10 of this book stems from this source.

4 *The conceptual model of the planning - ecology relationship (Tjallingii, 1978) drew empirically on the earlier Kromme Rijn Project experiences, combined with those of my later involvement in the Reconstruction of Midden-Delfland, a rural area between Delft and Rotterdam. At that time I was already strongly influenced by the planning and design environment at the Faculty of Architecture of Delft University of Technology.*

5 *One of these projects resulted in an analysis and plan for restructuring, management and maintenance of an old estate with park near Rotterdam (Kolff, Van der Meij & Tjallingii, 1986). The joint efforts of the residents' group and our study group saved the park as a public amenity.*

6 *This group, called StadsOntwerp en Milieu (SOM), (Urban Design and Environment), was as a hot bed for new ideas and inspiring plans. Its main concepts were summarized in the inaugural lecture by Duijvestein (1993).*

3. *Interdisciplinarity.* The practice of design, implicitly or explicitly, melds the contributions of the natural, social and engineering sciences. Here I learned most from the interdisciplinary study groups of students and teachers from various universities[7].
4. *A systems approach to Ecology.* As to ecology itself, as a science rooted in biology, I went back to basics, to fundamental principles that were able to found new conceptual frameworks for analysis and design. I was fortunate to work together with Professor Chris van Leeuwen who had done pioneering work at the Faculty of Architecture in establishing basic theoretical concepts on patterns and processes. His work on the fundamental regulation mechanisms of ecosystems proved to be of great practical heuristic value[8]. Important concepts discussed in the chapters 8 and 11, stem from this source.

One development took me by surprise. Ecology was very popular among architects in 1975. If you announced a lecture on ecology the hall was full of students. But in the early 80s, by the time our courses on ecology and design had been much improved, you were lucky to have 4 or 5 students attending lectures. Ecology had been fashionable in the 70s. Now it was out of favour and despised. Among architects, ecology had been strongly associated with the organic style that had been popular for only a short period. Now that this fashion was over, the baby of ecology was thrown away with the bath water. This experience greatly strengthened my conviction that ecology should dissociate itself from specific forms and concentrate on the underlying structures of cities and buildings, as mechanics does.

Soon after I entered the Faculty of Architecture, water much more than soils proved to be the key ecological factor capable of structuring plans. Of course this discovery had something to do with the dominant role of water in the Dutch landscape, but I was also very much inspired by Olmsted's plans for the Boston Fens (as described by Spirn, 1984) and by Ian Mc Harg's work on Philadelphia (Mc Harg, 1969). Floodplains and drainage patterns are key factors in hilly areas as much as ditches and polder outlets in the Dutch polder landscape. One of my graduate students, Sjef Langeveld, triggered my first work on water systems in urban areas. Using clean water sources and retaining rainwater as long as possible were among the first guiding principles that proved to be fruitful in generating alternatives in spatial planning. Their feasibility was demonstrated by a few pilot projects. However, current civil engineering practice focused on quick removal of rainwater by combined sewerage systems (transporting waste water and rainwater in one combined system)[9]. In the early 80s the professionals were highly sceptical about our

7 *The lessons from these study groups for a project-oriented approach to Higher Education were summarized by Van Woerden et al., 1988.*

8 *Van Leeuwens work was highly criticized especially by his colleagues in the biological sciences who, in the 80s, turned to a new paradigm: the theory of island biogeography. However, Van Leeuwen's concepts proved to be of great practical importance for the principle of creating conditions by design. (Van Leeuwen, 1966, 1973, 1981, 1985).*

9 *My first reflections and design ideas on urban water systems (Tjallingii, 1980) were received with profound criticism by most professional civil engineers. It was not until the late 1980s before the basic concepts gained more widespread attention and appreciation. At the UNESCO-IHP workshop in 1993, (Van Engen, Kampe &Tjallingii, 1995), very similar approaches were shown to have been generated in different parts of the world.*

new approaches. As the time was not yet ripe for the new concepts to be introduced in real plans, they were further developed in the laboratory of the university where they served to prepare students for their innovative role. The series of interesting and inspiring plans that originated in this way, later proved to be a great help in convincing policy makers to start real world experiments.

The PROSA design approach, to be discussed in chapter 11, first was developed in 1987, bearing on the empirical experience of student projects. Only later it was described formally and used to design plans for a number of new urban areas[10].

FROM DESIGN EDUCATION TO PLANNING PRACTICE

In 1990, when I left the Faculty of Architecture, I was already working with BOOM consultants. After all those years at the university, it was a real challenge to work on real planning assignments in local authorities. One of these assignments brought me back to Utrecht and the Kromme Rijn area, to work on a proposal for a demonstration plan for innovative of water management. Starting with the ideas developed during the Kromme Rijn Project, I gradually became aware of the institutional and professional hurdles that had to be overcome before these concepts could be implemented. A simple proposal to prevent rainwater from roofs and streets running into the sewage system was unacceptable for the engineers of the provincial and municipal water departments. It implied they had to rely upon cooperation with other specialists and with residents. They were afraid they would lose control over the system they were responsible for. From their point of view the reluctance to shift from integration by calculation to integration by cooperation was quite understandable, and it took us a lot of energy and calculations to convince them of the need to start experimental pilot projects[11].

In 1990 I joined the Institute of Forestry and Nature Research at Wageningen and gradually shifted all my activities to fit in with that job. A special department focusing on questions of management and policy was set up in the institute and one of its research groups was to focus on urban planning and ecology. Here I was able to elaborate the basic concepts on the role of ecology in planning in a new cycle of the learning process, with local authority practice as the empirical field.

In a study project initiated by Jenneken Berends, Jan Goedman, Gijsbrecht Borgman, Yvonne de Vries and Henk Ter Heide at the Ministry of Housing Physical Planning and Environment, and commissioned by the National Spatial Planning Agency, the Directorate General for the Environment and three local authorities, I got the opportunity and the guidance to elaborate earlier concepts to the "strategy for

10 Tjallingii, 1991a, 1993a

11 From this project I have taken only this small example. It aimed at linking water management in the regional catchment area of the Kromme Rijn to proposals for the urban water system downstream. The results were communicated by the Demonstration Plans' Secretariat of the National Physical Planning Agency (1992) and published in more detail in De Jong, Mooijman&Tjallingii (1992) and During (1993). A discussion on the institutional aspects was published in the planning journal Stedebouw & Volkshuisvesting (Van den Berg, 1993; Tjallingii,1993b).

ecologically sound urban development" that was published later as *Ecopolis*. The study project was the starting point for international and national activities. The Dutch Physical Planning Agency started a working group on Sustainable Development of Urban Systems that coordinated a broad programme of studies all over the country (Heerema, 1995). The framework of strategic concepts evolving from these experiences and discussions at the national and the European level, is the basis of the chapters 8, 9 and 10.[12]

Working with these strategic concepts in the context of local planning issues, I was again confronted with other approaches: economic, managerial, technical and biological. This enabled me to assess the *ecological strategies* approach and compare its achievements and perspectives with other approaches. Chapter 3 confronts and discusses the different approaches. The chapters 4, 5, 6 and 7 explore the underlying fundamental questions.

SUMMARY AND CONCLUSIONS

In the course of my personal quest it became clear to me that the role of ecology in environmental planning cannot be limited to nature protection. Islands of nature will not be able to survive in a sea of destructive practices in agriculture and urban development. These types of rural and urban land-use too should be addressed by ecology to make them more ecological. Putting this idea to practice leads to a broad programme of research and planning that goes far beyond the biological or geographical frame of ecological research.

The need for this interdisciplinary approach emerged from personal experiences in research and planning projects that also gave practical clues to the first steps in this direction. Working with students of architecture and town planning at the Delft Faculty of Architecture I learned the strength of ecological strategies in design and planning. Later in a series of local authority planning projects this learning process was extended to operational local practice. The theory of the strategic concepts discussed in this book originated in this cyclic process of learning from practice.

Vital to the development of the planning concepts in this book was learning from the experiences of local officials responsible for management and maintenance of public open space and green areas. Surfacing from these experiences were ideas on the role of planning in preventing environmental problems. In the making of land-use plans, the role of water is important, both in structuring processes and in spatially organizing the plan.

12 The conceptual core of earlier publications (Tjallingii, 1978, 1981) was further developed in a students textbook (Tjallingii & Reh, 1989). The process of change and growth of these concepts then passed through stages of evaluation studies and case studies (Koning & Tjallingii, 1991; Haccoû, Tjallingii & Zonneveld, 1994). A comprehensive framework of the key concepts was published first as Ecologisch Verantwoorde Stedelijke Ontwikkeling (Ecologically Sound Urban Development) and then elaborated to the Ecopolis version (Tjallingii, 1992, 1995).

2. LANDSCAPE EVALUATION, A CASE STUDY

INTRODUCTION

As I did in the preceding chapter I will start again in the early 1970s. This time we will look deeper into substantive issues that are the point of departure of my reasoning in this book. The case to be discussed is the *Kromme Rijn Project*, a landscape ecology survey that aimed to contribute to regional planning. There are several reasons for choosing this old project as the starting point for a study on ecology and planning. First of all the choice is related to my personal involvement. I know it as an insider. The project triggered my work in this field and may be seen as the context in which the first ideas were born. Secondly, more than 20 years later, some detachment has developed, making it easier to look at the project from the point of view of the outsider. Being able to take the two positions is an advantage for assessing the project's meaning and impact.

The first section describes the survey, the other sections discuss how the results of the survey were used, misused or ignored in the course of the subsequent process of decision making.

2.1 The survey

THE PROJECT

The Kromme Rijn Project[1] was set up by a number of departments of Utrecht University in the early 1970s and lasted until 1979. It aimed at an ecological analysis and assessment of the landscape east of the city , being the catchment area of the Kromme Rijn river, an old arm of the river Rhine (figure 2.1).

Apart from the commitment of staff members and students to this research backyard of the university, there was a practical reason for selecting this area for a multidisciplinary research project. The provincial planning department was well under way with preparing the new Regional Plan and was prepared to cooperate. Thus there was a good opportunity for learning about the role of ecology in regional planning.

BASIC ASSUMPTIONS ON ECOLOGY AND PLANNING

In the university environment of the project, ecology was conceived primarily as a natural science, the territory of biology and physical geography. However, the participants felt it was necessary to focus the project on the ecology of the landscape as a whole, including the history of land use and town and country planning issues.

1 *This account of the findings and views developed in the Kromme Rijn Project is mainly based on the two reports: Kromme Rijn Project, 1974 and Kromme Rijn Project, 1979. An important source is also: Tjallingii, 1974.*

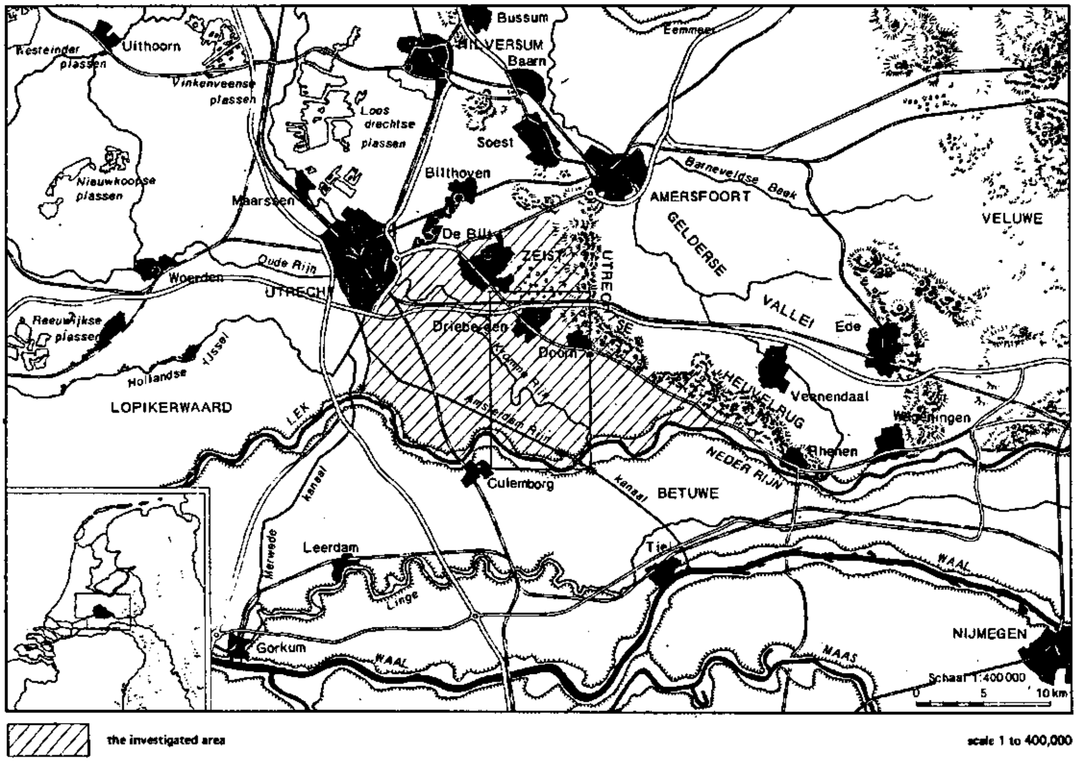


Figure 2.1:
The Kromme Rijn area.

Therefore ecology acquired a wider meaning indicating an approach for all the participating disciplines, including social sciences and design disciplines.

Nevertheless, nature conservation and habitat creation were chosen as the key functions to be studied, for several reasons:

1. In physical planning there was a growing concern about *nature*. In the Dutch context nature is used to indicate wildlife or areas less influenced by man. The Second Report on Physical Planning in the Netherlands, (Ministerie VRO,1966) stated: "The conservation and development of the natural richness of the landscape is a social necessity, as important as housing, providing work and transport facilities. This necessity is becoming more evident as the whole of society is more dominated by technology."

2. More than with any other function the qualities of *natural areas*[2] are deeply rooted in the physical conditions and the history of a particular place. Given also the vulnerable *nature* of the characteristics that qualify these areas as nature, the researchers felt that the planning process should start with natural areas, being the weakest links. Once the values and locations of natural areas are established, other functions then could be given their place in the spatial pattern.

3. Studying the more or less spontaneous plant and animal life also meant mapping the occurrence of sensitive indicators of environmental qualities. The understanding of these qualities was considered essential to the investigation because not only conservation but also the development of new landscapes and new nature should be made possible on the basis of the ecological potential of the area.

4. Sensitive indicators in terrestrial and aquatic environments also provided insight into the environmental effects of urban and agricultural activities and thus provided a basis for the planning of these activities.

5. The traditional experience of biology and physical geography has been accumulated in areas with processes less influenced by man. Biologists and physical geographers receive most of their outdoor courses in nature conservation areas. Thus the researchers, naturally, turned to these areas first.

2 *Following the Dutch convention adopted by the Kromme Rijn Project, I use* natural area *to indicate habitats like hedges, ditches, woodlands and wetlands that are considered to possess qualities of scientific or scenic interest. They do not necessarily have a formal status as a nature conservation area. Their natural qualities are primarily evaluated on the basis of the spontaneous presence of plant and animal species.*

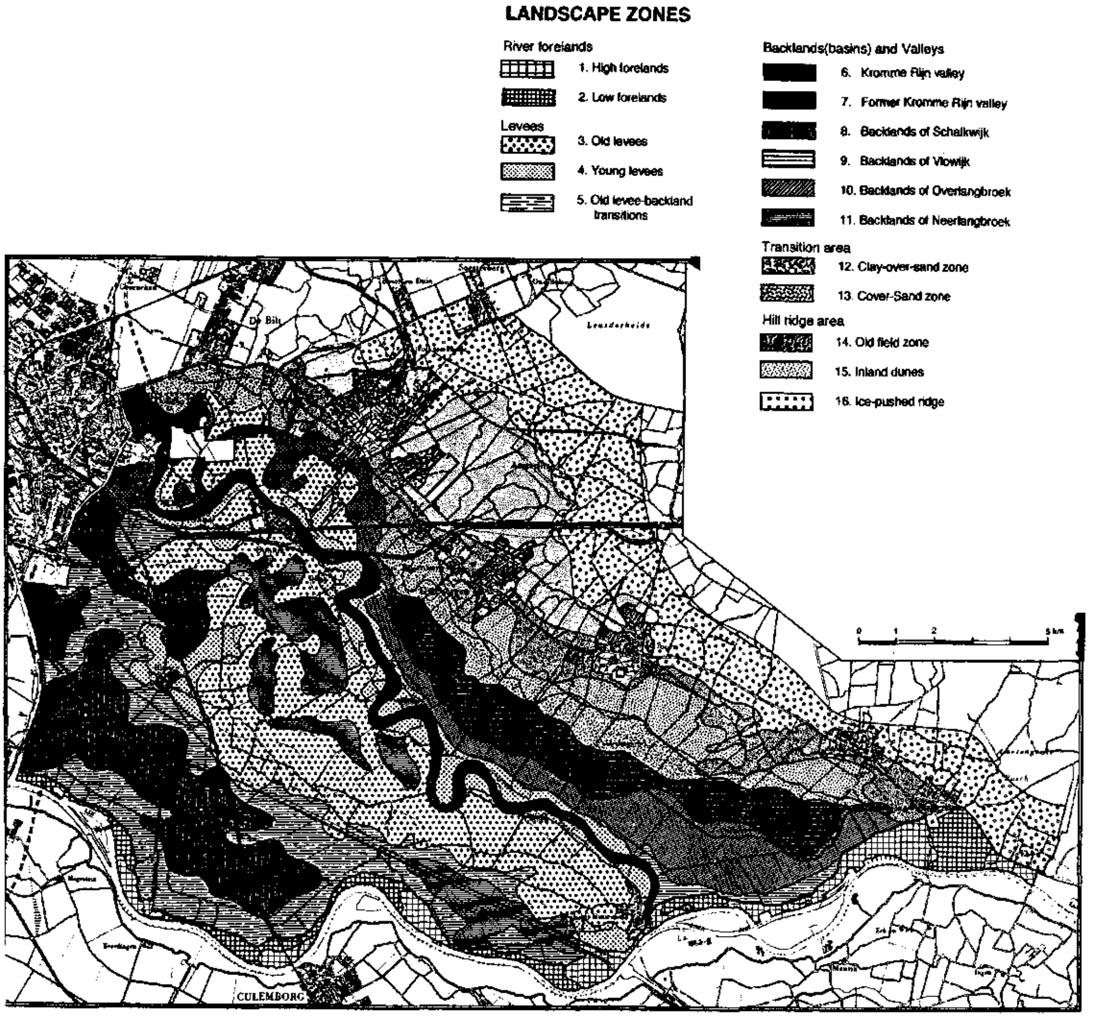


Figure 2.2:
Landscape Zone Map of the Kromme Rijn area.
source: Kromme Rijn Project, 1974.

Apart from functional conflicts between various types of urban and rural land use, the most important environmental problem was thought to be a general reduction of biodiversity and landscape diversity, an overall change of fine-grained to coarse and uniform patterns. Together with less visible environmental impairment like eutrophication the reduction of landscape diversity was held responsible for a general decline of the plant and animal world: both of species and of ecosystems.

Thus a detailed analysis of landscape-ecological structure and, more specifically landscape diversity, was considered necessary as a basis for planning.

LANDSCAPE ECOLOGY ANALYSIS

Decisions on the approach of landscape analysis were influenced by the nature of the environmental problems as well as by the tradition of methods in different disciplines. As a result the study of aquatic ecosystems, with its tradition of sample analysis, researched the pathways of pollution and eutrophication. The research on terrestrial ecosystems with its tradition of mapping, focused on unity and diversity of abiotic, biotic and cultural characteristics at the landscape scale. In the Kromme Rijn study the relationship between plant and animal communities and their habitat was chosen as the relevant springboard for the planning-oriented analysis of a landscape dominated by man. This led to the following results that were thought to offer practical pegs on which to hang decisions:

Terrestrial ecological units were distinguished by comparing of soil and vegetation maps.[3] This resulted in a *landscape zone map* (figure 2.2).
This map shows ecological units at meso and macro level. The analysis, however, started with micro-units.:

- the micro-units consist of a certain soil type with a certain vegetation type;
- the meso-units are characterized by their soil type which, if managed identically, would have one certain vegetation. But the management is not identical everywhere and therefore there are in fact different vegetation types, such as fields, woods and grasslands. The meso-units, presented on a map, show zones in which the ecological potential is identical. These zones can be described according to their characteristic sequence of vegetation types and the animal communities that are linked to them.
- the macro-units are characterized by a typical mosaic or gradient of the meso-units. As such the macro-units are closely linked with the geomorphology of the landscape, and, represented on a map, could be used in landscape planning.

The purpose of the landscape zone map is to provide a framework of this landscape's ecological potential to be used in the planning of all activities related to land-use in the area.

Terrestrial ecological diversity was also surveyed and mapped on the basis of soil and vegetation analysis supplemented by an ornithological survey. Diversity was considered a major issue in planning. As a basic document

3 *The method for this integrated survey is similar to the approach developed in Australia and Germany (Christian and Stewart, 1968; Haase,1968). For a discussion of the method, see Tjallingii,1974.*

there should be a landscape diversity map: the landscape ecology evaluation map. This multicoloured map cannot be reproduced here. Its legend is based on two surveys: The basic data concerning soils and hydrology, and on soil gradients with high potential for biotic differentiation were combined to a potential diversity map. The basic data on vegetation types, together with data on the vertical structure of vegetation (the presence of a tree layer, for instance) were combined to an actual diversity map. Actual values as represented by areas of scientific or scenic interest were then added to the actual diversity map.

Both the potential and the actual diversity maps were combined to produce the landscape-ecology evaluation map, the main visible result of the Kromme Rijn Project[4]. This map also shows smaller areas of special scientific interest. The purpose of this map is to indicate the ecological potential for diversity in landscape planning. As major building activities were considered to have irreversible impacts that reduced landscape diversity, these activities should not be planned in areas with high diversity values.

Aquatic ecological quality. A separate map presents the results of a hydrobiological analysis of water quality, linked to the working of the water system and to sources of pollution. The investigation also included chemical analysis, but focused on the way living organisms (plankton, fish) reacted to the combination of chemical parameters. A special study was made of the concentrations of toxic compounds in water and in fish.

For the discussion that will follow it is interesting to focus on the way the survey results were translated into practical recommendations that were presented in the final report.

RECOMMENDATIONS FOR REGIONAL PLANNING

The analysis of actual and potential landscape qualities and the effects of land-use led to recommendations to put limits to urban expansion and to the intensification process in agriculture. The Draft Regional Plan's proposal to establish a National Park in the eastern part of the area was supported. However, as this idea was clearly not compatible with current agricultural practice, the report suggested setting up pilot projects in the future National Park area, where agricultural and conservation organizations could cooperate to develop new types of agricultural management that might provide income to farmers and might contribute to the diversity of this cultural landscape.

4 *For practical reasons a number of assumptions and choices had to be made. These are discussed in detail in Tjallingii, 1974. The criteria used are based on: 1. the natural differentiation processes (maturation) 2. diversity of abiotic conditions (gradients, mosaics) 3. land-use diversity.* The landscape ecology evaluation map *focuses on map-unit pattern diversity and not on species diversity because it was thought to be more useful for landscape planning. In this respect the approach differs from other studies whose main purpose was to valuate habitats for plant and animal life.*

As regards further urbanization, the landscape ecology evaluation map indicates the more vulnerable and more valuable places in the area. It provides the town planners with information about where new urban areas will be more or less harmful to irreplaceable natural areas. The 1974 report especially criticizes the Draft Regional Plan's proposal to turn the village of Houten, southeast of Utrecht, into a new town of 25,000 or even 100,000 inhabitants.

Generally speaking, it was recommended to include landscape analysis in the process of urban design for new residential and commercial areas. Lessons may be learned from the planning of the new Utrecht University campus east of the city where the existing landscape and wildlife qualities were totally ignored.

The report is also highly critical about the plans for the construction of new highways in the Kromme Rijn area. The planned A 27 motorway came in for particularly severe criticism. Constructing this road would destroy an extremely valuable park woodland belonging to the old Amelisweerd estate, in the eastern urban fringe of Utrecht.

AGRICULTURE AND WATER MANAGEMENT

The second stage of the Kromme Rijn Project (1974-1976) focused on the effects of land-use and water management. Pollution of groundwater, surface water, solid waste disposal and noise problems are related to different types of land use. The second report (Kromme Rijn Project, 1979) tried to quantify the effects as far as possible. The recommendations include a proposal to introduce three landscape management zones, with increasing limitations about the degree of pressure permitted on existing ecosystems. A system of income compensation for farmers is proposed. In return, society gains the social benefits of maintaining and developing landscape and biodiversity.

The proposals for water management include prevention of pollution and the conservation of clean rainwater and upwelling groundwater.

2.2 The Amelisweerd case

What happened to the results of the research project? This section traces how the results of the research project failed to be used in one particular case. The problems faced are still highly relevant to the central issues of today's debate about ecology and planning. Thus the analysis provides a background and context for a comparison of approaches presented in the next chapter.

THE CASE

Amelisweerd is a beautiful park with some old estate buildings. It stretches along the Kromme Rijn river for about two kilometre. In its present state it is dominated by a 200-year-old woodland with a valuable flora and fauna and interesting scenery with characteristics of French and English style park design. As it is on walking and cycling distance from the city centre it has become a very popular recreation place for the citizens of Utrecht.

By the time the Kromme Rijn Project was well under way, in 1971, the plan to construct a new section of the A 27 motorway right across Amelisweerd had become a major public and political issue. The working group that sought to mobilize public and local politicians against the plan was both personally and scientifically supported by the Kromme Rijn Project. The question to be discussed here is: to what extent were scientific data on the history and the importance of the area for the plant and animal world and on the recreational value of the park decisive in the decision-making process?[5]

The Directorate-General for Public Works and Water Management (called here by its Dutch name *Rijkswaterstaat*) is responsible for the planning and constructing of the national motorway network. In 1971 *Rijkswaterstaat* already invested 8 million guilders in planning and buying the land. Builders had already been contracted when the public concern over the issue erupted, early in 1971. The money already spent, and the energy and prestige already invested in the planning proposal, proved to be the most important factors in the events that followed.

The working group first contacted the local press and politicians and published a report with a full account of the natural and cultural value of the park. In a few months 30,000 signatures were collected. The working group, though highly critical of the motorway whatsoever, tactically chose to plea for an alternative route for the road, one that would touch only the edge of the park.

As money played a major role in the discussions, the working group presented an economic valuation prepared by economists of Amsterdam Free University expressing the recreational value of Amelisweerd in terms of the costs of replacing the land and the trees. The alternative proved to be 2.4 million guilders cheaper than the original proposal. *Rijkswaterstaat*, promptly responded by calculating that the alternative would be 17 million guilders more expensive. A discussion over the basic assumptions in these calculations followed. The specialists' arguments were obscure to the other participants in the public debate.

A change in the national government brought a new Minister of Public Works into office who decided that the choice of the route of the road was a local issue, to be decided by the municipal council. In October 1971 this council finally opted for the working group alternative through the edge of the park (figure 2.3).

The working group was congratulated, even by its opponents, but was left with an uneasy feeling about what happened, against the background of increased motorization and road construction, a powerful process that was destroying the landscape. Elaborate scientific data on the value of the park could not stop this process. The efforts of the Kromme Rijn Project to elaborate a landscape ecology basis for land evaluation produced only limited results. Even massive protests were only capable of slightly reducing the damage. In the years that followed this uneasy feeling about the dilemmas of progress gained ground in society as a whole.

5 *The account of events presented here is based on the first and second report by the* Werkgroep Amelisweerd *(1971) and the publication* Amelisweerd, the road of most resistance. *(Grimbergen et al. 1983)*

In the mean time the decision-making process continued. Building permits for viaducts had to be issued and the detailed route of the new road had to be laid down in three official zoning plans, covering the different sections.

In these years engineers from *Rijkswaterstaat* gradually started to incorporate more ecological considerations in their work. The result was a proposal to put the road in a cutting to reduce noise nuisance in the park and to construct a *skin* to seal off the entire excavation from the groundwater. Thus the effects on water tables were minimized, but the gently sloping road verges required a 155 m wide zone of the woodland to be felled. The working group responded by developing an alternative construction, *bucket like*, with vertical walls. This alternative required only 55 m of woodland to be felled but the costs were about 10 million guilders higher.

In 1976, after lengthy discussions the municipal council opted for the *skin* construction by 21 votes to 19. Later, in 1980, the Crown decided it should be the bucket construction. Again the working group had been successful in promoting an alternative solution. But this was not the end of the story.

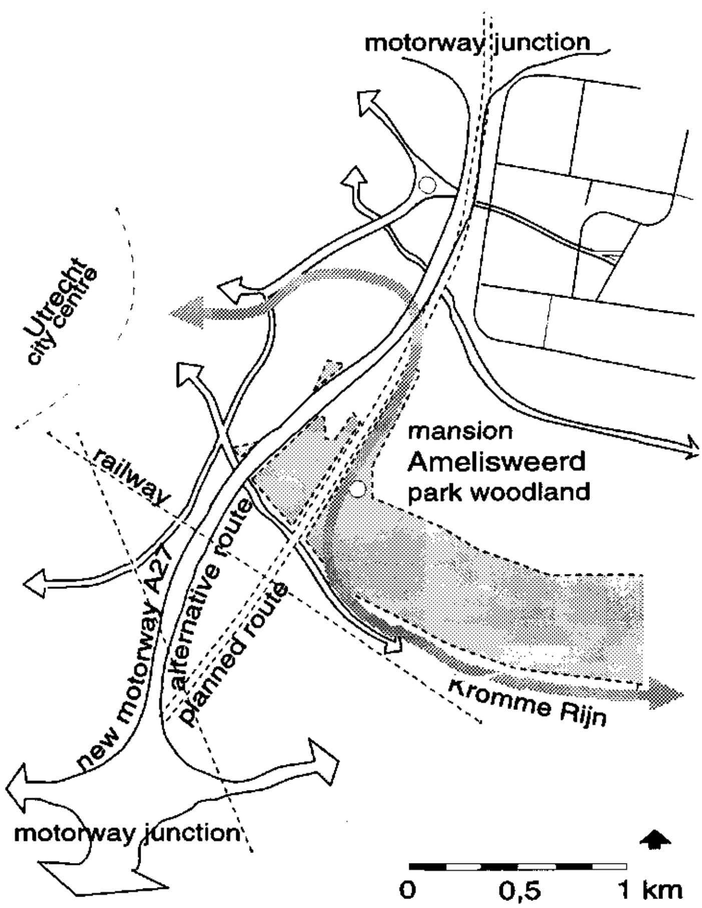


Figure 2.3:
Amelisweerd: shifting the location of a section of motorway.
source: Grimbergen et al., 1983.

In the years that followed *Rijkswaterstaat* went on with the preparations, demolishing houses and building sections of the new road to the north and to the south, thereby making the process increasingly irreversible. The working group and its supporters radicalized, thousands of people demonstrated, roads were blocked and even trains were brought to halt at the spot to draw public attention to the issue. In terms of politics the issue then became a decision between building quickly according to the plans, or considering and studying alternatives. The latter even included not building the motorway, but, instead, improving the parallel motorway closer to the city. The political discussions reflected a general shift in public opinion. Environmental issues became more and more important. Under these circumstances politicians were highly embarrassed by being placed in a position to have to decide to sacrifice a park for road construction. The 1,200 appeals against the zoning plan including the road were left unanswered. The politicians started to prevaricate in their public statements. This lasted until 1982, when, again at the national level, the Second Chamber finally cut the Gordian knot and with a vote of 71 to 69 decided to go ahead rapidly with the construction of the road.

On 24 September 1982, assisted by a big police force, bulldozers chopped down the trees. Activists had built huts in the trees and resisted physically on the ground. No people were killed but several were wounded. Newspapers reported it had been a dark day for democracy and that, in fact, there were no winners, only losers.

DISCUSSION

In the literature on policy analysis the Amelisweerd case is considered to be a classical example of policy implementation against a considerable loss of public support (Coenen, 1992, p. 142). The Amelisweerd case is not exceptional. Similar case studies can be written about the airport extension in Frankfurt and about motorway construction around London. In The Netherlands, in 1995 again, major issues like the expansion of the Schiphol and Maastricht Airports and the plan to construct a new railway line from Rotterdam to Germany (*the Betuwe line*) are again provoking similar emotions, political debates and planning dilemmas. As I am writing this, in the winter of 1996, the plans to build the *Newbury bypass*, west of London, evoke similar public reactions.

Is ecology capable of stopping these developments? To put it in a more moderate way: will it be possible to develop feedback mechanisms that may influence the interaction between society and environment? Or, to use the modern phrase, are there passable ways towards sustainable development?

In hindsight some comments can be made about the effectiveness of research in this planning context. One may conclude that scientific information about the park, as provided by the researchers of the Kromme Rijn Project, did play a role. The working group used it to illustrate the irreplaceable value of the park. This was probably convincing to large groups of citizens because it was their beloved park that was threatened. However, it did not convince others. Many people expressed their concern about the park, but considered the damage to the landscape as the price that should be paid for the inevitable and autonomous growth of car use.

Attempts to defend the park woodland by *calculating* the monetary value of nature failed because the calculations were refuted by other calculations. Contradictory statements by experts from both sides cancelled each other out. There was no agreement on *the facts*. Politicians primarily responded to the massive public support. Later, however, some of them became irritated by, what they were calling, the activists' *dogmatism*.

At first the engineers were sceptical about the landscape ecology information, believing it to be irrelevant. Later, when public support for the motorway weakened and concern for environmental issues was growing, they started to think about mitigating the ecological impact of the road. However, the Kromme Rijn report did not provide much information relevant to that question.

Looking back at the decision making process, the working group did not change the course of events by underpinning the value of the park, but *by putting forward practical alternatives for the alignment of the road.* The research project, however, did not provide these.

It is difficult to assess the relative influence of information, public support, lobbies and technical alternatives. But the role of the latter seems to be very important, especially when there is public support for the underlying values. Would things have turned out differently if alternative solutions had been considered from the outset? We will never know. At the time of the first plans and investments in groundwork, however, ecology was not an issue. Throughout the decision-making process the early investments continued to be a strong argument against any alternatives. Later, when the dominant attitudes in society had changed, there was actually no way back and polarization was almost inevitable. In the end the democratic participation procedures only sharpened the conflict by causing endless delay in decision making.

This leaves us with the question about the role of ecology in developing alternatives that are practical not only in a technical sense but also in terms of being socially and economically capable of gaining public support. In this case ecological research did increase awareness of the problem but to be effective, not only the problem but also the possible solutions should be on the political agenda.

2.3 The Houten case

The Houten case seems to confirm last section's conclusion. The researchers, however, felt different about this case. Their results were not ignored in the planning process for the new development, but misused. Discussing the Houten case is also relevant here because it is throwing more light on the role of ecology in the making of plans.

THE CASE

Though some of the recommendations about urban extensions were adopted by the Regional Plan for the area, the advice to stop the village of Houten being developed into a big new town was not.

In 1973 a preliminary report of the Kromme Rijn Project evaluation had been sent to a number of people for comments. One *reaction* we got hold of by chance was the first draft of a zoning plan for the expansion of Houten. Without consulting the research group the planners had used the *landscape-ecology evaluation map* to locate the new urban extensions in an area that had not been given a high *actual value* on the map. A section of the evaluation map was reproduced on a more detailed scale. A special shading, indicating a high ornithological value, was left out. The report recommendation for further detailed research before planning in these areas was ignored. The Kromme Rijn Project group protested in vain. This example of misuse of scientific data was not illegal.

The planners of the new Houten development can be blamed for misusing the Kromme Rijn Project preliminary report. They cannot be blamed, however, for entirely disregarding ecological considerations. At the time there was an environmental motive for the planners of urban expansion schemes east of Utrecht. At the national level it had been decided that the *Green Heart*, the central rural area in the Randstad, should be kept free from urban development.[6] In recent years, under the pressure of increasing housing needs, this national policy , however, has been weakening. Early in 1995 a master plan was presented for an urban development of 30,000 dwellings west of Utrecht. Times and paradigms are changing. In hindsight one may say that, of course, a survey of the landscape east of the city is not the appropriate basis for an assessment of all possible locations for expansion.

Another asset of the Houten location is its position on the railway line from Utrecht to the south. It was assumed that, by building there, car use could be reduced by developing an attractive public transport alternative to commuters. This opportunity was absent in the area of Nieuwegein, south of Utrecht, where the planning of another new town was well under way. Later, in the eighties, a new rapid tram was built to connect Nieuwegein with the centre of Utrecht, but by then most people had already become used to go by car. In Houten there was good public transport from the outset.

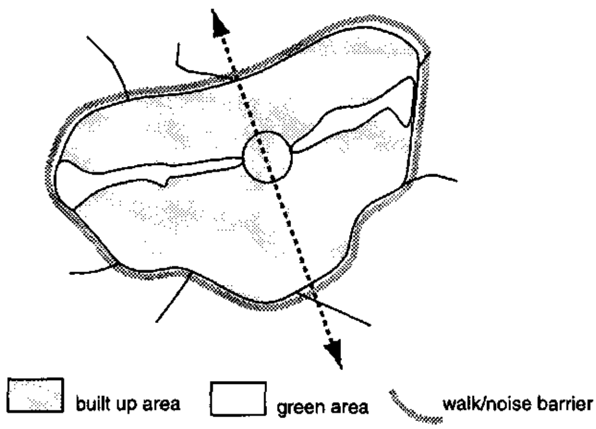
Meanwhile new Houten has been built. For certain aspects, ecological considerations were decisive for the plan. The transport concept, for example, has led to the railway station having a central position and to a town plan based on bicycle use (figure 2.4).

The shortest way from the new districts to the town centre and from one district to another is the bicycle path. Cars have to take the ring road skirting the built-up area. Indeed the number of car trips per household is 25% below the average (De Jong & Bosch, 1992). However, the average car trip for shopping is

6 *I will discuss more of the Green Heart's pains and pleasures in chapter 10.*

slightly longer, if compared with similar towns (Brükx et al. 1993). Both groups of researchers agree that the town structure of Houten significantly contributes to a high share of bicycle and public transport in total kilometrage: the so called modal split. In this respect the town planning in Houten is seen by many as an example for modern transport planning. This is supported by research on the functioning of shopping centres (Klein & Buit, 1994).

The noise barrier dikes on the inner side of the surrounding ring road give the town the appearance of being fortified. But unlike the old fortified towns from earlier centuries, the edge of the residential area is not an pleasant verandah leading to the surrounding countryside. The town - country relationship is noisy, with busy traffic that forms a barrier for pedestrians, cyclists and animals. It would not be very attractive for animals to cross it anyway, because most urban grassy areas are managed according to a regime that involves mowing 26 times per year.



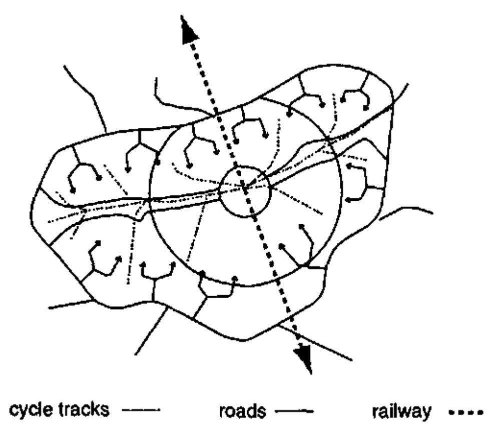


Figure 2.4:
Layout of Houten new town.
source: Houten local authority.

DISCUSSION

Houten new town was not built in one of the ecologically most valuable areas, and at no extra costs the new urban area could have been a place that enriched plant and animal life in the region. But the ecological researchers played *all or nothing* and got nearly nothing. Indeed the Kromme Rijn Project results did not provide guidelines for town planning. Management recommendations were made for other activities like agriculture and water, but most eyes looked at the evaluation map. In a way not foreseen by the researchers, this map was eagerly used for weighing purposes. But that was only widening the gap between ecological researchers and planners, between survey and plan.

Yet, even during the research work, there was contact with students of architecture and town planning from Delft University of Technology. One of the discussion points was whether building should take place in areas of low ecological value, like the monotonous basin clay areas, or in potentially high value areas like the more diverse river levee areas. The Delft students opted for the latter and tried to use the differences in soil and relief to create an attractive plan. The resulting sketches were an eye-opener for most of the researchers, who were working in the Utrecht University campus which is a depressing example of modern town planning. It dawned on them that it is possible to design towns differently and that a good urban design even might be more beneficial for plant and animal life than the existing intensively drained and fertilized agricultural land use.

In its second stage, however, the Kromme Rijn Project did not enter the interesting field of research and planning being opened up by the confrontation with a new generation of town planners. As a result the discussion ground to a halt on the question of whether or not to build. There are several possible reasons for this:

1. Most researchers were unfamiliar with a design approach, and the real world town planning as exemplified in the new developments in the Utrecht area did not encourage them to embark on this challenge. *The landscape evaluation map* and the other results of the Kromme Rijn Project did not shut these doors, but neither did they open them.
2. A more fundamental reluctance may also have constrained the researchers. Once engaged in a design process they feared that the question of whether or not to build would no longer be at stake.

As a consequence, ecological planning was trapped in its defensive stance: defending wildlife and landscape, *nature* as it was called, against impairing activities.

2.4 Use and usefulness

The two cases reveal how several results and conclusions of our survey were not used, rejected or even deliberately misused. Is this a general picture? In this section we will first look at some general impacts of the Kromme Rijn Project. Then, we will see that the method of landscape evaluation as such was criticized in the debate over the report.

LANDSCAPE ECOLOGY AND SUITABILITY

The landscape zone map (fig. 2.2), based on the tradition of soil and vegetation surveys leading to land suitability maps, aimed to be useful for land-use activities. At the national level the approach inspired a landscape ecological survey which had to provide basic information for land-use planning, or *physical planning* as it was called in the Dutch situation.[7] The survey was commissioned by the National Physical Planning Agency in accordance with the objectives of the third Memorandum on Physical Planning in The Netherlands (Ministerie VRO, 1977) These objectives included a zoning scheme for rural areas *interweaving* nature and agriculture in some zones. However, the zoning plan did not change dominant agricultural practices. Groundwater and air pollution continued to increase and thus, nature did not really benefit from interweaving.[8]

At the time it was hoped that the Kromme Rijn zone map could also be used when planning less intensive agricultural management. But the dominant trend in agriculture was, and still is, intensification based on manipulated soil and water conditions leaving no prospects for a real landscape-ecology approach. De Smidt, one of the Kromme Rijn Project leaders, was assigned by the Ministry of Agriculture to chair a national committee on alternative agricultural practices.[9] But the response from the official agricultural world was predominantly negative and the committee report only led to a marginal research programme. In the Kromme Rijn area, following one of the project's recommendations, there was an attempt to set up a working group of ecologists and farmers to discuss the development of new perspectives. But here too, concrete results did not really materialize.

LANDSCAPE EVALUATION

Being one of the pioneer studies in this field, the Kromme Rijn Project, influenced the practice of physical planning in The Netherlands.[10] The making of Regional Plans, offering a strategic frame fore local zoning plans (designated land-use plans) is a core activity in physical planning, or spatial planning as it is called now. In the 1970s Landscape ecology survey became a regular practice in the preparation of Regional Plans. Generally speaking, planners and decision-makers were quite satisfied with the evaluation maps that provided them with, what was perceived as *objective* information on wildlife and landscape. This information was considered useful for weighing procedures in the context of location choice in spatial planning. Most provinces, being the authorities responsible for regional

7 *The maps, at a scale of 1: 200,000, link stages of potential vegetation development to soil and water conditions (Kalkhoven et al. 1976).*

8 *The Third Memorandum (Ministerie VRO, The Hague, 1977) introduced the* camel, *a model that showed zones of strict separation of functions and other zones based on* interweaving. *There was, and still is, a small programme of income compensation for farmers in the interweaving zones but the planners focused almost exclusively on the spatial pattern side of the problem and not on the production processes and their environmental impact. This lack of balance in the planning approach of rural areas is analyzed in Tjallingii, 1978.*

9 *Commissie Onderzoek Biologische Landbouwmethoden,1976: Alternatieve Landbouwmethoden. (Alternative Agricultural Methods).*

10 *Recently, for reasons unknown to me, the official English translation of the Dutch Ruimtelijke Ordening has been changed: from* physical planning *to* spatial planning.

planning, set up survey teams to inventory wildlife, scenic and historic features in their territory. The surveys were called landscape mapping or environmental mapping projects. The resulting information on maps was then evaluated using methods that resemble the Kromme Rijn Project approach. Several students who took part in the Kromme Rijn Project later became leaders of these provincial teams.

Together with colleagues from other universities, who had been active in similar projects, the Kromme Rijn researchers set up a National Association for Landscape Ecology. This Association flourished and organized the exchange of experiences. In 1979 one of its working groups published an assessment of 13 landscape evaluation projects which concluded that environmental mapping has not prevented further environmental degradation in the surveyed areas.[11] Social and economic trends are to strong. A change of mentality was thought the only remedy. It was suggested that maps might contribute to this change.

In the 1980s, as Environmental Impact Assessment became legally required in major plans, landscape ecology evaluation became a regular part of this procedure. Section 3.1 discusses further developments and other aspects of the evaluation methodology.

A DISCUSSION ON LANDSCAPE EVALUATION

The *landscape ecology evaluation* was not considered useful by some planners and designers. A discussion about the Kromme Rijn report in a leading planning and design journal (De Boer, 1975; Tjallingii, 1975) made clear that the important issue of how to use a landscape in a dynamic society was left in the shadow of the question of whether or not to build. Once that issue was settled in the political debate, the landscape architects and town planners could not use the static information of the evaluation studies.

A group of *critical biologists* made fundamental objections from a different point of view. In their view, evaluation maps risk "indicating where the landscape can be destroyed" and are part of "a defensive strategy to save one part of the landscape by sacrificing another". The environmental evaluation maps only discuss the place of development and not the nature of the developments themselves (Werkgroep Kritische Biologie, 1977).

The two reactions represent opposite views on conservation, but they both point at the risk of focusing ecological research exclusively on location choice. This conclusion seems to agree with what can be learnt from the two cases. At its best, the landscape evaluation map contributed to a shift of activities. In conflict areas its result was polarization. But is there really a way to stop unlimited motorway construction, to discuss the nature of the automobile system or the continuing process of urbanization? Is there a way out of this dilemma?

11 Burggraaff et al. 1979. p. 212.

Udo de Haes and Ter Keurs have reported on an environmental conflict in the Leiden region, where a planned motorway was cancelled after intense debate and with the help of a feasible public transport alternative. Their case story is told in a book that discusses more than 25 environmental action histories from The Netherlands in the 70s. Out of this collection, 11 cases in the field of urban and transport planning may be called successful. Making alternative plans in each case played a key role in their achievements.[12]

2.5 Summary and conclusions

Looking back at the Kromme Rijn Project and trying to learn its lessons, some comments can be made. Would it be more fruitful to direct ecology to generate practical alternatives for human activities? Would the Kromme Rijn Project have been able to stop the road and the urban expansions if transport planning and urban design had been incorporated in the research programme? Probably not, but keeping our hands off certainly did not keep them clean, as others were doing the quick and dirty job.

In other fields like water management and agriculture the Kromme Rijn Project did indeed focus on activities. However, the gap between our recommendations and day-to-day practice of these activities was obviously too wide. Clearly, the hurdles to implementation need more attention from researchers and planners. I gave an illustration of these hurdles, when I discussed my later work on water management issues in Utrecht and the Kromme Rijn area in chapter 1.

Looking for ways to improve the interaction between ecology and planning, two leading questions emerge:

1. How may ecology play a role in planning for *activities*? By activities, here, I mean environment-use activities.
2. What could be ecology's contribution in generating alternatives, or, more generally, in the *making of plans*?

These questions have been the driving forces behind this study. They became more and more urgent as the environmental crisis deepened and the need for sustainable development was more widely recognized in the 80s and 90s.

12 The case study by Udo de Haes & Ter Keurs, 1978 was published with many others in the review Environmental action in the Netherlands *(Tellegen & Willems, 1978).*

3. APPROACHES TO ECOLOGY AND PLANNING

INTRODUCTION

Bringing ecology and planning together has been the aim of a great number of researchers and planners over the last twenty years. To what extent these efforts have produced alternatives to the Kromme Rijn Project approach? This chapter will look at four approaches to ecology and planning: In section 3.1 the further development of the landscape ecology evaluation approach will be discussed under the title *nature's values*. The key role in this approach is for conservation of wildlife and scenery. In section 3.2 then follows a review of the approach focusing on the development of target nature types or target images of nature. Subsequently, in section 3.3, the *ecological standards* approach will be presented, that sets ecological limits to all activities using the environment. The theme of section 3.4 is the *ecological strategies* approach, that seeks to develop guidelines for activities and their spatial arrangement. I have slightly sharpened the positions held by the four approaches in order to elucidate the position of the ecological strategies approach adopted in this book.

From the critical assessment of the Kromme Rijn Project in the preceding chapter, two issues have emerged deserving further attention:1. The prospects of a combined approach of spatial and functional planning of environment-use *activities*. 2. The prospects of a combined effort of research and planning in *the making of plans*, in developing alternative options. In the final section of this chapter these two issues will be discussed in relation to the four approaches.

3.1 Nature's values

PROFILE

This approach originated from the idea that areas or features of scientific and scenic value are undervalued in planning decisions. Following the Dutch convention, I will call these areas or features *nature*, indicating the key role of spontaneous processes, albeit after initial human interventions. As *nature* is not tradeable on the market, other means have to be found to establish its price or value. By linking the environmental evaluation methods to the theories of welfare economics an attempt is made to overcome their deficiencies.

objective

The main objective is to attach quantitative and if possible monetary values to *natural* areas to make *nature* more objective and competitive in dynamic decision-making.

research

As objective criteria are asked for, research focuses on quantitative characteristics. On the natural science side this also implies quantifying criteria like *naturalness*[1]. At the social science side it implies inquiries to establish *willingness to pay* and comparable criteria.

planning

A market model of decision-making is central. Also nature has functions, it delivers goods and services to people. Decision-making is perceived primarily as choosing between *allocation* alternatives. The result can be a decision to buy the land and to designate it as a nature conservation area, or to save the area by planning development elsewhere. The approach focuses on planning tools like Cost-Benefit-Analysis and Multi-Criteria-Analysis[2].

communication

It is assumed by the protagonists of this approach that decision-makers may best understand the information presented to them in the language they know: figures.

users

The approach addresses public and private decision-makers but is considered most useful to government agencies or councils that have to balance different claims.

EXAMPLES AND EXPERIENCE

In The Netherlands and elsewhere, throughout the period of 1970-1994 much effort was given to developing theory and practice of assessing nature's values in *landscape evaluation* projects, thus further elaborating the approach described for the Kromme Rijn Project in chapter 2. The assessment by Burggraaf et al. (1979) of 13 projects in The Netherlands has already been mentioned. Tips & Gysels (1979) present an extensive review of these studies in different European countries. Many ecologists and planners consider *functions of nature*, expressing the potential of the natural environment to fulfil human needs, a fruitful concept as a basis for valuation.

A more fundamental approach linking the concept of function evaluation to physical planning was published by van der Maarel & Dauvellier (1978) in their General Ecological Model (GEM). They introduced the categories of production, carrier, information and regulation functions. The GEM is a comprehensive study that provides an excellent picture of the state of the art in the late 70s. The report includes a general assessment of some national policy documents. Later, the GEM concepts on function analysis and ecological interaction analysis were not used

1 *W. de Groot (1992, p. 218 ff.) defines the concept of* naturalness *as contextual, reflecting the unmanipulated state of the ecosystem at a given place. It is the essential complement to* species diversity *which is not contextual and can also be developed by the zoo or the botanical garden.*

2 *Some studies, like the General Ecological Model (Van der Maarel & Dauvellier,1978) reject the use of monetary values for natural areas. Instead criteria based on functioning are preferred, that can be used for example in Multi Criteria Analysis procedures where each parameter is assessed according to its own criteria.*

explicitly in physical planning. The reasons for this were never assessed.[3]

The *function concept* provided a common language with economists exploring this field (Hueting, 1980; Braat et al. 1979). This evoked more thinking about *nature's price* (Van Dieren & W. Hummelinck, 1979). Recently this line of thought was further elaborated by R. de Groot in his thesis on Functions of Nature (1992). In his book he applies the approach to case studies on Tropical Rainforests, the Dutch Wadden Sea and the Galapagos islands.

A recent review of landscape evaluation methods, assessing them for application in Environmental Impact Assessment procedures, is rather critical about these methods in general (Ministeries VROM / LNV, 1992). An American review of literature on Landscape Ecology and Its Potential Application to Planning (Hersperger, 1994) pays little attention to this approach.

DISCUSSION

In several European countries the approach was very popular in the 70s but recently researchers and planners seem to be becoming sceptical about its usefulness. Economic planners, however, are still exploring the field, primarily in the context of Multi Criteria Analysis (MCA) applications.[4] The criticism levelled at the approach focuses on three aspects:

First of all there is an ethical question. Why should the survival of a woodland depend on our clumsy ways to prove that the functions of the woodland have value? Why not shift the burden of proof to the traffic planners? This, of course implies considering other transport options which is not easy. But attributing values to natural areas is not easy either, especially if the *intrinsic* (non instrumental) values of plant and animal life or the value for future generations are concerned. The literature is full of discussions about criteria to assess these values.

Secondly and quite ironically *the subjective character* of so called *objective criteria*, formulas and weighing and aggregation procedures is criticized. "The risk of manipulation is great, especially as complicated calculations are involved that cannot be followed by outsiders" (Ministeries VROM / LNV, 1992, p. 320). R. de Groot (1992) presents a good example of this risk. According to him, the main objection to the application of criteria like *naturalness, diversity, species richness* and *rarity* in the landscape evaluation studies, is the aggregation of different criteria values to one value on the map. An area with a score of 3 for diversity and 7 for uniqueness shows itself as equal to another area with 6 for naturalness and 4 for ecological fragility. However, one cannot simply total figures which represent fundamentally different values. De Groot suggests that only areas with similar ecological characteristics should be compared (R. de Groot, 1992, p. 3). However, in his proposal to determine socio-economic values by adding up scores per category, De Groot himself falls into

3 *Goedman (1978, pp. 287-391) criticized the GEM concepts on theoretical grounds. The GEM, he stated, concentrated on the information and regulation functions but failed to elaborate the production and carrier functions. As a result, the GEM did not open up a dialogue between ecology and economy.*

4 *The ins and outs of MCA procedures in strategic planning at large will be discussed in section 5.4.*

the same trap (R. de Groot, 1992, p. 151 ff.)

A third point of critique concerns *the static nature of the evaluation*, being a picture at a given moment and not doing justice to physical and social processes. These may include further deterioration but also improvement by good management practices or by creating new habitats for wildlife.

These criticisms adds to the problems of ranking values leading to saving one part of the landscape by sacrificing another. We have discussed this already in section 2.4. Functional *evaluation* tends to reduce the values of natural areas and landscapes to debatable indices or aggregated values. Pricing nature is already a difficult matter. Sometimes it is even more difficult to find people who are prepared to pay that price. Functional *analysis*, however, seems to have great potential to make decision-makers aware of ecological interactions. Both Van Dieren & Wagenaar Hummelinck (1979) and R. de Groot present impressive examples of descriptions of the functions of nature. These descriptions illustrate invisible ecological processes that may also create conditions for economic activities.

For which category of planning situations might the Function Evaluation of natural areas may be appropriate? It seems to have potential for situations involving decision-making on predominantly economic grounds such as large development schemes. The construction of large dams is a good example of the functions of nature being underestimated of the by economists and decision-makers. The tragedies of the Aswan Dam in Egypt and other *damned big dams*, like the one in West Africa discussed in chapter 1, could probably have been avoided by careful environmental function analysis and evaluation in an early stage of planning (Hardin, 1973, p. 40; Stüben, 1986). R. de Groot mentions the important role of a clear description of the functions of tropical rainforest in formulating the Dutch foreign aid policy concerning tropical forests.

3.2 Target images of nature

PROFILE

As a reaction to the defensive approach of *nature's values* and stimulated by unexpected spontaneous wildlife development in the new polders in the IJsselmeer, a new offensive approach emerged in The Netherlands.[5] The approach is called nature development, or developing new nature. It would have been more precise to speak of creating new abiotic conditions for wildlife to develop spontaneously.

5 *In the first plans for the new polder of South Flevoland, an industrial zone was planned between the new towns of Lelystad and Almere. However, because of a serious problem of upward seepage this idea did not materialize. Instead, a wetland that soon acquired an international reputation for its bird life developed spontaneously: the Oostvaardersplassen. A management plan was made to enhance its qualities for wildlife. (Vera, 1980) Later even the route of a new railway was shifted to ensure that nature would develop undisturbed.*

objective

To formulate concrete and detailed targets, by describing target types, defined in terms of species or in terms of the images of the ecosystems. These images may lead decision-making.

research

The advantage for researchers of a well defined target type is that they can focus on species and therewith are able to use the extensive literature on the ecology of these species. Once the target types with their species have been chosen, there are no difficult problems relating to assigning a value to these species.

planning

Focusing on the results that are to be achieved enables the necessary steps to create that situation to be formulated by means of *back casting*, the reverse of forecasting. This implies an emphasis on a preset result. Looking backwards from that point, the interventions necessary to create this result are investigated and planned. The way target images are chosen remains vague. Time and again the question "What nature do we want?" turns up in literature.

communication

It is assumed by the protagonists of this approach that decision-makers and the general public may best understand the information presented to them in the form of maps and pictures of the final result. In many cases a symbol is chosen, like the World Wildlife Fund's Panda or "The salmon back in the Rhine" (the target image, of the international Rhine programme).

users

The approach addresses the general public, conservation organizations and public decision-makers. The emphasis is on sectoral planning for nature conservation and development.

EXAMPLES AND EXPERIENCE

Habitat creation (called nature development in The Netherlands) has a tradition in the planning and management of urban parks. The first pilot projects in the new Flevoland polders may have further stimulated the approach in the Netherlands. A special chair was established at Wageningen Agricultural University as early as 1974, where Van Duin started teaching the principles of what was called *habitat construction* in the Department of Agricultural Engineering (Van Duin, 1974). However, it was not until the late 80s that the approach became popular. In 1987 the Stork Plan for the central river area in The Netherlands was launched (De Bruin et al. 1987). Here, the Black Stork was the symbol for a multifunctional design and planning programme with an emphasis on nature development in the river forelands.

In 1989 the Third Memorandum on Water management (Ministry of Transport & Public Works, 1989) introduced the AMOEBE method to set target images for *ecological restoration* of the sea and the rivers. AMOEBE (in English: Amoeba) is an acronym for the Dutch title, which translates as General Method for Ecological Description. The method was later used to indicate target types for nature conservation policy in general. Figure 3.1 illustrates the National AMOEBE. On the circle a number of indicator organisms are listed, representing groups of species. The circle itself represents a historical reference index, based on data for 1900-1950. The shaded areas indicate the frequency of the species in 1990, as a percentage of the reference index, in this case the situation between 1900 and 1950. The figure shows that the occurrence of most desired species has declined considerably, whereas the occurrence of undesired organisms like algae has increased. The AMOEBE model shows the target that is equivalent to the reference index. Thus a clear illustration is given of targets as compared to the present situation. As an indicator it also serves to demonstrate the effectiveness of policy measures.

Later the target image approach was adopted by the National Nature Policy Memorandum (Ministerie LNV, 1990) in its plan for a National Ecological Network for The Netherlands and for a large number of smaller projects that were planned and implemented by public and private conservation organizations (Dijs & Groen, 1990). Recently the target type approach was elaborated into a comprehensive system of 132 nature target types for The Netherlands (Ministerie LNV,1995) On the global scale the target image approach has also been adopted, notably by the World Wildlife Fund.

DISCUSSION

The target image approach is attractive to the public and to the policy makers at national, provincial and local levels. It has certainly succeeded in freeing nature from its conservative and defensive image. Something can be done actively and something can be shown. There are campaigns, there is publicity. The criticism focusses on several issues:

The choice of reference types and indexes in the AMOEBE models is somewhat arbitrarily fixed at the years 1900-1950 (sometimes at 1930), mainly for reasons of data availability. In some areas the situation has changed to such an extent that the target is not realistic. In other areas the targets could easily be higher. It seems more sensible to take the ecological potential of an area, not a historic reference as a starting point.

The accuracy of the target types is an understandable wish of operational managers and of politicians who want to show the public exactly what is going to be achieved for the taxpayers money. But predicting ecosystem development with that exactitude is impossible. The arrogance of *making new nature* risks to evaporate the last tiny difference between gardening and creating conditions for nature development.

Some critics fear that the attention paid by public and policy-makers to *new nature* may cause a further decline in the quality of *old nature*, as for example the meadow birds of normal farmland or the old cultural landscape with hedges (Van Zomeren, 1994). This critique includes the more general point that the approach further stimulates a separation of land functions. As a result there will be, for instance, less incentives to change agricultural practices that cause falling water tables and eutrophication. These may also threaten *new nature* development. Nature cannot flourish in islands surrounded by sources of aerial and water pollution.

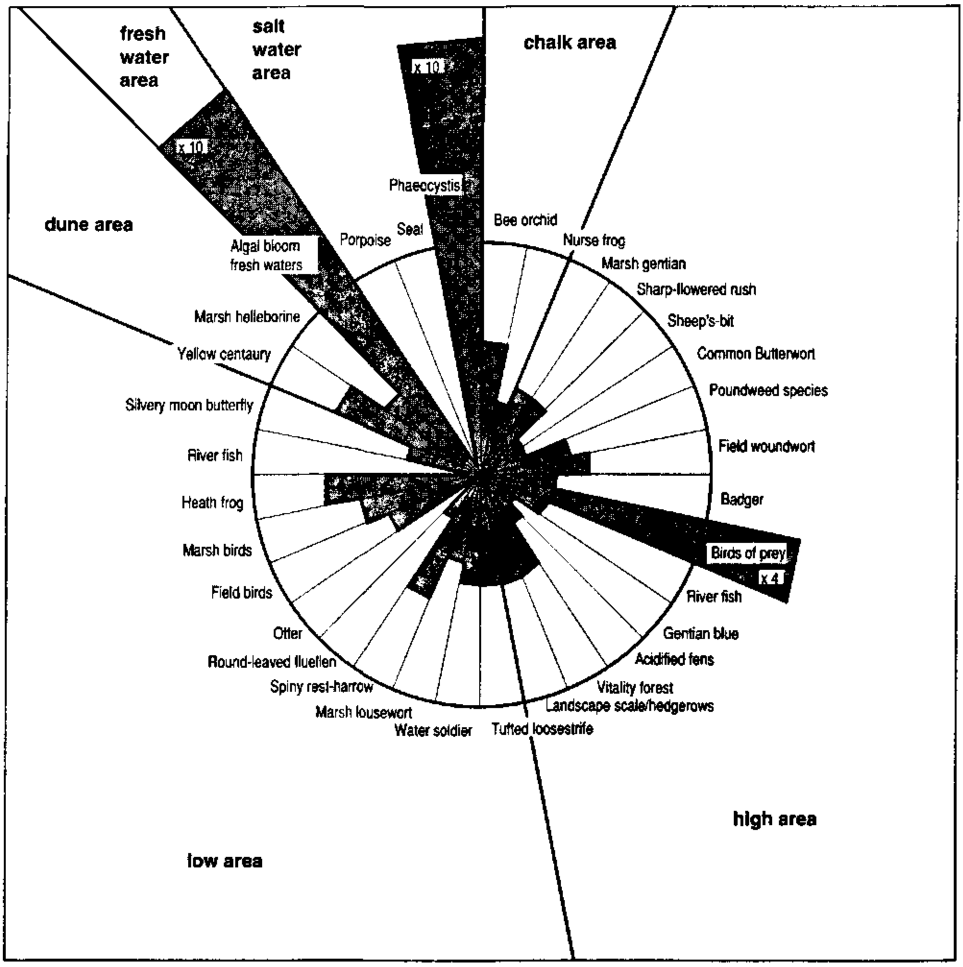


Figure 3.1:
The National AMOEBE 1990.
source: Latour & Reiling, 1991.

A more general comment refers to the target image method as such. The operational and sectoral nature of this approach to planning tends to lose sight of the social causes of environmental problems. Increasing the targets of one sector is not conducive to integration. It will create more claims on land use and does not promote cooperation. The chairman of the Dutch branch of the World Wildlife Fund recently declared that his organization declines cooperation between nature and agriculture "The WWF opts for nature that stands on its own feet" (Nijpels, 1995).

3.3 Ecological standards

PROFILE

The central idea of the ecological standards approach is to restrain or set limits to all activities that may harm nature, or impair health or the environment. All activities motivated by social or economic needs should meet ecological standards to create a healthy and sustainable environment. Throughout the history of health policy standards indicating thresholds that should not be crossed or limits that should not be exceeded have played a major role. Later they were extended to meet wider environmental issues. I call them *ecological standards*. Rather than giving nature a higher price on the dynamic decision-making *market*, the approach tries to delineate the static boundaries that limit the field of operation of all environment-use activities.

objective

The objective is to formulate concrete and detailed limiting values for *emissions* or *immissions*. Target standards are made for the long term and limiting standards for the short term.

research

Standards require clear definitions and justification by experimental or statistical research such as risk analysis and dose-effect analysis. These types of research produce standards that may take the form of: No Adverse Effect Level (NOAEL), Maximal Acceptable Concentration (MAC) and Acceptable Daily Intake (ADI).

To analyze compliance with standards, extensive monitoring research programmes have been started.

planning

Risk analysis and studies on No Adverse Effect Levels may generate standards that should be anchored in legislation. They take the form of *general standards* for all activities or *special standards*, formulated for specific functions or areas. At an early stage of standards developing they may have a task-formulating function. After legislation or incorporation in the remit of organizations they acquire a role in implementation or enforcement practices.

To assess the effectiveness of policy measures and instruments standards are often aggregated to indices. Generally speaking, the key role of standards is in the testing of plans; they provide criteria.

communication

The assumption is that clear and unambiguous standards communicate the objectives of environmental policy to all concerned.

users

Above all, the approach compels the national government to produce standards that can subsequently be used by private and public decision-makers at lower levels. In recent years the concept of environmental space or *ecocapacity*, defined by all environmental standards applied to a certain area, has been introduced to communicate to users the space available for their activities.[6] Figure 3.2 illustrates the ecocapacity for the city of Amsterdam. The sum total of all emissions should not exceed the level indicated by the bell-glass. The highest level is the health intervention level, the bold line shows the present level and the lowest level is the target standard for the long term.

EXAMPLES AND EXPERIENCE

In the first stage of environmental policy in all industrialized countries, standards were formulated for *environmental compartments* like soil, air and water and, in connection with these, for the issue of permits to industries. Later, the use of standards was geared to decision-making at the project level. Here Environmental Impact Assessment (EIA) was the prime instrument. When it was first introduced in the United States, this procedure served to provide "a mechanism for analyzing anticipated compliance with standards". (Legore, 1984). Norms and standards are indispensable in impact studies, inside and outside EIA procedures.

In the 80s, a two-pronged approach to environmental planning developed in The Netherlands: the source-directed (preventive) and the effect-directed (curative) approach. Standards are used as an instrument on both sides, but the emphasis is on the effect side.

The next stage of environmental planning in The Netherlands implied a further shift towards integrated planning. The memorandum More than the Sum of the Parts (Ministry of Housing, Physical Planning and Environment, 1984) first outlined the synergetic effects resulting from integral policy that chose themes, target groups and regions as points of departure. In this sequence they represent the key problems, the socio-economic sectors responsible for these problems and the specific environmental functions performed by areas. These three are the backbone of the first Dutch National Environmental Policy Plan (1987) and its successors. Standards still play a role, of course, but attempts are made to connect them to the themes, target groups and regions.

The increasing complexity of environmental regulations has stimulated the national government to develop indicators and indices at side. In a recent state of the art publication, Adriaanse (1994) describes performance indicators that present achievements toward set target standards. The indicators are made so that they are "clear and transparent ways of presenting the environmental issues we face." As the

6 *The concept of ecocapacity will be discussed in section 6.1.*

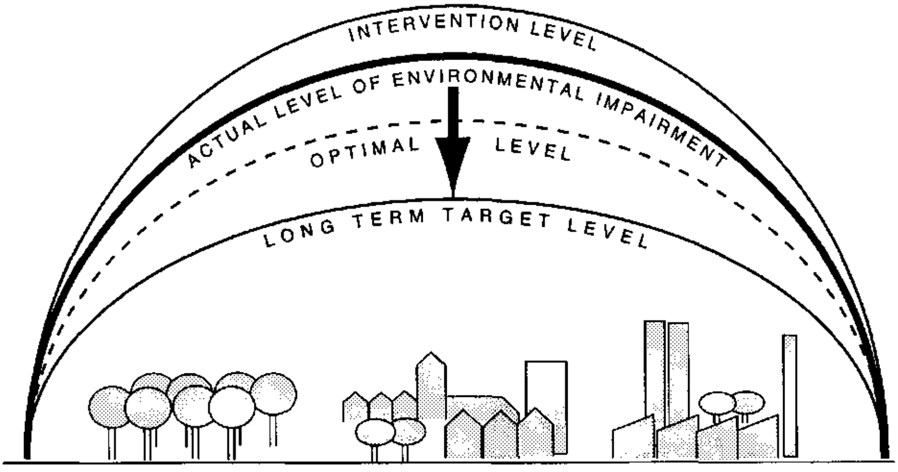


Figure 3.2:
The ecocapacity for the city of Amsterdam.
source: Dept. of Physical Planning, Local Authority Amsterdam.

main issues are elaborated as themes in official environmental policy, an indicator is developed for each theme. Several criteria are aggregated to make the theme indicator.[7]

The use of ecological standards is common practice in many countries. A German example is the introduction of ecological standards in urban planning in order to to make construction and design more ecological (Schäfer, 1992).

DISCUSSION

Setting standards is one thing, but meeting them is a different matter. In the Netherlands, water quality standards were set in the 70s by legislation and policy implementation plans. In 1984, the Dutch water quality managers observed that in spite of their efforts it seemed impossible to meet the standards set (Dekker & Nieuwdorp, 1990, pp.77-81). They put the blame for this on the standards. First of all they criticized their uniformity. The same salt content, for instance, can be natural in brackish water but indicate severe pollution in fresh water. These discussions could be settled by further refining the standards. Their second objection is more difficult to deal with. Assessing ten years' experience of working with water quality standards, the managers conclusion is: only attainable standards make sense. If not, they demotivate the water managers who, ultimately, disregard the rules. To make the standards more practicable they should be attuned to local

7 *The* themes *in Dutch environmental policy are: Climate Change, Acidification, Eutrophication, Dispersion of toxic substances, Disposal of solid waste, and Disturbance of local environments. Two other themes, Falling water tables and Squandering of resources have not yet been dealt with in the indicator development programme (Adriaanse, 1994).*

ecological capacities, to the functions officially assigned to surface waters and to shorter planning periods .

If we followed these recommendations, made by people involved in problems of day-to-day management, standards would be shifted from national and strategic to local and operational planning. This may be seen as an indication of the domain where standards can be effective and legitimate. But as a result the standards may become more of a compromise, and national targets to reduce the overall emission levels are pushed to the long term. The dilemma is clear: the causes of diffuse pollution seem to be beyond reach for the water quality managers, but merely setting national standards does not change these diffuse polluting practices.

The example of water quality standards reveals a general problem of setting and enforcing standards, (*direct regulation*). As Dutch national environmental legislation developed, the system of regulations grew too complicated. It became increasingly difficult to obtain the essential information for differentiated norms and to enforce the set standards. A special committee of the Netherlands Scientific Council for Government Policy reported on this issue (WRR, 1992). Its conclusion is that direct regulation should be used with restraint. Instead the policy instruments chosen should depend on the situation of the target groups involved. The committee reviews a great number of instruments that offer alternatives to direct regulation: financial transactions (charges and subsidies), private law mechanisms (liability) and social regulation (covenants).

The *policy performance indicators* presented by Adriaanse present the same problems connected with attaching weights and aggregation that have been mentioned in the discussion part of the nature's values approach. For example: the indicator for the theme climate change dropped from 286 CO_2 equivalents in 1980, to 239 in 1991- a 16% reduction. The figure resulted from a weighted summation of 4 greenhouse gases. However, the emission of one of these greenhouse gases, CO_2 , has actually risen by 8%. In the indicator this was compensated for by a drop of the other figures.[8] What do these figures tell us? Primarily they indicate whether the government has achieved a significant reduction in the emission of greenhouse gases. From that point of view they seem to make sense.

If we look more closely into the matter some doubts arise. Climatic change, for instance, is influenced not only by emission but also by absorption of greenhouse gases: the *content of these gases in the atmosphere* is crucial. Absorption, however, is not measured in the indicator. One process of CO_2 absorption is photosynthesis by algae. The growth of algae is highly stimulated by surface water eutrophication, an environmental problem covered by another indicator. Now let us assume that both the eutrophication and the climatic change indicators drop sharply. This implies the absorption of CO_2 is reduced. At the same time the CO_2 emission may have increased, as in the case mentioned above. As a result, the policy performance indicators show good results but *the CO_2 content of the atmosphere rises*! This demonstrates that the indicators sometimes hide more than they reveal.

8 Adriaanse, 1993, p. 20-25.

Fever can be measured as an indicator of the illness and recovery of the patient, but if there is no recovery the fever does not inform us about the causes of the disease or about its cure. Likewise, policy performance indicators demonstrate the achievements of policy instruments to a certain extent. But they do not inform us about the causes, nor about the improvement of instruments to abate persistent problems.

3.4 Ecological strategies

PROFILE

The central idea of this approach is that ecology should be internalized in all activities. In pre-industrial times, ecological considerations played a major role in mankind's interventions in the environment because mankind had inadequate technical means. Now that technology has developed in a revolutionary way, a *deliberate strategy* is required to make our activities more ecological. The ecological strategies approach has developed in design and planning from the pioneers of ecological villages to the World Commission on Environment and Development (the Brudtland Commission) and its plea for *sustainable development*.

objective

The objective of ecological strategies is to formulate long-term ecological goals and to indicate means to work in that direction. In this approach, solving environmental problems and creating conditions for their prevention have to be incorporated in the normal activities of governments and private actors. Thus the objective is to integrate ecology into planning, design and management.

research

Research is indispensable for making strategies and plans. But researchers from the natural and the social sciences seem to keep a fair distance from the design process that is considered the domain of designers and planners. Researchers, also from the technical sciences, usually focus on modelling and *testing plans* rather than on developing guidelines to *make plans*. As demonstrated by the case study in chapter 2, there is a gap between researchers and planners.

planning

Strategic planning seeks to combine short-term starting points for planning with long-term prospects via with mid-term modes of operation.[9] *At the policy level*, scenario studies may survey the possible developments in the context. Strategies outline the options to react and act in the present situation (Becker, 1994). *Policy design* has recently also included environmental issues in its case studies (Hoogerwerf, 1992).

At the project level, Environmental Impact Assessment procedures have stimulated the generation of *environmentally friendly alternatives*. However, the

9 *In this formulation I follow Kreukels, as quoted by Ter Heide (1992, p. 15).*

EIAs bias towards impact analysis has deflected attention from the making of plans to the testing of plans. Yet, the best assessment methods do not produce better results, if no good alternatives are considered.

communication

The assumption is that it will be possible to achieve consensus about general aims, communicated by simple narrative programmes and drawn diagrams. At the project level, pilot plans demonstrate the feasibility of alternative solutions.The concrete projects communicate the visible solutions and demonstrate costs and principles of implementation and management, including the participation of public and private actors.

users

Unlike the ecological standards approach, there is no hierarchical structure among the users. Governments and private initiatives may opt for ecological strategies at different levels. They may learn from each other.

EXAMPLES AND EXPERIENCES

project level

One source of the ecological strategies approach at the project level is the stream of pilot projects that resulted from local initiatives. There were two different strategies in the environmental movement from the outset: *influencing government decisions* and *developing alternatives* (Tellegen, 1983). The second strategy was embodied by pioneer projects, like the *eco-villages*. Initially they were rather isolated, separated from the other strategy and some of them even from the world in general. Later, in the 80s, as more connections between the two strategies developed (Cramer, 1989), several authors tried to draw lessons from the pioneer projects for ecological planning in general (Lutz, 1987; Nicholson Lord, 1987; Koning & Tjallingii, 1991). The lessons from the building technology pioneers were used in the emerging *ecological building* (or sustainable building) practice (Krusche et al., 1982, Duijvestein, 1990).

The history of ecology and design is another project level source of the ecological strategies approach. North American landscape architects have played a leading role. Olmsted's plan for the Boston Fens, made in 1887, is a classical example of integrated ecological design.[10] Mc Harg's Design with Nature (1969) represented a renaissance, and a start in the development of methods. Later, Spirn (1984) and Hough (1984, 1995) were among those to contribute significantly to the development of the approach. In The Netherlands Maas (1971) and Reh (1980) were among the pioneers. It was not until the late 80s that the roots of the ecological approach in landscape design grew deeper in professional practice (De Bruin et al., 1987; Van Buuren & Kerkstra, 1993).

Architects and urban designers like Alexander (1975) and Lynch (1981) also

10 Olmsted combined park design with a flood prevention scheme, an idea still considered innovative in modern plans based on the same principle. The plans for Boston and Olmsted's ideas are described extensively by Spirn (1984).

made valuable contributions to practice and to the theory of the ecological strategies approach. The title of a recent publication by Hartman & Sijmons (1995): "Environment, a source of inspiration for urban design" reveals an important aspect that distinguishes the approach from the others described in this chapter.

policy level

At the policy level, the ecological strategies approach developed more slowly. The *environmental model* introduced in 1971 in a policy document on the future of South-West Netherlands and described by Goedman (1978) was an early attempt. Goedman himself elaborated theoretical concepts on the economy-ecology interactions and on epistemology. One of his sources was the concept of *Ekistics*, "the science of human settlements" focusing on scale hierarchies (Doxiades, 1976). In the 80s and 90s other dimensions were explored. Huber (1982) opened up new perspectives in the ecology-politics discussion and introduced the concept of *ecological modernization*. This concept will be used in the next chapters, because it expresses very well the idea of internalizing ecological principles in processes of social and technological change. Neddens (1986) focused on the issue of ecology and architectural form. W. de Groot (1992) made fundamental contributions to the facts and values debate in environmental science and design.

The Brundlandt report (WCED, 1987) led to *sustainable development* becoming the issue of a new worldwide debate on ecological strategies, taking into account the needs of future generations. The discussion initially focussed on the role of ecology in development plans in the third world. Gradually, however, sustainable development has also become an important theme in planning in industrialized countries. Urban planning took the lead (Cadman & Payne, 1990; OECD, 1990; Commission of the European Communities, 1990) later also in rural planning the implications of this concept were elaborated (Van den Berg et al. 1995). At a more general level ecological strategies are now integrated in scenario studies. In The Netherlands, the Netherlands Scientific Council for Government Policy (WRR, 1995) used scenario studies in an analysis of sustainability, environmental and social risks.[11]

DISCUSSION

As I will discuss the planning aspects of the *ecological strategies approach* in later chapters, here I will only mention some aspects of the *man versus nature discussion*, as this is the central issue in the comparison of the four approaches in this chapter.

Many conservation-minded ecologists are reluctant to become involved in urban planning or in other planning *from the activities side.* They prefer to stick to *nature's values*, *target images of nature* or to defensive ecological standards. By so doing they seem to stay in the domain of their own empirical methods and do not become mixed up in politics. "Working for the enemy is dangerous!'" they seem to

11 This study will be discussed in chapter 6.

think. As a result , however, man and nature are kept separate, both in the minds of people and in our landscapes. Hence, in society, nature conservation areas become separate amenities that have to be paid for from the revenues of a polluting economy. The chimney must smoke to save the forest! As we live in one world, however, there is no lasting perspective for this separation of functions. This is not to say *any* functional separation is to be rejected. 'Good fences make good neighbours', as a well known saying goes.[12] Alas, there are no good fences against pollution of the air or groundwater.

Whether they like it or not, ecologists therefore have to occupy themselves with current economic and social dilemmas. These issues limit or create the conditions for the development of wildlife. In "The lost innocence of ecology" Huber (1982)[13] stresses this point: "There are no alternatives for industrial society, only *within* it."

But how effective can *ecological strategies* be? Can they really save forests? Or can they really offer prospects for survival? In the face of doomsday scenarios, any strategy is powerless. If we follow some ecologists, only coercion as an instrument in a technocratic *eco-dictatorship* could possibly save us.[14] In chapter 6 I will elaborate on this dilemma. At this stage I will only give a short comment. The dictatorial approach seems to be neither feasible nor desirable. Alarming figures should not be ignored but they should be seen in the context of the necessity to seek democratic ways to solve environmental problems. Doomsday thinking does not promote the creativity that is so badly needed in a situation of threat.

At the national and local level of environmental policy, the ecological standards approach, aiming at direct regulation, has already come up to face its limits. This means we have to develop more creative means. The *ecological strategies* approach tries to develop these by seeking practical answers for actors facing dilemmas in their attempts to translate environmental awareness into environmentally sound activities. This implies the *standards* and *strategies* approaches may be combined in a balanced carrot and stick policy.

3.5 Comparing four approaches

Having described the four approaches to ecology and planning, I will now look at them from two different points of view: the man versus nature and the ecology and planning perspective. But before doing so I will confront the four approaches with the two issues raised in the introduction of this chapter.

12 *The sentence stems from the American poet Robert Frost.*

13 *My translation from the German "Die verlorene Unschuld der Ökologie", Joseph Huber, 1982.*

14 *These views stem, for example, from Ehrlich's The* population bomb *(Ehrlich, 1968) or from the writings of Garrett Hardin (1968). Recently the Club of Rome's Report Beyond the Limits. Confronting Global Collapse; Envisioning a Sustainable Future (Meadows et al., 1991) has again expressed the view that democratic societies are unable to take the drastic measures that are required.*

FOUR APPROACHES

Two issues about ecology and planning were selected from the Kromme Rijn case study. The first, is concerned with nature (wildlife- species and habitats) and the activities that act upon the environment as a result of land-use, or rather environment-use. Does the approach focus on influencing environment-use *activities* or does it focus on protecting *qualities of nature* (species diversity, naturalness etc.) against these activities?

The second issue is about the way the approaches seek to influence planning. Do they focus on the testing of plans (criteria) or on the making of plans (developing alternatives)

	activities	qualities of nature
making of plans	ecological strategies	target images of nature
testing of plans	ecological standards	nature's values

Figure 3.3:
The four approaches as related to two pivotal issues.

In figure 3.3 the four approaches discussed in this chapter have been arranged under the two issues. We can examine the approaches from different perspectives:

THE MAN-VERSUS-NATURE PERSPECTIVE

From the perspective of the *man-versus-nature* discussion the four approaches can be considered as alternatives. One can either give priority to increasing nature's price, or to actively restoring and developing nature, or to restraining threatening activities or to influencing these activities to make them less impairing. It is conceivable, of course, to unite them all in one comprehensive strategy. But even then it is worth looking at the differences first.

Both *nature's values* and *ecological standards* may be qualified as *defensive*, whereas *target images of nature* is more *offensive*. The defensive-offensive antagonism is inappropriate, however, to characterize the integrated *ecological strategies* approach.

It may be argued that all four approaches are ecological strategies. However, in the context of the *man versus nature discussion*, I see *nature's values* and *target images of nature as strategies for nature conservation areas, certain species and biodiversity.*

Ecological standards is an ecological approach addressed to all activities, but it is a strategy *against* these activities rather than for activities. The norms and standards still belong to the domain of ecology as a natural science. Thus, the approach can better be characterized as a defensive *strategic ecology* than as *ecological strategy.* I have therefore chosen to call ecological strategies the approach that tries to internalize ecology in the environment-use activities.

In the meeting rooms and studios where plans are made and interventions are prepared, we can not change the processes of nature, we have to focus on man's activities and seek to change them from within. The *ecological strategies approach* does not fit in the *man-versus-nature* picture. It does not place man opposite nature but seeks to incorporate nature in man's activities. This is a fundamentally different position, with far reaching implications, as will be discussed in the next chapters.

THE ECOLOGY AND PLANNING PERSPECTIVE

From the perspective of the ecology and planning discussion, however, the four approaches are not alternatives. They may be combined, taking *target images of nature and nature's values* for sectoral planning tasks and *ecological standards* and *ecological strategies* for integrated planning. In doing so, *ecological standards* may be seen as one category of planning instruments that deserve a role within the framework of an *ecological strategies approach.*

According to Steiner (1991)[15] ecological planning is " the use of bio-physical and socio-cultural information to suggest opportunities and constraints for decision making about the use of the landscape."

Following this definition, the nature's values and ecological standards approaches focus on the constraints for all activities other than nature conservation. In the planning process this implies the role of these approaches is in the testing of plans.

On the opportunities side, the *target images* of *nature approach* plays its role in the making of plans for *conservation management* or *new nature development.* The ecological strategies approach has great potential to use the opportunities for the making of integrated plans for all environment-use activities.

3.6 Summary and conclusions

The *ecological strategies approach* is the best starting point for developing an integrated planning framework linking ecology and planning. This conclusion follows from the assessment of experiences in the Kromme Rijn case in chapter 2 and from the discussion of four contrasting approaches in this chapter. My main arguments to opt for the *ecological strategies approach* are: it addresses *all* environment-use activities and it focuses on the *making* of plans.

15 Steiner, F. 1991: The living landscape, an ecological approach to landscape planning. Quoted by Hersperger (1994).

This choice of a starting point does not exclude the other approaches discussed in this chapter from playing an instrumental role. *Ecological standards* cannot be missed as instruments for *monitoring* environmental quality. To improve that quality one needs more. Sectoral planning for the *nature sector* (the social sector concerned with nature conservation and the creation of new habitats), can find its place with other sectors in an integrated ecological strategy. Whether the nature's values or nature's price approach can be useful for weighing the sectors' against other interests, remains to be seen. The Kromme Rijn case study and the discussion in this chapter do not support a recommendation of the nature's values approach for this purpose. An analysis of the functions of natural processes for society, however, and an inventory of wildlife habitats and species, seem to be crucial in the context of environmental planning. The target images approach seems to be promising in a sectoral and operational setting.

The ecological *strategies approach* will further be explored in the following chapters and this will lead to the Ecological Conditions Strategy as a basis for planning practice. That will be the theme of part III of this book.

The comparison of approaches in this chapter clarifies the position the ecological strategies family. It also highlights a number of fundamental issues that have to be elaborated further: they are the themes of part II.

The main questions are:

1. If *ecology* is applied to all economic and social activities that play a role in the interaction between society and its physical environment, then what exactly is ecology? Is it a science or a way of life? Related questions include: Is ecology *back to nature*? Is it a *primitive technology*? Is it *organic architecture*? Is it one particular *life style*?

2. Will it be possible to conceive an ecological approach that creates conditions for natural and cultural diversity?
These questions will be discussed in chapter 4.

3. How may ecological research be deployed in the making of plans? This leads to leads to other questions, such as: How does ecology relate to empirical and normative sciences?

4. How can the government's apparent need for *objective criteria* to be used to weigh conflicting interests, be met? Will it be possible to overcome the disadvantages of the *nature's values* approach in this respect?
These questions will be discussed in chapter 5.

5. To what extent the global carrying capacity is at risk? Are ecological objectives, related to these risks, attainable in democratic societies?

6. How to cope with the problems of risks and uncertainty in planning?
These questions will be discussed in chapter 6.

7. How will it be possible to develop planning as a learning process linked to ecological strategies in a dynamic society?
   This is the question to be discussed in chapter 7.

Most of these questions have been touched upon already in this chapter. But the answers have to be deepened and related to each other. As explained in the first chapter, for practical reasons *urban* planning will be the central field for the elaboration of the ecological strategies.This seems to be at odds with the traditional view that ecology is *absent* from the urban environment, but it may illustrate my point that ecology is relevant for all activities.[16]

16 Eugene Odum, in his Fundamentals of Ecology (1971, p. 269) classifies urban-industrial environments as non-vital systems. Others, like R. de Groot (1992), still hold this view.

INTERMEZZO 1: DISCOVERY IN THE CHERRY ORCHARD

The preceding chapter yielded a number of reasons for opting for the ecological strategies approach. What are the practical prospects of this approach? Before further exploring the theoretical foundations, we will cast a quick look at a students' design project from 1978. At that time I had only an intuitive notion about the need of an ecological strategy, but: "Efficient practice precedes the theory of it ."[1]

In summer 1978 I walked with two students of town planning in the Kersenboogerd (Cherry Orchard), a polder area near Hoorn, north of Amsterdam. Only a few of the orchards that had given the area its name had survived, and pasture and ditches now dominated the polder landscape. The reason for our field visit was an analysis of the ecological potentialities of the polder as an area for a new urban expansion to Hoorn. Approximately 6000 new dwellings were planned in this area of about 160 ha and my two students had chosen to base this their graduation project on this planning programme.

Looking for ecological characteristics that could be used in the urban design, we made an important discovery. We found some interesting plant species like *Equisetum fluviatile*, a horsetail, growing in the ditches, not everywhere but only where the ditches crossed the *creek ridges* formed as levees by seawater during high tides before this land was protected by dikes. The water in the creeks was running relatively fast during high tides and hence the resulting levees have sandy cores that still play a major role in the hydrology of the area. Rising no more than one metre above the surrounding area, the ridges were hardly visible but still ecologically effective. In those sections of the ditches that crossed the ridges, upward seepage occurred and the horsetail was an indicator species of the clean seepage water. Thus we discovered *clean water sources*!

We realized that these sources could serve as key elements in the design of the water system for the new urban area. As can be seen in figure 4.1, the ditches in the students' plan no longer cross the ridges but carry the clean seepage water to the lower basins on either side where, together with the more polluted runoff rainwater, it is being collected in water courses running to the pumping station that keeps the polder dry. The soil map, showing the extent of the creek ridges in the area thus provided the basis for drawing the water structure plan, being a first stage in the students' design process.

1 *The quotation is taken from Gilbert Ryle's The Concept of Mind (1980, p. 31). In this book, first published in 1949, he criticizes Descartes's* two-world myth. *Ryle rejects this myth, which he describes as* the intellectualist legend of the Ghost in the Machine. *According to Ryle the action does not necessarily follow a pre-existent idea; knowing how, develops by doing things. I will return to this discussion in chapter 5.*

In further stages of this process the traffic system completed the main structure and then the location of green areas, housing and services was geared to this structure. The existing ditches, the surviving orchards and other elements were included in the detailed land use plan as far as possible.

Thus it was not the inventory of valuable areas that was the ecological input to the plan, but the interaction between ideas on water management and the ecological capacities of the local landscape. The ecological strategy approach combined general guiding principles on flow management with an area-specific analysis and design process. Plant species were not elements in a target image. But as indicators for environmental qualities they triggered the whole process of the making of a multi-functional plan.

Figure 4.1 illustrates the stages in the making of the water structure-plan and is taken from the study by Kleikamp & Westrik (1979). In a later publication I discussed the plan in the context of the development of guiding principles and guiding models for urban water systems (Tjallingii, 1991).

At the time, this academic exercise was far ahead of real world design practice. However, as a research project the plan was very useful in elaborating design implications of the approach.

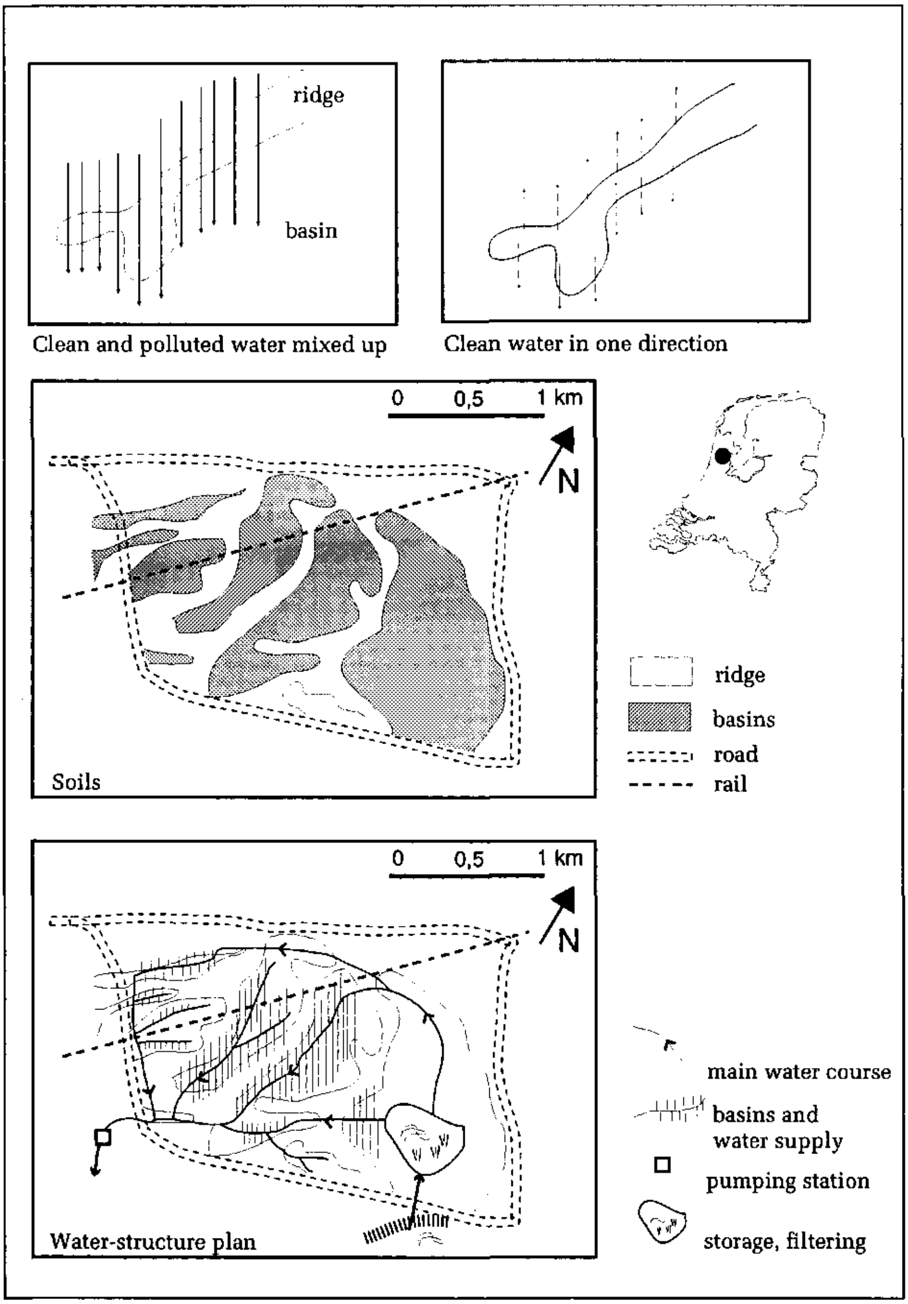


Figure 4.1:
Stages in the making of a water-structure plan for Hoorn-Kersenboogerd.
source: Kleikamp & Westrik, 1979.

II FUNDAMENTAL ISSUES

4. ATTITUDES, LIFESTYLES AND IMAGES

He who wishes to determine everything by laws,
will stir up vices rather than reform them.[1]

Spinoza

INTRODUCTION

In chapter 3 I chose to elaborate the ecological *strategies approach* further. What is the general aim of this strategy I am pursuing? Does it imply a specific attitude towards nature or a specific approach to ethics? The *man versus nature* discussion in section 3.5 has already drawn our attention to the relevance of basic attitudes towards man and nature. Section 4.1 focuses on the metaphysical questions about world models and basic attitudes towards nature and on the ethical questions about rules of conduct towards future generations and towards other species. These questions are crucial when scientists, politicians and philosophers speak about changing mentality or lifestyle because they are concerned about environmental problems.[2] What is lifestyle, and what does a change of lifestyle imply?

Section 4.2 discusses the lifestyle issue, placing the ecological strategy in a social context. Does an ecological approach require a specific lifestyle? In section 4.3 I will extend this question to specific architectural images. Is an ecological approach identical to a dominance of wild and green and *organic architecture*?

From the planners' point of view, neither the rather vague plea for a change of mentality nor the rather precise ideas about a new lifestyle or about images are useful. In this chapter I will use *the metaphor of the tree.* The ecological strategy emerging in this chapter creates *conditions* (physical and organizational structures), symbolized by the stem of a tree. The stem may rest on different roots (basic attitudes) and should be able to carry a diversity of branches (lifestyles and preferred images). Thus, creating good ecological conditions for a pluriform society becomes the general aim of the strategy. From the family of ecological strategies the Ecological Conditions Strategy emerges.

1 *"Qui omnia legibus determinare vult, vitia irritabit potius, quam corriget." I owe this quotation from Spinoza's Tractatus theologico-politicus, chapter XX, to Schuyt's essay: Spinoza, ecological thinking and change of lifestyle (Schuyt, 1993)*

2 *The scientists' cry for a change of mentality has already been mentioned in section 2.4. A change of lifestyle is pleaded for by authors like A. Naess (1989), C. Schuyt (1993) and G. A. van der Wal (1994).*

4.1 Ethics and attitudes towards nature

This section first discusses basic attitudes towards nature, then considers ethical issues and finally it focuses on the relevance of these matters in the context of ecology and planning.

One specific question concerns me in this section. In the planning documents of published regional plans it is not uncommon to find a map called: "constraints", or "limiting conditions". This map shows the present richness of wildlife and cultural heritage! What is the background to this attitude that considers environmental qualities only from the negative side?

MAN AND NATURE, BASIC ATTITUDES AND WORLD MODELS

The basic attitudes described in environmental philosophy are a good starting point for the discussion on metaphysics and ethics. I present my own interpretation that has various sources.[3]

The way people see environmental issues is connected to their *world views* or basic *attitudes* towards nature. At least four contrasting attitudes can be discerned:

1. **Man as the master of nature.**
   Intrinsic, i.e. non instrumental value is found only in man. Nature is instrumental. According to Stoic thinking, man has the right to dominate nature. Following the ruling Judeo-Christian line of thought he (of course *he*) even has the *duty* to dominate nature. A consequence of the Cartesian revolution was that the effects of this attitude gained momentum by turning nature into an instrument subordinate to science and technology.

   This basic attitude is shared by two contrasting views on environmental problems.

   1a. Market and technology.
   The attitude is based on the belief that scarcity of environmental goods will increase pressure on technological innovation that will solve the problems. Colby calls this attitude *frontier economics.*

   1b. Collective resource management.
   This attitude is based on the belief that collective management of resources and state programmes for technological innovation are most effective in environmental policy.

2. **Man as the steward of nature.**
   Intrinsic value is primarily found in man, but nature too has intrinsic value.

3 Both philosophers and environmental scientists contributed to the debate. The Norwegian philosopher Arne Naess published his deep ecology approach in the1970s. My source is Naess & Rothenberg, 1989. The typology presented here comes close to the one described by the Dutch environmental scientist Wouter de Groot (1988, 1992). In the Dutch environmental philosophy debate the basic attitudes have become a well-known frame of reference (Zweers, 1991). In 1990, the American social scientist Michael Colby presented a similar categorization that was further elaborated by the Norwegian planner Petter Naess (1992a).

In the religious variant the idea is that God also created nature. Thus nature, having an independent line to God, is not only instrumental. In the non-religious variant the idea may be phrased as "we have inherited the earth with all its living beings; it is our responsibility to protect it". In The Netherlands this basic attitude is one of the arguments for official Nature Conservation policy.

3. **Man and nature as partners.**
   In this view not only do man and nature have intrinsic value, but man-nature relationships also have non-instrumental value. The partnership view is called a *three-values ethic* by W. de Groot (1992). He refers to systems theory, where the relationship is considered an emergent property resulting from the interaction between two entities. *Working with nature* is emerging as having a value in itself.

4. **Man as a participant in nature.**
   The intrinsic value is primarily in nature. Being part of nature is the aim for humans. In its extreme form this is a *oneness-with-nature mysticism, an unio mystica* in the words of Zweers (1991). It is called deep ecology after Arne Naess (1989). In this attitude, as in the *man and nature as partners* view, not only living beings belong to *nature* but also mountains and rivers, inanimate nature.

Needless to say that there are numerous attitudes that hold intermediate positions or combine elements of different categories. It is not my intention to discuss the boundaries between these categories. My main point is to highlight that different attitudes are related to *ontological* issues.

one world or two

Underlying the four basic attitudes is a more fundamental difference: man and nature may be perceived as one world or as two. The *master* and *stewardship* attitudes have a two-world basis, contrasting with the one-world orientation of the partnership and *participation* attitudes. Descartes assumed two substances: man and nature, or, related to that: mind and body. In his study on Spinoza, Schuyt (1993)[4] compares the *substance-pluralism* of Descartes with the *substance-monism* of Spinoza.

"Monism is leading to a relational perception of reality - an interconnectedness of parts and whole - pluralism leads to an atomistic perception of reality." (Schuyt, 1993, p.5)

Mathews and Schuyt argue that the separation of the two worlds creates conditions for a mechanistic world view and the loss of respect for nature, being only matter without mind. This may be true for the *master of nature attitude*; *the stewardship attitude* certainly combines a two world model with respect for the plant and animal world. By contrast, the *partnership and participation attitudes* are

4 Schuyt refers to F. Mathews's book The Ecological Self (1991), as an important source of his ideas.

based on a one-world view, as held by Spinoza.

Leaving aside the extreme versions of the *master of nature* attitude, all these basic attitudes pay attention to environmental problems, including the loss of biodiversity. The ecological strategy ideas of *incorporating nature in our activities*, and *ecological modernization* are closest to the concept of working with nature that is central to the *partnership attitude*.

ATTITUDES AND ETHICAL THEORIES

How do these basic attitudes and world models relate to ethics? By themselves values have no moral relevance unless they are placed in the framework of an ethical theory.

deontological theories

Deontological theories are most common in environmental ethics. They are concerned with moral obligations or restrictions, as a rule derived from objectivistic reasoning about values. *Lower* and *higher life-forms*, for example, are ranked according to criteria such as the capacity of suffering. There is a whole literature on environmental *axiology*: the exploration of moral grounds that could justify the limitation of human activities (Achterberg, 1986).

In the *master* and the *steward* attitudes human activities themselves need no justification, they have intrinsic value. Limiting these activities needs justification. This calls for hard figures, for an *objective* formulation of *rights* and *obligations* that justifies the drawing of a line.[5] In chapter 3, we have discussed the attempts to justify limitations to activities, either by *pricing nature's values* or by *ecological standards*. In the context of that chapter these approaches were discussed as ways to counteract man's domination of nature. We now recognize they actually stay within the *circle* of *reasoning* of the master and *steward* attitudes.

This circle plays a major role in planning practice worldwide. The presentation of wildlife qualities on maps called *limiting conditions* as mentioned in the introduction, can now be put into perspective. In this view, human activities are self evident. Wildlife, landscape and environmental qualities are placed in the negative corner of constraints, barriers to the planning of activities: they reduce the options for planning rather than create new options.

teleological theories

Teleological theories focus not on obligations and restrictions but on criteria or guidelines for what is called *good life*. In teleological ethical theory, according to Musschenga (1994), intrinsic values may be considered *elements of good* life , instrumental values are *conditions for good life*. The proponents of the basic attitudes of *partnership* and *participation* consider intrinsic values of nature to be elements of good life. In doing so, in a way, they are not less anthropocentric than

5 *This is also one of the motivations for Rawls' s justice as fairness principle in decision-making theory that will be discussed in chapter 6.*

the other attitudes but they have another image of man. The participation attitude emphasizes *being in* nature but the partnership attitude emphasizes *working with* nature as an element of *good life.* W. de Groot (1988,1992), in particular, has stressed this aspect of the partnership view.

Nature, in the context of *working with nature,* is not seen primarily as a thing, a species or an area, but as a set of physical processes. The values attached to species or areas are values of things we can *have.* The values attached to natural processes can only be expressed in *doing.* In technology we can either work *with nature* or see it as a constraint. When *working with nature*, it may be argued, the role of nature becomes only instrumental. This is true. However, the meaning of instrumental is enriched, to encompass the respect for intrinsic values of plants and animals, mountains and rivers. The instrument is rehabilitated. So nature is not *only instrumental*, it is like a musical instrument that makes it an honour to play on it. This *rehabilitation* of *nature as an instrument* bridges the gap between man and nature, between subject and object. It brings values of beauty and craftsmanship into the working with the instrument as demonstrated by Pirsig in his famous Zen and the Art of Motorcycle Maintenance (Pirsig, 1974).

consequentionalist ethics

Teleological and deontological approaches may both play a role in the context of decision-making. Faludi, in his work on Popper (1986, pp. 127-130), relates teleological ethical theory to *consequentionalism*, i.e. being responsible for the consequences of one's decisions. The ultimate criterion for a morally right decision is the comparative balance of good over evil produced. In a utilitarian interpretation this leads to Bentham's *felicity calculus*, a *moral budget* weighing the pains and pleasures of a decision. At the level of collective decision-making Bentham's criterion is the *greatest happiness for the greatest numbers.*[6] If the teleological approach is identified with the utilitarian interpretation, then other aspects such as justice and equity may be disregarded. These aspects are usually laid down in deontological rules on moral obligations. Some argue therefore, That the deontological rules are indispensable to temper a purely utilitarian pursuit of good life. Faludi, however, prefers the wider interpretation of the teleological approach to include distributive justice and even the interests of future generations in what he calls *consequentionalist ethics.*

The implication of consequentionalist ethics is clear: decision-makers are responsible for the consequences of their decisions - sticking to the rules is not sufficient. This is not say, of course, rules can be abandoned.

The discussion on ethics is relevant for the current debate on direct regulations versus incentives and other alternative policy instruments in environmental planning.[7] *In this context some other, psychological and social aspects of the two ethical theories are worth discussing.*

6 *See Bor & Petersma, 1996, p. 312.*
7 *See section 3.3 and WRR, 1992.*

moral actions and beautiful actions

There is a correspondence between deontological and teleological ethics and Kant's distinction between *moral actions* and *beautiful actions*. Arne Naess (1989), referring to Kant's two categories, describes the different psychology of the two approaches:

> "Moral actions are motivated by acceptance of a moral law, and manifest themselves clearly when acting against inclination. A person acts beautifully when acting benevolently from inclination. Environment is then not felt to be something strange or hostile which we must unfortunately adapt ourselves to, but something valuable which we are inclined to treat with joy and respect, and the overwhelming richness of which we are inclined to use to satisfy our vital needs" (Naess, 1989, p. 85)

Moral duties, he thinks, are more difficult to communicate than *beautiful actions*.

The sociologist Max Weber too, made a distinction that may be compared with the deontological and teleological categories. He speaks about "Verantwortungsethik", described as responsibilities, leading to obligations, and "Gesinnungsethik": the pursuit of virtue as an intrinsically motivated way of life.[8] Again, the essential difference is between an inner directed principle (the teleological approach in its wider meaning) and limitations that come from outside (the deontological approach).

A "GOOD CONDITIONS" APPROACH TO PLANNING

Both Arne Naess's and Max Weber's observations are from the personal ethics point of view. But what if we look at the two ethical approaches in the context of planning, of collective decisions?

In planning, the issue is not personal choice but *creating conditions* for individual behaviour or for collective environment-use activities. Physical and social conditions may be created as *limiting conditions* (deontological) or as *stimulating (or carrying) conditions* (teleological). These conditions should favour common values like health, safety, employment and a good environment. They also should provide the basis for individual freedom. Without that freedom there is no inner directed choice. Planners cannot and should not define good individual life, but they have a task in creating *good conditions*.

The point is whether *good conditions* should be based on a Hobbesian war of everyone against everyone, controlled by prohibition and punishment, or on a system of education and planning that seeks to enhance cooperation nourished by respect for people and for nature. Spinoza was convinced of the latter approach, as testified by the quotation that opens this chapter. In his discussion of Spinoza's view Schuyt (1993) adds:

8 *Weber's views on ethics are discussed by Schuyt (1993, p. 12) and by Friedmann (1987, p.101). "Gesinnungsethik" is translated by Friedmann as "ethics of ultimate ends". These ethics are connected with ultimate principles. Luther's famous statement: "Here I stand; I can do no other" is taken as an illustration.*

"This view surprisingly corresponds with insights from modern behavioral sciences, drawing on research on measures to improve environmental behaviour of both individuals and enterprises. Light coercion combined with non-juridical measures is far more effective to change behaviour than abundant legislation combined with punishment and threats of punishment." (Schuyt, 1993, p.13)

Good conditions, I may conclude, should primarily be stimulating or carrying conditions with limitations in a complementary role. The ecological strategy that is the pivot of this book has to be an Ecological-*Conditions* Strategy. It shares with consequentional ethics the emphasis on the responsibility of decision-makers, but it is a strategy; it aims at providing guidelines for good plans as a basis for good decisions.

Some examples may illustrate the practical implications of a *good conditions approach* to environmental planning:

1. The Cherry Orchard case (see intermezzo 1) illustrates the implications for urban design. The elements of the existing landscape are not seen as a set of limitations or constraints but as a source of inspiration for the design of the water structure plan, a structure of carrying conditions.
2. At the policy instruments level *the good conditions* approach is in accordance with a shift from direct regulation to instruments based on transaction, like tradeable emission permits, and on persuasion, like covenants between the government and target groups. This shift is proposed by the Netherlands Scientific Council for Government Policy (WRR, 1992).[9]
3. Programmes of Demonstration Plans, or *pilot projects* are good examples of good conditions for a process of ecological modernization. These programmes are organized, for example, by bodies such as the European Union (for solar energy and energy saving) and by public and private organizations at the national level. In The Netherlands successful programmes have been organized in the fields of physical planning, social housing and water management.[10] These programmes encourage public and private actors to develop creative ideas for practical alternatives. Thus inspiring examples originate of *good activities*, such as buildings, parks, water systems, industrial and agricultural projects that are more sustainable and react more respectfully to local diversity than current practice.

A good conditions approach draws our special attention to tricky questions such as: How can we escape from the dilemma of an increasing number or rules and decreased compliance (WRR, 1992)? How can we move from, as the French call it, an *état protecteur* to an *état catalyseur*? How can we shift the emphasis from effect oriented end of pipe policy to *source oriented* preventive policy?

9 *See also section 3.3.*

10 *The* demonstration plans' programme, *organized by the Netherlands Spatial Planning Agency from 1991-1994, for instance, produced over 50 inspiring plans. Many of them were implemented. Environmental issues played a major role in these plans. The programme was welcomed by planners, designers, practitioners and politicians and gained a Special Merit Award from the European Union. (Ministerie VROM, 1995).*

the Ecological Conditions Strategy

Returning to the project of elaborating the ecological strategies approach, this section has enabled me to take one step forward: from the family of ecological strategies to the Ecological Conditions Strategy. The aim of this strategy is to create *good ecological conditions. Conditions* implies that the strategy does not aim at achieving well defined results but at creating conditions for a variety of results that have one thing in common: they are *ecologically good.* The meaning of good (sustainable, sound) will be discussed in detail in part III of this book. At this stage, and after the discussion on deontological and teleological ethics, it is important not to formulate it as limitations or sacrifices but in a positive way. The concept of *ecological modernization* fits very well. This concept has already been mentioned in section 3.4. It expresses the idea of internalizing ecological principles in processes of social and technological change.

Having elaborated this first preliminary outline, I return to the attitudes. Does the Ecological Conditions Strategy need to rest on one basic attitude? Does it require a change of mentality or "belief system"? Or do we have to elaborate a compromise, accepting the fact that different attitudes exist?

towards a new paradigm?

It seems attractive to link the Ecological Conditions Strategy to the basic attitude that comes closest: the partnership attitude. The main reasons for opting for the *partnership* attitude are:

1. The emphasis on *working with nature*, as an independent value. This is very much in harmony with the principle of internalizing ecology in human activities or ecological modernization.
2. The one-world model that creates the basis for a relational perception of reality. This supports the basis of ecological strategies: using the interconnectedness of parts and whole as a starting point for planning.

If I were to establish a formal link between the Ecological Conditions Strategy and the partnership attitude, there might be good prospects for the combination, especially in the long term.

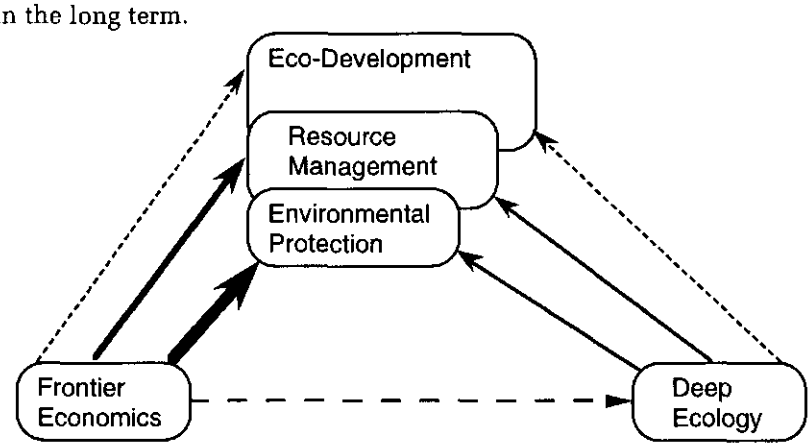


Figure 4.2:
Evolutionary Paradigms Diagram, after Colby, 1990.

It could be argued that there is broad support. The increasingly worldwide consensus on *sustainable development* might be interpreted as a sign of support, but, more specifically Colby's view on the evolution of paradigms is worth mentioning here, because he explicitly refers to the basic attitude discussion (Colby, 1990). Colby (1990), has presented his view in what he calls an *evolutionary paradigms diagram*, using *paradigm* for what I have called *basic attitude*. Figure 4.2 shows this in a slightly modified form.[11]

Unlike the suggestion in the diagram, one paradigm does not replace the other; once developed they stay alive. Today all of them play a role in public debate on environmental issues and in official national and even global environmental policies.

It may be argued that sustainable development and ecological modernization may not only be supported by the partnership attitude but also by other basic attitudes. This may be considered an advantage because consensus on ecological conditions is probably more solid if it is supported by various deeper motivations, just as the stem of a tree stands more firmly if supported by roots going out to different directions.

I have expressed my own preferences, but the strategy I want to propose should not be judged on its link to a certain basic attitude but on *pragmatic* grounds. The crucial question is: does it work? This question includes, of course, short term and long term aspects.

In planning, it is quite clear that various basic attitudes may support a process of ecological modernization. It is conceivable to work out practical proposals for environmental policy endorsed by a convergence of:

- enlightened self interest (market and technology attitude)
- responsibility for resources (resource management attitude)
- respect for nature (stewardship attitude)
- working with nature (partnership attitude) and
- being part of nature (participation attitude)

The discussion on basic attitudes reveals links between different arguments. In this way the analysis may contribute to a better understanding of strategic proposals and planning instruments. However, we cannot justify a concrete planning proposal by referring only to a basic attitude. Therefore, there is no need to seek a common basic attitude or to work out compromises on attitudes. Rather we should use our energy to develop a shared understanding of practical issues related to ecologically sound conditions.

two languages

The analysis of attitudes and ethical approaches in this section suggests logical links between the *two worlds model*, the desire to *control nature*, the need for

11 In his interpretation frontier economics (man as the master) has evoked deep ecology (participation) as a reaction. This polarity then has generated public debate and practical projects from which develop successively the environmental protection (health, end-of-pipe technology) the resource management and the eco-development paradigm (has some common traits with partnership). His paradigms do not coincide exactly with the basic attitudes mentioned above, but the differences are not relevant in this case. The relevant issue is the evolution of basic attitudes, a phenomenon also signalled by Zweers (1991) and W. de Groot (1992).

hard figures to *prove the necessity of limiting conditions* and the view of nature as a *constraint* to man's activities. Later in this book I will describe this chain as the *language of control*. Another chain of logical links is formed by the one world model that creates conditions *for an interactive relationship with the environment*, a perception of nature and environment as a set of *opportunities* and the need for *carrying conditions* for ecological modernization. This chain will be called the *language of interaction*. Both chains, or *discourses*, can be traced through the paragraphs of this section and they will run through other chapters of this book. At the end of part II, section 7.4 will discuss the two discourses as such.

In industrialized societies the *language of control* dominates the approach to environmental problems, as testified by the preference for direct regulation and the use of standards. In this book I will argue that the language of control will not solve these problems and that we need to create a more important role for the *language of interaction*. This section illustrates how the language of control is deeply rooted in the dominant attitudes of our culture.

Understanding the philosophical roots of human approaches to environmental problems may help us in developing strategies for preventing them. Life, however, is not applied philosophy. It is the other way round. A change of mentality does not precede ecologically sound practice. Here too, *efficient practice precedes the theory of it*. Knowing how can only be learned by doing.

4.2 Lifestyles and good conditions

Environmental problems are perceived as threatening by many. But the solutions to these problems also may be experienced as threatening: as an attack to consumption pattern and lifestyle. Acknowledging the need to develop patterns of production and consumption that do not squander resources and pollute the environment, this section is concerned with the question of whether an Ecological Conditions Strategy should focus on a specific lifestyle. My central thesis is that it should not. This leads to a discussion of ways ecological issues can be integrated in the social complexity of modern life in industrialized societies, illustrating the viewpoint that ecological conditions, in principle, may also create conditions for a diversity of lifestyles.

Environmentalists and environmental policy have been criticized for neglecting the social and political context of the ecological issues.12 As far as ecologists have warned of the environmental impact of human behaviour, they cannot be blamed. But warnings are not identical to solutions. As far as the social context is neglected in the formulation of environmental policy's objectives, the criticism is justified. In this section I will look at the social context of Ecological Conditions in various situations. In chapter 6 a discussion follows on the issue of

12 See for instance Van Driel et al. 1993, p. 10; Koskiaho, 1994; Lapintie, 1996, p. 10. The issue will be discussed further in chapter 6.

what should be done if socially acceptable solutions are not sufficient and will lead to environmentally unacceptable risks.

INDIVIDUAL AND STRUCTURAL

Squandering resources and polluting the air are not aims of lifestyles but consequences of levels of consumption. To a large extent environmental problems are structurally rooted in our society. Vermeersch (1991) describes two approaches to environmental philosophy: one that focuses on individual attitude and another that starts with structural conditions. In section 4.1 I have already discussed and rejected the *change mentality first* idea. As far as basic attitudes may change they will do so in doing things; in activities. Therefore, organized environment-use activities are important in this context. An Ecological Strategy should create good structural conditions or should aim at changing bad structural conditions for activities. Changing patterns of production and consumption is a matter of structural conditions.

Does this imply everyone should adopt the ecological lifestyle; the lifestyle we know from the example given by groups of pioneers?

the lifestyle of the pioneers

The lifestyle of ecological pioneers is seen by many as an example of what ecology really means. On the one hand the pioneer environmentalists who set up communes and built ecological villages (Lutz, 1987), produced excellent examples of practical technical alternatives, but on the other they demonstrated a lifestyle that is rejected by many. As a result, widespread prejudices that are difficult to overcome exist about the lifestyle of environmentalism in general.

Facing the impossibility of changing social structures, the pioneers had no choice but to found their own isolated communes to live their own life. A more frugal lifestyle is not only less polluting but, to a certain extent, also makes people less dependent on the pressure of the system. This is one factor that made the pioneers flee the city. At present, as awareness of environmental problems has become more common, we have to translate pioneer experiences to society in general. In doing so a new task emerges that cannot be learned from the pioneers: how to create conditions for social and spatial diversity. An Ecological Conditions Strategy for planning should not imply a plea for one lifestyle. *Working with nature* can be as differentiated as the number of workers and the variety of nature. The discussion on natural ways or less natural ways of living is irrelevant here. The question that matters in an activity-oriented approach is *how* to incorporate our understanding of ecological relationships in decisions on activities that respect both natural and cultural diversity.

In the context of a planning strategy these normative statements should be supported by at least some evidence about the feasibility of this "working with nature " approach. Is this idea compatible with other social strategies? Does it evoke conflicts with vital social interests?

LIFESTYLE AND INCOME

One of the proposals for ecological conditions is internalizing environmental costs in the prices of products. *Low income groups* may have most difficulties in accepting these measures. Even in social- democrat circles, however, there is a plea to *get the prices right* (Van Driel et. al, 1993, p. 66). Those who are attached to environmentally impairing ways of consumption should be prepared to pay more "regardless wether they earn more or less". Fair prices that include environmental costs should not be held back for social reasons. According to this social democrat view, the government should take income differences into consideration, but leave it to the people to decide on the way to spend their income.

the basic income debate

There are also more fundamental approaches to the common roots of environmental and social problems. In his Poverty or Frugality, a study on *modern poverty*, Janssen (1990) explores ways to find coherent answers to the structural problems of social poverty and environmental deterioration. Janssen concentrates on a "strategy of social frugality, that , for the time being only sets as its aim to preserve the future." Central in his proposals is a *basic income* that creates prospects for the informal sector and opens the door for more labour intensive production such as repair and recycling. The *basic income* idea plays a central role in the welfare state debate. Some, like Van Parijs(1994) consider the basic income as the cornerstone of a third social option, besides the market and the state. A basic income, in his reasoning, creates the conditions for a more autonomous personal choice and thus for more freedom to choose your own lifestyle, not determined by the competition of the market nor by the regulations of the state. At the same time a basic income may create conditions for more people to engage in voluntary activities in organizations with social and environmental aims.

"eco-tech and eco-touch"

Looking from the activity side, Ter Heide & Berends (1994) suggest developing eco-tech and eco-touch approaches. The first is capital intensive and focuses on technology to close circles, the latter is space-extensive and relies on time available for work.

> "If, for instance, in studying lifestyles and locational preferences one finds a distinction between people with much money and little time, on the one hand, and people with little money and much time, on the other, consideration of the distinction between eco-tech and eco-touch may be relevant." (Ter Heide & Berends, 1994, p.128)

Janssen (1990) also signals the increasing number of people belonging to the *little money - much time group*. The basic income, he thinks, could create conditions for those people to escape from the stigmatized social security category. This, of course, would require a radical change in our tax and social security systems. But even without such radical changes small steps in this direction have been explored by using social security funds for employment projects. There is a strange discrepancy between on the one hand the need for work to be done in health and environment projects in neighbourhoods, and on the other hand the number of people who have plenty of time but are not allowed to work because they benefit from social security. The potential for good conditions to enhance both employment and the neighbourhood's social and physical environment has been demonstrated by projects in different countries.[13]

Thus, it is conceivable to develop a programme of ecological conditions that is compatible with cultural diversity and explores the potential for synergism with social policy. How is the link between lifestyle and ecology in the context of urban planning?

LIFESTYLES AND URBAN PLANNING

To use the lifestyle concept in urban planning, several questions should be answered. First of all, lifestyles should be categorized and defined. Secondly they should be related to design. A third question is about the role of the housing market.

cultural and economic lifestyles

Lifestyles originate as a consequence of the two main categories of resources in society: income and knowledge. Therefore besides an income hierarchy, there is also a cultural hierarchy. These concepts developed by Bourdieu in 1979 are elaborated by Driessen (1994) in his description of the *economic* and the *cultural* lifestyle dimensions. By relating surveys to data of a cross section of the Dutch population, Driessen found a number of behavioral preferences that represent the economic or *cultural lifestyle* of the more wealthy 40% of the population (Driessen, p.22).

A number of measures in the design of urban environments, recommended to make them ecologically sound, were found by Driessen to be compatible with both the economic and the cultural lifestyles. They involve issues like green areas, energy conservation, domestic waste collection, the use of building materials and ecologically sound urban storm water and sewage systems. In other aspects, like private car facilities compared with public transport, the cultural and economic lifestyles have different preferences. The cultural lifestyle is not only interested in environmental issues; people with this lifestyle also behave in a more environmentally friendly way. They prefer public transport. People with an economic lifestyle like to show off in spending money. They are attached to their car. Their interest in environmental issues, however, is high. Money is not a problem for this group, but they have no time to spend on environmentally friendly behaviour.

lifestyle and design

In his study, Driessen compares the cultural and the economic lifestyles with eight *urban environment types*, described in a study on new urban areas in The Netherlands by Urhahn (1993). Het contends that the types with higher housing densities, are preferred by the cultural lifestyle. However, as demonstrated by Berends (1994), an ecologically sound design can be made for each of these eight

13 Examples are the work of the Manpower Service Commission in Britain (Nicholson-Lord, 1987), the French Régies des Quartiers (Behar, 1987) and in The Netherlands, the pilot projects of the Steering group for Experiments in Social housing (Voskamp, 1992; Waarts, 1993).

urban environment types.

Leaving aside a methodological discussion about the lifestyle research, these approaches from the social science and from the design side suggest there are more roads leading to Rome. These studies make creating ecologically sound conditions for different lifestyles visible. Furthermore, many environmental measures in urban design do not affect lifestyle at all. These conclusions are confirmed by our analysis of realized *ecological projects* (Koning & Tjallingii, 1991).

There are many practical and fundamental research problems related to learning about interactions between lifestyle and the built environment. Researchers tend to reduce, whereas designers develop concepts of wholes. In chapter 5 we will look deeper into this matter. Things are even more complicated in a field like this where options for change towards ecologically more sound conditions are explored. One interesting and promising approach to bridge the gap between the analysts and designers of urban areas is a study by Mey (1994). She analyzed *daily patterns* of activities of men, women and children in household categories with different lifestyles in Dutch cities.[14] Ecological aspects, such as the spatially developing a network of green areas and improving, facilities for public transport, pedestrians and cyclists, play a major role in her recommendations for design.She gives no simple recipes but shows there are prospects for an ecologically sound and diverse urban environment.

The research findings discussed here indicate prospects for linking ecology to urban design for different lifestyles. This is not to say, however, that there are no conflicts between ecological aims and preferences related to lifestyles. One potential field of conflicts is the housing market.

lifestyles and housing market

Wijnbelt (1995) discusses the Waalsprong urban expansion plan of the Dutch city of Nijmegen. Drawing on lifestyle studies by Driessen and others, he confronts these with the results of *housing market research* on the preferences of citizens who expressed interest in moving to the new residential area. There appears to be only a modest market for more densely built urban areas. Detached houses with gardens are preferred. In expressing this preference the respondents assume that there will be no future constraints on private car use, an essential condition for living in areas with this type of house. This assumption, however, is far from realistic. The regional structure plan for traffic and transport expects an increase of private car kilometres of 38 - 75 % in the period of 1999 - 2010. This implies a substantial increase in problems of congestion and probably limitations to car use.

From the point of view of ecological strategy it would be preferable to increase the proportion of more densely built areas. Thus, the urban plan might contribute to create good public transport and therewith to reduce private car use and spare green

14 *Mey's analysis leads to prototypes that can be used in the design process for the individual plan, an approach that comes close to the use of* guiding models, *as proposed in chapter 8.*

areas. Decision making is subjected to market demand here, so the interesting question remains unanswered: Given the expected future constraints to car use, how many people would prefer or accept living in more densely built urban areas with, as *good conditions*:

- less parking space and fewer private gardens, but with
- good public transport,
- shops and services within walking distance,
- a safe environment for children to play,
- green areas for recreation nearby, and
- good houses with balconies or roof gardens.

This question is not asked and few of these urban environments are designed. Wijnbelt concludes: "The present plan is a compromise between sustainable building and the wish of the market."

The perception of risks by investors who have to sell houses on the market is an important factor that is real but is only indirectly related to lifestyles. In this case an Ecological Conditions strategy could opt for a variety of demonstration projects that show a diversity of available options, including more densely built ones. The available options, of course, should be attuned to feasible urban transport options.

This section discussed planning and design issues related to new urban areas. We now will turn to planning and management in existing situations. Two issues will be discussed briefly: the role of standards and the role of moralism.

CREATING CONDITIONS FOR INDIVIDUAL CHOICE

It may be argued that it does not make sense to discern two or eight lifestyles; each person has an individual way of life. This implies there is a need to take decisions about your own preferred environment. In planning the built environment, however, many decisions are taken by institutions on behalf of passive subjects. International standards are a commonly used basis for these decisions. The thermal climate inside buildings is an interesting case, discussed by Coldicutt (1995).

> The Electricity Trust of South Australia, drawing on international standards about comfort zones, recommends not to turn on coolers in buildings at a temperature below 23.5^0 C, and not to turn on heaters at temperatures above 180 C. The motto is: Save Energy, Save Our Planet. A research project carried out in this region revealed people's real preferences: 80% of the population turned on coolers at temperatures above 23.5^0 C. The real comfort zone even extends up to 32^0. This means 80% of the population would save less energy if they followed the agency's advice. (Coldicutt, 1995, pp.47-48)

Thermal climate is a typical case of institutions that have to decide in a situation with contentious ends. Coldicutt uses the case to demonstrate that institutions, with the best intentions, tend to focus on means or norms, implicitly assuming a passive response. Referring to Foucault, she warns against the power of experts that is expressed by the norms.

> "The great bulk of theoretical work on comfort emphasizes the more passive response rather than active responses - it studies sensations rather than actions- ..". (p. 48) She then stresses the mutual support of theory and large institutional decision-making: " A world seen

in terms of groups, norms, and passive people provides a comfortable place for such institutional decision-making, whereas a world construed in terms of agents seeking to address complex ethical issues is a world in which institutional decision-making is subject to challenge. The former world view gives us real facts; the latter is messy and contingent and perhaps carries a threat of anarchy." (p. 53) [15]

In our assessment of urban *ecological projects* (Koning & Tjallingii, 1991), we encountered this fear of anarchy in discussions with local authority park departments. The department officials sometimes strongly felt a need to stick to the norms for the maintenance of green areas and to reject local residents' initiatives to create a neighbourhood park that suited their ideas about an ecologically and socially sound environment. In Tjallingii, Spijker & De Vries (1995, p. 70) we describe the approach of the city of Utrecht's local park department, making temporary contracts with local residents in such cases. There are currently 450 of these contracts for areas up to 3000 m^2.

As a planner, I am inclined to think about solutions-in-principle for categories of decision situations. Later in this book I will discuss a number of these solutions-in-principle, calling them *guiding models*. It is important , however, to be aware of the non-existence of the average citizen, of *the* average situation. Guiding models are meant to guide the making of individual plans. Creating conditions is creating conditions for individual choice, or for the choice of groups of neighbours, as in the case mentioned above.[16]

Drawing on her research on thermal comfort, Coldicutt (p. 41) proposes a theory of decision making in situations with contentious ends: The first option is that of individual free choice. There are only three legitimate reasons for deviating from this option:

1. Special competence of decision makers.
2. The need to decide for groups.
3. The need to protect the interests of third parties.

These three reasons may all be relevant in decision making about environmental issues. They may require specialist knowledge, ecological conditions by definition are decisions for groups, and risks for other people or for other species may be involved. The three principles, however, should be used in justifying decisions that deviate from individual free choice.

Decision making and free choice also emerge in another discussion that springs up frequently when discussing ecological strategies.

15 Reducing the complexity of real life situations is an inescapable scientific procedure. Yet we should also find our way back to real life. The epistemology of complex ecological issues will be discussed in chapter 5.

16 In a discussion on an earlier version of my strategic concepts (Tjallingii, 1994), Lapintie (1996, p. 11) makes a critical note about the "paternalism that is hidden behind the scenes" of the strategy, that is alleged to bracket out the powerful role of experts. I do not think, however, we disagree on the importance of creating conditions for choice.

moralistic and morally inspired

In collective or institutional decision-making, there is an important difference between addressing the individual and addressing the action. Focusing on the individual may easily become *moralistic*. It risks ending up in discussions on moral purity that threaten to overshadow the structural nature of environmental problems in our society (Achterhuis, 1995, p. 204 ff.). Achterhuis advocates *moralizing devices* rather than people. The principle of built-in safety values is well known. A paper-cutting machine, for instance, only cuts a pile of paper if you simultaneously press buttons, one with your right hand and the other with your left. Free choice would be too risky here. How far can this principle be extended to other areas? Achterhuis discusses the example given by Latour of the car that does not start unless safety belts are fastened. Current jurisdiction seems to prohibit its introduction, but should it not be normal, Achterhuis argues, to internalize both safety values and environmental values in machines? For example: instead of warning people not to shower too long, the shower itself should be constructed in a way that combines comfort with a low water consumption, leaving it up to individuals to decide how long they prefer to shower. Compared with traditional ethics, however, this implies a radical shift in the ethical orientation: from rules of conduct or obligations for individual behaviour to creating *good conditions* in machines or in urban design.

An example taken from traffic planning may illustrate the practical importance of this point:

> Faced with traffic accidents involving pedestrians crossing a road, the authorities may envisage the following solutions.
>
> 1. If the main problem is thought to be that drivers do not understand the dangers of the situation, the authorities may decide to place signs like *warning: children playing* along the road. This is *the moralistic approach*. Drivers may or may not respond to this appeal.
> 2. If the main problem is perceived as driving too fast, it may be decided to impose speed restrictions along the road. This is the *direct regulation approach*. The enforcement of the speed limit may pose serious problems. And if they find out that there is no enforcement drivers may ignore the signs.
> 3. If the problem is looked upon in the context of *good conditions for activities*, another approach may be adopted. The road may be redesigned, incorporating bends that make it impossible to drive fast. The bends in this solution are combined with a central refuge enabling pedestrians to cross safely. The central refuge may also be combined with the planting of trees and the location of the bends may be part of the urban design of the area including children's playgrounds and the entrances of schools. This is the good conditions approach. Figure 4.3 illustrates the different approaches.[17]

This example of good conditions planning, used to improve the conditions for safe and agreeable life, also shows another aspect: the good conditions approach, the design solution, would not easily come up as a result of *one cause - one effect reasoning*. The plan is a proposal for the integration of all functions in the area.[18] This stresses the importance of discussing the proposal with all actors concerned. If

17 In The Netherlands the third approach was first introduced by Vahl (1985).

18 The way the problem situation is described and analyzed is important for the scope of solutions. The reverse may also hold: an idea about the scope of solutions is decisive for the analysis. The related epistemological and planning problems will be discussed in the chapters 5 and 7.

we look at the three principles mentioned by Coldicutt, the traffic plan indeed requires specialist knowledge (1), it cannot be discussed with all drivers (2) and the safety of pedestrians cannot be left solely in the hands of the drivers (3). In this case one may speak of limitations to *driving style*; *lifestyle* is not at stake.

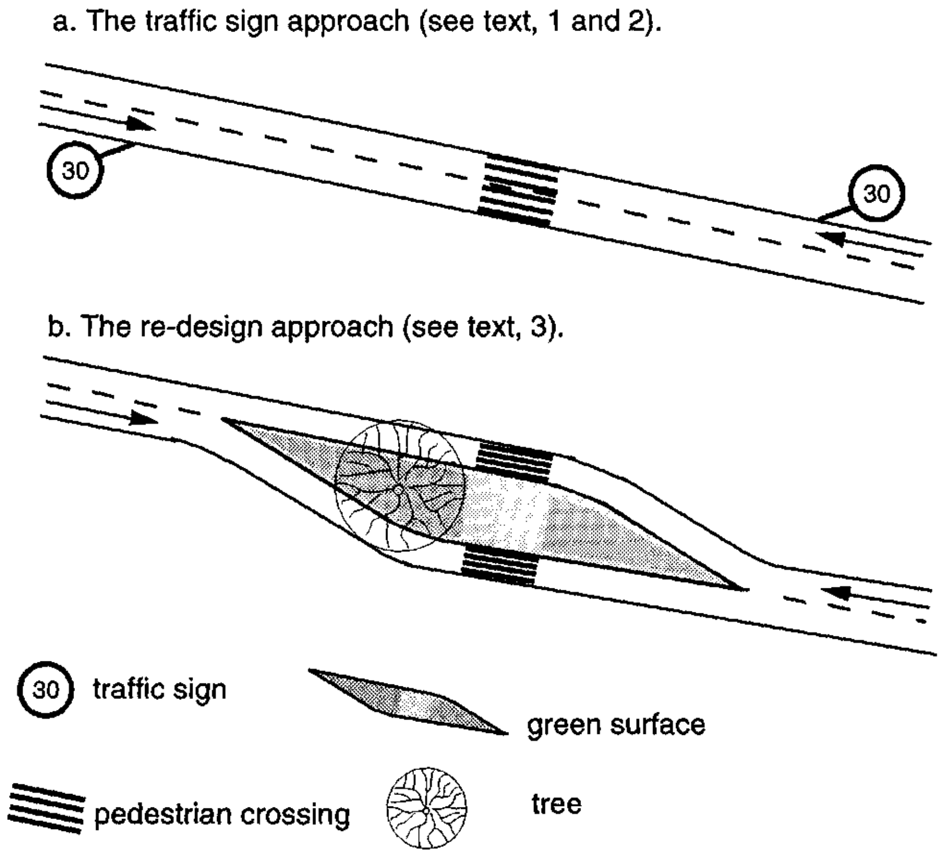


Figure 4.3:
Alternative designs to make a road less dangerous.

In an ecological strategy one should avoid a moralistic approach, but it is possible and desirable to combine ethical and practical considerations in an activity-oriented approach that may be called *morally inspired.*

Advertizing campaigns hammering on individual moral duties illustrate the moralistic approach. A morally inspired ecological strategy creates structural conditions (social, economic and technical) for working with nature activities in a world of social and natural diversity.[19]

19 The difference between moralism, addressing the individual's behaviour, and morally inspired policy that creates conditions is discussed by Van Driel et al., 1993, p.63.

In the preceding paragraphs a number of practical questions and situations have been discussed. There seems to be no insuperable difficulty for a strategy that seeks to create good conditions for ecologically sound development. In principle, these conditions may be combined with a diversity of lifestyles. However, there are theoretical objections we cannot ignore.

GOOD ENVIRONMENTAL POLICY AND DEMOCRACY

Is it conceivable to opt for consensus about good environmental conditions in a democratic society? This seems to be a rhetorical question in a democratic country like The Netherlands with a well established environmental policy. Yet, the monitoring and evaluation studies on the performance of this programme (RIVM, 1991,1992) demonstrate the difficulties of achieving some of its major targets, and thus the question is becoming more urgent. Will it be possible to reach consensus about sharpening the instruments of policy?

The doubt about this issue that frequently creeps into discussions on practical issues is fed by theoretical statements by authors like the American philosopher William Ophuls, who answer the question categorically with: no.[20]

Let us assume, following Agenda 21(1992), that good environmental policy includes concern about environmental quality for the present and for future generations *and* concern about biodiversity. Later we will elaborate more detailed structures and strategies to make these rather vague notions operational. But before we can do so we have to prepare the ground. This ground is a democratic society in which the government should stay neutral. The principle of neutrality follows from the basic rule that all individuals should be treated equal. Two aspects of neutrality are particularly relevant at this point: neutrality in the justification of decisions and *Homo economicus*, sometimes called rational man as the neutral image of man. They emerge from studies on the philosophical basis of democracy and are discussed by Achterberg (1991) and Dubbink (1994).

1. *Neutrality in justification* implies that decisions should not be justified on the basis of "the presumed intrinsic superiority of any particular conception of the good life."[21] Is this possible? In chapter 4 I discussed two approaches that exist in the real world of environmental policy: *ecological standards*, concentrating on *limiting conditions* and ecological strategies, starting with *carrying conditions*. The shortcomings of the ecological standards approach, as discussed in section 3.3, did not include a lack of neutrality. In this section the ecological strategy of good conditions has been shown to be able to carry a variety of lifestyles. Thus, there seems to be no theoretical objection to meeting the neutrality criterion.

2. *Homo economicus* is the image of man that is illustrated by Garrett Hardin's Tragedy of the Commons (Hardin, 1968). Hardin's account of what happened to the common land around villages is as following: The private advantage

20 Ophuls's controversial ideas about scarcity are discussed in Achterhuis (1988, p. 104); his views on environment and democracy are analyzed by Dubbink (1994).
21 Larmore (1987), quoted by Achterberg (1991).

of putting more cows on the common pasture was far greater than the private share of the common disadvantage resulting from overgrazing. Thus everyone added more animals to their herd. As a result, Hardin states, the *commons* declined. Hardin uses this story to show that Adam Smith's invisible hand is in some cases structurally absent. More generally the tragedy is seen as an example of micro-rationality leading to macro-irrationality. And this process is considered to be responsible for many environmental problems. Ophuls, Hardin and others therefore believe that good environmental policy and democracy are incompatible. They propose mutual coercion, notably population control for the sake of survival.

Does the *tragedy metaphor* really demonstrate the basic incompatibility of democracy and environmental policy? *Does Homo economicus* or *the calculating citizen*, permanently making cost-benefit analyses to assess short term goals and means, really exist? Does the requirement of neutrality leave us with these - in Dubbink's words - *socially handicapped persons* as the basis for planning?

There is no doubt that calculating citizens exist. Ecological and other planning strategies should account for that citizen in all of us. But the consensus option for good environmental policy in a democratic society should not be rejected for this reason. Even Driessen's *economic lifestyle*, discussed in the section on urban planning and lifestyle, is found in people who do care about environmental problems.

The point is that *Homo economicus is not a lifestyle at all*. The concept is a construct of economists rather than the result of social research.

This becomes clear if we look at the real story of the commons. Achterhuis (1988) and many others have clearly demonstrated the historical incorrectness of Hardin's description.[22] The historic commons did not perish in the way he described. Social incentives and agreements kept the system alive for many centuries in medieval Europe. It was only as a result of introducing private ownership of the land, that the commons, as an institution, came to an end. The land was bought by rich people from outside the community. The commons did not perish by a *rational man tragedy* from within but by a tragedy caused by external developments.[23]

This does not mean, however, that the principle of the tragedy from within is nonexistent. Private profits do threat common values concerning health, safety and the environment. On the other hand, cooperative initiatives also still play a major role in the planning and management of these common values.

The abolition of slavery and child labour and the struggle for humane working conditions in industry have been long and painful processes. Likewise, the internalizing of environmental values in a market economy will be long and laborious. But there is no evidence that it is theoretically impossible to embark upon this journey in a democratic society.

22 See Achterhuis (1988) pp. 189-90; 203 ff; Fairbrother, 1970, p.35.

23 In fact the commoners were rational enough to cooperate. The concept of rational man narrows rationality to short-term selfishness.

There is still a long way to go to a sustainable society, particularly so if we also include concern about biodiversity. Increasing regulations and formulating our objectives more firmly is not a feasible option, unless it is done in the context of a strategy that combines ecological with social, economic and political issues. In this section we have discussed some questions concerning the social context of the emerging Ecological Conditions Strategy, that will be further developed in the chapters that follow. One question, in particular, has concerned me in this section: does an ecological approach lead to one specific lifestyle? The answer is no. Ecological conditions not only may carry different lifestyles, they should also carry diversity in order to be useful and acceptable in the context of environmental planning.

It is not uncommon for people to identify ecology with one lifestyle. Ecology is even more frequently perceived as being identical to a dominance of wild and green, and organic architecture.This misleading image is the theme of the following section.

4.3 Images, ecology and design

Nature is seen as a source of inspiration by some of the designers mentioned in the first discussion of the ecological strategies approach in section 3.4. Do Ecological Conditions lead to specific images?

IMAGES OF NATURE

In the context of different basic attitudes, *nature* is either seen as *raw materials, resources, endangered species, natural heritage* or as the whole world. None of these images is excluded in an Ecological Conditions approach to environmental planning that addresses activities. In the context of *working with nature* it does not make sense to make one general definition of nature. The interesting question is not "what is nature?" but "*what* are the images of nature of the actors?" Learning from different views, the planner may look for feasible solutions to practical problems. But *working with nature*, as a strategy, is not neutral. This may still seem a rather abstract notion. What does it mean in the context of spatial planning and design, where nature is considered practically identical to green areas?

In the world of nature conservationists there are tedious discussions about the *degrees* of *naturalness*. So areas are considered natural to a greater or to a lesser degree. The *values* of *nature approach*, in chapter 4, uses the results of these discussions. A different point of view is taken by Van Leeuwen (1973) and by the French school of "phyto-ecology" at Montpellier (Long, 1974). They prefer to speak about degrees of artificiality. This comes closer to an activity oriented approach but it is not yet tailored to do the job. The relevant question in a *working with nature* approach is not "is this area natural or less natural, artificial or less artificial?", but "how can we work with nature in this area?". It is this question that leads the design process illustrated in the Cherry Orchard case. It may lead to different images but they will all have some relationship with the basic structure of the underlying landscape ecology.

images of city and countryside

But does this shift to the question "how can we work with nature" solve the question of being more or less ecological? Is not the forest always more ecological than the city? Is building as such not always damaging to ecosystems? In the context of the *one world model* discussed in section 4.1, the first question is wrong and the answer to the second one is no. The first question compares a forest and a city in a way of reasoning produced by thinking in *two worlds*, as in the *master* and *steward* attitudes. In a *one world* model, as adopted by the *partners* and *participant* attitudes, man does belong to *nature*. In this one world there is a place for forests and for cities. Both can be planned and managed ecologically to some degree.

The concept of a city as an ecosystem does not depend on metaphysics. We could also reason from a practical side: The effectiveness of ecological principles in urban planning projects, as apparent from studies like the review of 40 of these projects by Koning & Tjallingii (1991), supports the idea that cities can be considered as ecosystems: functional interaction networks between animate and inanimate elements in a certain area.

As to the damaging effects of building, back in 1967, Rublovsky stated: "The city, for all its congestion, for all its soot and smoke, is not a barrier that can stop the stream of life".[24] The city offers a refuge to many plants and animals that can no longer live in intensively drained and fertilized agricultural land. Thus, the classical opposition of town and country can no longer be used to indicate a culture - nature antagonism. This symbolic perception, however, is persistent. Of course, there are different visual images of town and country, but they are not *by definition* ecological to a greater or lesser extent. The visual contrast between urban and rural areas and the proximity of green areas for city dwellers remain important elements in urban design, but ecology can be used on both sides of the city edge.

ECOLOGY AND URBAN DESIGN

Taking the broad definition of ecology, there is a long tradition among architects, town planners and engineers of using ecological principles in design. In the first century B.C. the Roman architect Vitruvius, in his famous Ten Books on Architecture[25] gave detailed instructions about the role of landscape and water in town planning. During the building of many historical cities, particular attention was paid to the relief, soil differences and water courses. Decisions about the

24 Quoted by Gill & Bonnett in their book Nature in the Urban Landscape (1973), which contains interesting information and funny anecdotes on wildlife in London and Los Angeles.

25 The eighth book is devoted entirely to the role of water. As a first step in the planning of a new town he recommends: "Before sunrise, lie down flat in the place where the search is to be made, and placing the chin on the earth and supporting it there, take a look out over the country.... Then, dig in places where vapours are seen curling and rising up into the air. This sign cannot show itself in a dry spot." I quote this from the translation by Morgan, 1960.

location, the street pattern and squares and parks in these cities were strongly influenced by the natural differentiation in the pre-urban landscape. Even where urban structures have been designed in one step, according to a geometric idea, discrepancies in the regularity often betray the influence of the underlying natural structures.

I do not consider these historical design choices as examples of the use of an ecological strategy, as they were all related to the limited technical means. Now that we have many more technical options, it has become necessary to make a deliberate choice about whether or not to utilize the ecological potential of a certain place.

fashionable images

In the first chapter I recalled my personal experience with the designers at the Delft Faculty of Architecture where ecology was fashionable in the 70s and despised in the 80s. Ecology was seen, and is still seen by many designers as a specific *organic form language* based on forms found in the living world. From a theoretical point of view, Neddens (1986) defends the link between an ecological approach to urban development and *organic design*, which he sees as an undercurrent in the history of architecture. The town planning history of the German city of Frankfurt am Main seems to support his case:

> Two designers, Ernst May and Leberecht Migge, worked together in the development of the Siedlungen in Frankfurt in the 20s. Obviously the local relief and the valley of the river Nidda inspired them in the design of the famous Siedlung Römerstadt. The form language has some organic traits.[26] Moreover, the detailed design of lookouts overlooking the valley also shows that the design has been carefully adjusted to the ecological potential of the original landscape. Only a few years later, however, they planned the next Siedlung, Westhausen, in a radically different way. Here the rational principles of the Athens Charter were applied rigorously and there is no relationship at all with the adjacent Niddatal (Castex et al., 1984). The contrast is demonstrated in figure 4.4. The most striking thing is not the change of form, but the fact that that change caused the functional relationship with landscape to be abandoned too.

The undercurrent went under again and only resurfaced for a short period in the 70s. May and Migge also seem to have combined organic form and ecology. They used them and also abandoned them together.

Many designers combineorganic *form* and ecology. This combination, however, is a real *barrier to learning*: learning about ecological processes, about functional relationships, and about ways of coping with environmental problems. In the context of an Ecological Conditions Strategy there are good reasons to separate the two. *Organic form and ecology are not identical.* But how then, could form and ecology relate to each other?

The role of mechanics in design may illuminate this. Every architect, whether they like it or not, is aware of the importance of mechanics. Some are inspired by

26 Here, organic *refers to urban design, not to the form of buildings.*

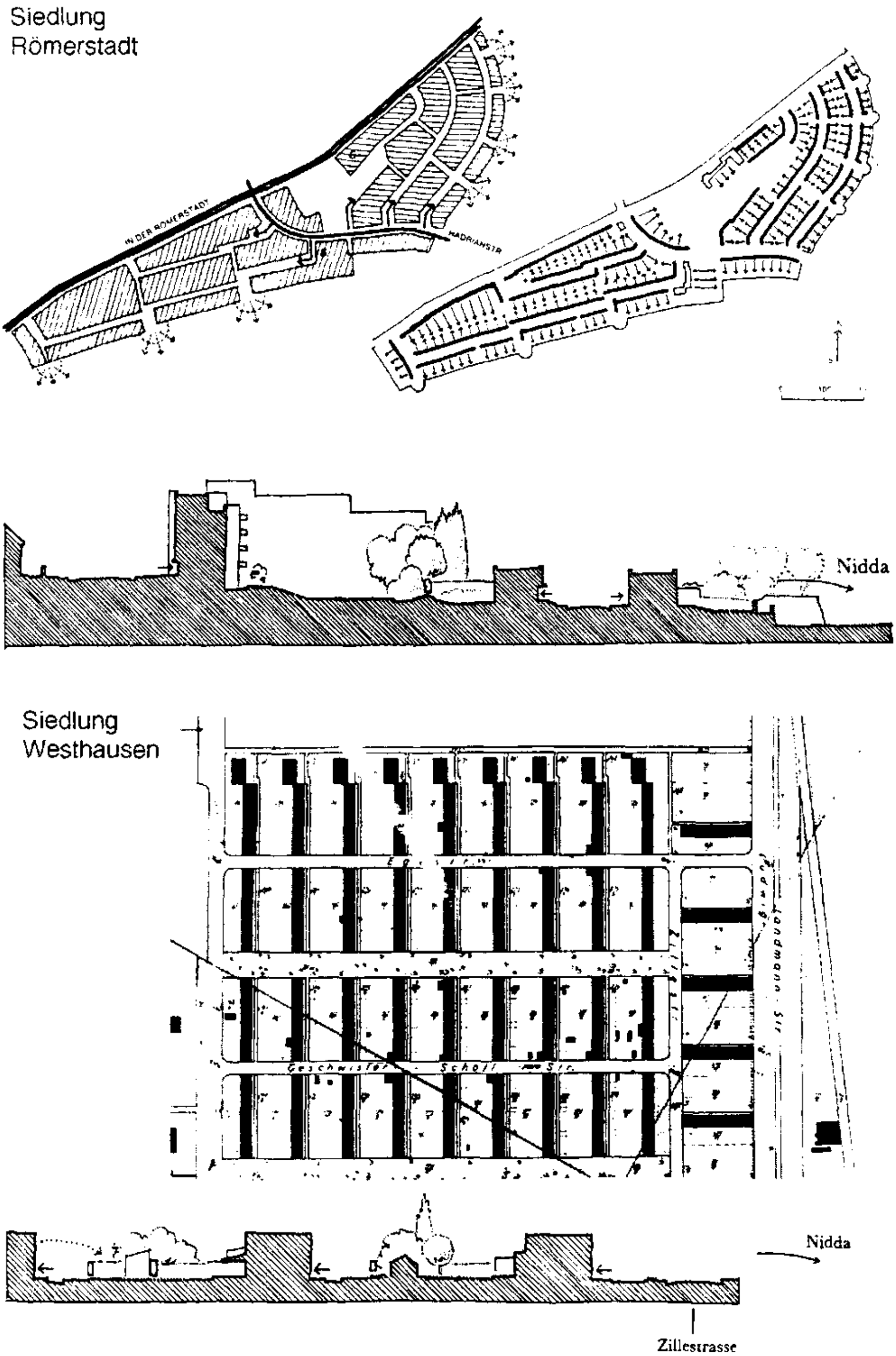


Figure 4.4:
Plans for the Siedlungen Römerstadt and Westhausen, Frankfurt 1925-1930 by May and Migge.
source: Castex et *al.*, 1984.

mechanics and create beautiful forms expressing the construction. Others design beautiful buildings that do not reveal the technical structure *which is nevertheless there.* This is the role I have in mind for ecology. This is why an Ecological Conditions Strategy should not focus on specific forms but on the underlying structural conditions, on the *structural language in which many form stories can be told.* Style, or fashionable form can play an important role in creating a sense of making something modern and new. It stimulates the essential appetite of investors, developers, architects, politicians and users to cooperate in the realization of the plan. If ecological structures are expressed in form they may contribute to this process of cooperation. But even if they are not, the structural conditions are still there and have to be used. A structural ecological strategy creates conditions for expression in form; it should not prescribe specific forms. They belong to the personal field of the designer or to a certain limited period.

between regionalism and "rationalism"

Ecological guidelines for the design of physical structures underlying plans for buildings and urban areas differ from the guidelines of mechanical engineering. One reason is that more values are involved.

Some planners and designers resist ecology because they fear nostalgia will take over, or, much worse, that there is some underlying "Blut und Boden" regionalism. For fear of this abyss, they keep far away from it. Achterhuis (1985) describes the influence of similar fears on post- war philosophy. For a long period, nature protection and environmentalism have been somewhat suspect because of this association. Recently, architects trying to use elements of local nature and culture in their approach to design, have carefully called themselves *critical regionalists* to avoid misunderstandings.

However, urban design in this century is not dominated by a romantic regionalism but by the other extreme: the rationalistic idea not to take existing nature into account. This view was inspired by the *Athens* and subsequent CIAM conferences and by Le Corbusier in particular. His ideal was the "Unité d'habitation", which he called a *machine for living*, a large and tall residential building, which is a world in its own right. It stands on legs, thereby literally breaking contact with a concrete place on earth. For his ideal of a city, the *cité radieuse*, he also argued in favour of one *universal value* which became visible as a rational chessboard, with many high-rise buildings and a strict separation of functions: a splendid example of the *man as the master of nature* attitude discussed in section 4.1.

Le Corbusier himself continuously developed his ideas, and in later projects came to quite different concepts (Guiton, 1981). However, the worldwide implementation of the undiluted basic ideas, especially in big post-war housing construction schemes, has led to an endless monotony of districts full of blocks of flats all over the world (Castex et al., 1980). In The Netherlands, all variations in soil and water were generally covered by a layer of sand, and the city of the future was built on this *tabula rasa.* The urban development solutions-in-principle were used as *stamps* to print the same blocks everywhere. Some people enjoy living in these areas, but the large-scale application does justice to neither the social nor the ecological differentiation in the urban landscape. From an urban ecological point of view, it is very unfortunate that this concept in particular has made such a mark on the urban development of this century. After all, the idea of the *cité radieuse* is characterized both by aesthetic and technical arrogance vis à vis the ecological potential of the existing landscape.

How may an Ecological Conditions Strategy position itself between nostalgia and universal rationalism ? Following the way of reasoning developed in this section nostalgic images, like all images, should be detached from an ecological approach. Universal principles, in the sense of universally applicable recipes for urban ecology, do not exist. In part III of this book general *guiding models* will be presented for certain categories of planning issues. They reflect the rational response to environmental and social problems of a more general nature. This structural approach should be combined with a local design process focusing on using ecological potential respectfully and thereby leaving open the decisions about romantic or geometric form. The Cherry Orchard case illustrates how *guiding models* for the design of good urban water systems may guide detailed local design.

structure and design concepts

Creating *good conditions*, structures and strategies, may be seen as the task of the urban planner. This task does not directly imply a form but is related to underlying principles called *concepts*.

In his book Good City Form (1981, pp. 81-90), the urban designer Kevin Lynch examines the relationships between human values and the physical form of the city. First of all he analyses three influential concepts, comprehensive ideas concerning the shape of the *ideal city*: The *cosmic concept*, the *machine concept* and the *organism concept*. At first sight the latter looks like an ecological concept. It came into being through the rise of biology in the eighteenth and nineteenth centuries. In the organism concept the city is seen as analogous to living beings, with the streets as arteries, parks as lungs, sewers as intestines, the centre as heart and offices as the brains. In urban planning this idea was given shape in the romantic English landscape style used in the design of parks and green belts and in the garden city movement which has been very influential in the design of many new towns and urban districts. From a social point of view, this idea is connected with the idea of cooperation in close-knit neighbourhood communities.

However influential these beliefs have been so far in the creation and development of cities, the city does not fulfil the criteria of one of these simple models. The city is neither a crystal, a machine nor an organism. These are idealized images which are based on a metaphor, on a com- parison and not on real conformity. The city can be built according to these concepts but real life never complies with this built up order. This causes conflicts from which new concepts with other images emerge.

Concepts play a large part in the world of planners and designers, often to the suspicion or irritation of the researchers. Is there a *scientific* alternative? Conscientious researchers are producing insight into many separate aspects of the city. But the designers regard this as piecemeal, a meal of biscuits not containing enough food for a plan in which the overall connection of parts must be given structure. If scientific understanding of the connections within complex entities such as the city already exists, then the uncertainty surrounding it is too great for planning. The emergence of movements with their own hypothetical *concepts* is to be expected in this situation. From a scientific point of view *planning (or design) concepts* can also be productive when critical discussion is possible, whereby lessons can be learned from the experiences gained in application. The simple metaphors are not very meaningful in an informative discussion. This does not apply to concepts which form a hypothesis about complex reality, nor to planning concepts which are based on the creative thinking of the researchers as well as of the designers.

In a review of Dutch planning concepts in spatial planning by Zonneveld (1991a,b), it is made clear that such concepts can be meaningful and necessary, especially in the communication between researchers, designers and policy makers. Until recently this tedious discussion has often been avoided in urban planning. The history of post-war urban planning has taught us that the images of the designers and the insights of the researchers can each lead a separate life. The tragic results in some cases are illustrated, for example, by the study on the rise and fall of the great design in the Amsterdam Bijlmermeer district (Mentzel, 1989, 1990).

After a detailed critical analysis of the three concepts mentioned, Lynch reaches the conclusion that the *ecosystem concept* offers more prospects that the cosmic, the machine or the organism concepts. He describes the city as a *learning* ecosystem. In doing so he adds the very element that is missing if ecology is linked with fashionable form. The complexity of the open system with animate and inanimate elements, cyclic processes and a complicated network of relationships, offers a fundamental approach to the phenomenon which is the city. The ecosystem concept is based not on a metaphor, but provides a way of thinking about the real city.

The ecosystem approach towards the city offers a framework in which the relationships between technical, social, economic and cultural processes in the built-up area can be placed in the context of life and survival. In Lynch's words: " The good city is one in which the continuity of complex ecology is maintained, while progressive change is permitted."

This provides points of departure for both researchers and designers to develop a structural language based on ecological concepts.

design images in context

Later in this book I will elaborate a number of structural concepts for urban situations. Here, I will conclude this section by giving a concrete example of the interaction between design images and the workings of the city as an ecosystem.

In recent years, many urban designers in The Netherlands seem to have had a preference for large paved areas to *create an atmosphere of urbanity.* The idea, of course, is not new. It is influenced by the beautiful plazas of old Mediterranean cities like Florence and Siena.

At first glance, some of these plazas in Dutch inner cities look fine. But unlike in the Mediterranean climate, there is no sun to burn the weeds. On the contrary, the rains of our climate stimulate plants to grow between the paving stones in places where people do not walk. The parks departments use a weedkiller called diuron, that was considered harmless, to remove the unsightly weeds. Recently, unexpected environmental problems have resulted from this practice. The drinking water company that works for the city of Rotterdam has had to stop admitting river water into their reservoirs because of prohibitively high contents of diuron in the water of the river Meuse. The herbicide was used in many cities and towns in the southern part of The Netherlands and was discharged into this river via groundwater and sewers.

This case illustrates that decisions on urban design cannot be taken without regard to the ecological context, climate, groundwater flows, sewage systems and rivers. Local causes have distant and far reaching effects. This does not mean there should be no beautiful plazas in this climate but, that when designing them the maintenance problem and possible environmental effects should be considered. Good design may prevent environmental problems at no cost, merely by thinking about ecology at the right moment when making the plan.

4.4 Summary and conclusions

Summarizing and concluding this chapter, I may draw a *tree of unity and diversity* (figure 4.5) as a metaphor of the evolving *ecological strategy.*

The general aim of the strategy is to create ecologically sound conditions for a diversity of *lifestyles* and *images.* The strategy is therefore called the Ecological Conditions Strategy, symbolized by the stem of the tree. The stem carries a variety of branches, the diversity of lifestyles and images. The stem is the domain of collective decision making; individuals decide at the level of the branches. The upper part of the stem, where collective and individual decision-making meet , is the level of *environment-use activities.* Here sectors and interest groups play a role. The basic attitudes are represented by the roots, offering more support because they grow in different directions. The tree illustrates the position of good ecological conditions as a unifying stem between the diversity of roots and the variety of branches.

The stem is the part of the tree where a certain degree of unity exists. It performs the functions of support and infrastructure, channelling the flows of water and nutrients. Here, the stem represents collective consensus on *good conditions.* To elaborate criteria for good, or *ecologically sound* conditions is the theme of this book. Conditions are created by *structures,* representing the static physical and organizational qualities and by *strategies,* representing the dynamic processes of steering and learning.

In this chapter I have argued that the *partnership view* is a rich source of ideas for good conditions. However, in this book I will concentrate on the stem, on the strategies and structures part of the tree. The good conditions that will be presented are not good *because* they stem from a particular basic attitude. They have to be justified in their own domain of planning, design and management issues.

The analysis of basic attitudes and world models has shown that there is a logical link between the *two-world model*, in which human activities are self evident and opposed to nature, and the ethics of obligations asking for hard arguments for imposing limitations to activities. This background is probably responsible for the habit in policy making to speak about nature and the environment in terms of constraints and sacrifices. By contrast there is also a logical link between a *one-world model*, uniting man and nature, and a form of teleological ethics emphasizing the interaction between man and nature as a part of *good life*. In this context the Ecological Conditions Strategy aims at developing good conditions that are in the first place *carrying* or *stimulating conditions*.

At the theoretical level the tree of unity and diversity creates space to combine freedom and responsibility. Ter Heide & Berends (1994, p. 122), Lapintie (1996, p. 68) and others rightly have stressed the point that environmentalists tend to underestimate the need to meet the challenge of this combination.

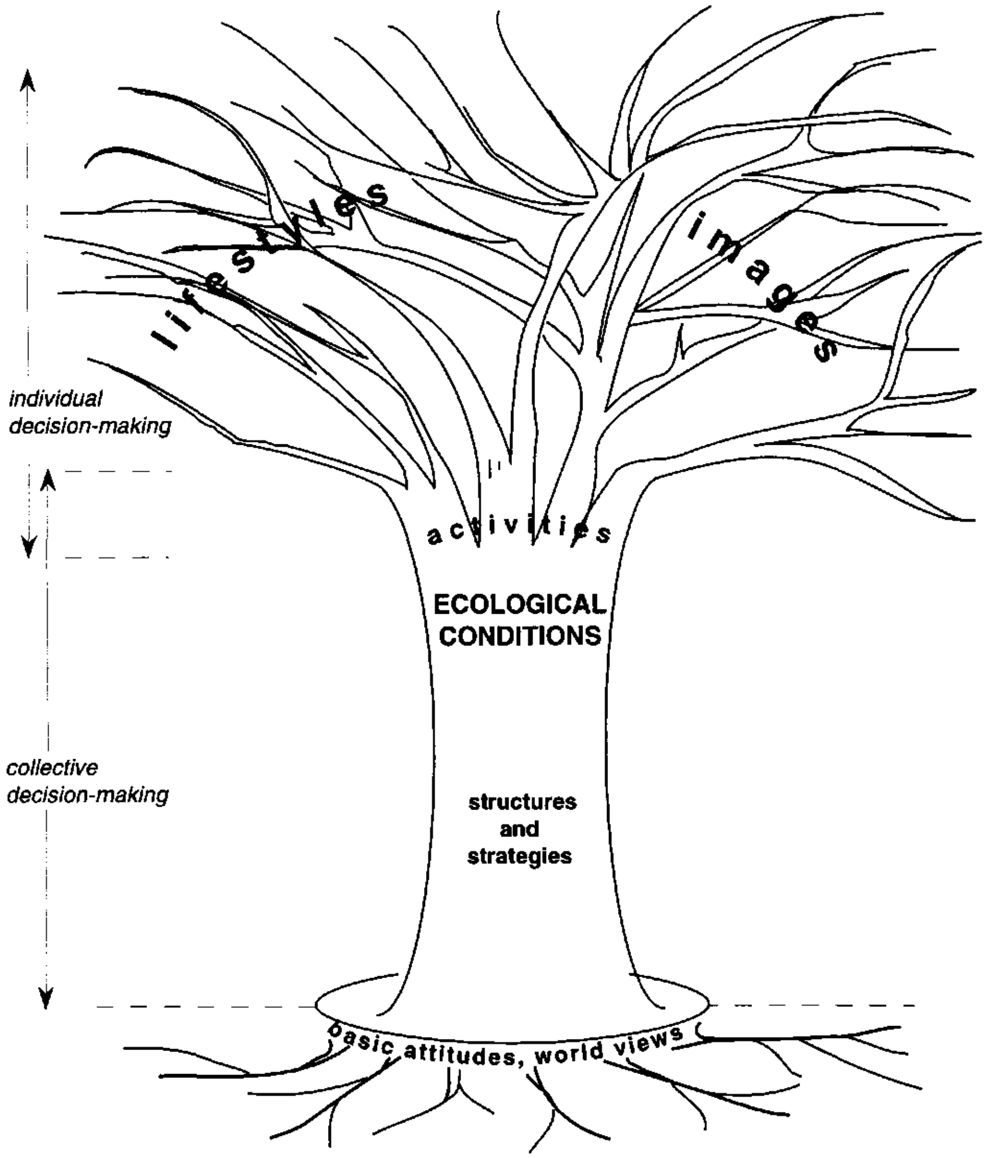


Figure 4.5:
The tree of unity and diversity.

5. OBJECTS, CONTEXTS AND VALUES

All my means are sane
but my motives and my object are mad

Ahab, in Melville's Moby Dick

INTRODUCTION

Chapter 4 described ecological conditions as the unity of the stem of the tree between the diversity of roots and branches: of basic attitudes and lifestyles and images. Before looking more closely at the ecological nature of conditions, I will discuss some other questions related to the aspect ofunity . How can we decide whether ecological conditions are good? Scientific objectivity or validity and the social aspects of consensus are the key issues in this context.

The scientific validity question is about how we can be sure our statements, for example about creating ecological conditions, are related to real world features. In a social context the question is to what extent knowledge depends, for example,on the rationality of economically or technically powerful groups. Ecologically sound means justifiable both in a scientific and in a social context. This discussion is the theme of section 5.1; the key word isobjectifying.

Subsequently, we will discuss the concept of conditions . What is the position of conditions in cause and effect reasoning and in argumentation about goals and means? The discussion on this in section 5.2 leads to the Ecological Conditions Strategy being positioned in the field of empirical and normative schools of thought in the sciences and professions. One motive for exploring this issue is to gain a better understanding of the gap between researchers and planners as signalled in the discussion of the Kromme Rijn case and in chapter 4.

Deciding about ecological conditions is deciding about values. In section 5.3 I will focus on economic theory about ecological values in decision-making. How are these values weighed at macro and micro-economic level? A two-tier value theory is a promising approach emerging from this discussion. Section 5.4 explores the practical options of the two-tier theory for making decisions in environmental planning.

5.1 Objectifying

In section 4.2 we encountered discussions about standards based on the hypothetical average person (1). Later in the same section, we also discussed the economists' construct of Homo economicus,which, in its pure form, is not a lifestyle found in sociological research (2). In the discussion on the gap between researchers *and designers in section 4.3 I signalled the problem designers (and planners) have in dealing with fragmented knowledge(3).The three issues presented there have in common the attempt of scientists to objectify what they study in their field and the difficulties that arise in working with these approaches in the context of ecology and planning.The core problem in the three issues seems to be their concealment of the underlying values. In this section I will briefly discuss some philosophical backgrounds. My main sources for the broad outline are Van Vucht Tijssen & Van Reijen (eds.),1991 and Faludi's study on Popper, (Faludi, 1986).*

OBJECT AND SUBJECT

How can we describe and discuss ecological conditions and justify them non-arbitrarily? This question leads to the issue of objectifying . The issue is problematic because there is a strong line in Western thinking, going back to Greek philosophy, to call objective, that which has been detached from the environment. The context is seen as contingent and as subjectively colouring the real thing. This line of thought is related to three traditions:

1. The separation of object and subject in a *man and nature perspective*. Nature (resources, species) as the object as opposed to man as the subject. Nature tends to be seen a raw material, as the object of engineering. The idea of man as a part of nature is beyond the horizon. Ecological conditions only matter as far as constraints and risks are concerned. This tradition has already been discussed in section 4.1, in discussing the basic attitudes.
2. The second tradition *separates the observed and the observer*. Objective characteristics are thought to belong to the object, they are thought to be beyond subjective discussion. The objective facts are called *sense data*, a term coined by the English philosopher G.E. Moore. The members of the Vienna Circle are well known protagonists of the approach. Karl Popper has passed fundamental strictures upon this view. He contends that there is no theory-free observation.
3. The third tradition is related to *reductionism*. The object is not only separated from the observer but also *separated from its own context*.
   Parts are isolated from wholes, from the context. This is at odds with ecology which is concerned with the relations between living beings and their environment.

As I have already discussed the first tradition in section 4.1, this section will concentrate on the second and the third. The headings are: "knowledge and interpretation" for the second tradition, and "objectifying in context" for the third.

KNOWLEDGE AND INTERPRETATION

Popper's critical rationalism

Poppers' criticism of the Vienna Circle's logical positivism deals with the unexamined concealed values playing a role in so-called objective statements. He does not support the idea of an objectivity beyond-discussion. Indeed he thinks, that discussion is the essential element in objectivity. Knowledge is conjectural knowledge. This implies knowledge is hypothetical: conjectures can be refuted.

Here Popper applies his famous principle of falsificationism: A scientific law that is claimed to be universal, should be falsifiable by one critical experiment. In his later work Popper describes three worlds[1]: World 1: the physical world; world 2: the world of mental states; and world 3: the world of the products of the human mind. Objectivity belongs to world 3: statements that can be criticized.

If knowledge is conjectural, it is essential to discuss also the context of the observer and the context of the observed. In the case of knowledge about universal laws, as developed in physics and chemistry, the laboratory context is formalised and reproducible. The importance of Poppers theoretical breakthrough lies in this field; in the core sciences of positivistic thinking. Even here, knowledge is based on refutable statements. This has implications for day to day discussions about ecological issues: from climatic change to traffic noise in the neighbourhood, we cannot hope for an objective science that will eventually make all these discussions redundant. Yet this seems to be a dream of many scientists and many politicians. In chapter 6 I will return to this issue in the context of the discussion of risk. At this stage the conclusion is: *Statements about ecological conditions should be open* to discussion. There is no value-free scientific *knowledge enabling* one to escape from this. In this respect I follow *Popper.*

interpretative and critical science

Popper's view on objectivity as a statement to be discussed creates space for advances between Popper's *critical rationalism* and two other approaches to knowledge that have originated in the humanities and the social sciences: the hermeneutical or interpretative approach (Dilthey, William James, Max Weber) and the *critical theory approach* (Horkheimer, Adorno, Habermas). The implications of these three approaches to various fields of social and environmental sciences are discussed by many authors in the book edited by Van Vucht Tijssen & Van Reijen (1991). In their introduction the editors conclude that the different schools that dominated the sharp debate on positivism in the 60s and 70s have buried the hatchet. They are developing more understanding about each other's views.

Interpretations of nature, landscape and environmental issues may vary with the basic attitudes towards nature and with aesthetic preferences, as discussed in section 4.1 and 4.3. It is, of course, essential to communication to do justice to these different interpretations and to understand their background. An analysis of Dutch policy documents revealed that environment was interpreted as "a set of official environmental standards" by one agency, and as "the social environment in a neighbourhood" by another agency belonging to the same Ministry (Tjallingii & Zonneveld, 1993).

Interpretations are also strongly related to the underlying power structures and interests. Is a polluting industry entitled to demand objective facts about the possible damage. Or is the government entitled to demand objective facts about the

1 *See Faludi (1986, p. 62). The description is based on Popper & Eccles: The Self and its Brain (1977, p. 38)*

safety of substances? Who has the onus of proof? Issues like this ask for discussions on facts and values that deal not only with the polluting substances but even more with the social and economic context of the issue. There is no value-free objectivity.

communication

The crucial role of communication about observations and interpretations is clear. But where does this communication takes place? In discussions about universal laws the professional community of specialists will act as a forum. But scientific learning about ecological processes or ecological strategies, also requires other platforms. Let us consider a practical case in which ecological modernization is on the agenda: the construction of a new building.

> If we consider a building, then from different angles people will describe it in different ways. The positivists' approach would be to call these different ways subjective, the building, from that point of view, is objective. The situation is not always clear, however. If the angles represent a personal point of view, then the descriptions will reflect the mood, the hopes and fears and other personal feelings of the observers, the subjects. But if the angles represent the *points of view of different scientific disciplines, each having their own rules of objectifying,* the situation is different. They would not agree to call their perception subjective.

Can there be more than one objective building? The answer is yes: *there are various ways of objectifying*! The building as a place to work or to live in; as a construction that needs renovation; as a facade that has to emanate the distinction of a head office; each view, whether it is taken by sociologists, technologists or economists is objective within its own context.

Now let us assume the building in this case is a large and complex one and that researchers, designers and users of the future building are the members of the project group that has to decide on a detailed plan. *The context of objectifying has changed* now. No longer may the disciplines only use their own standards, they have to decide what is good for the building as a whole. This means that the platforms for objectifying knowledge of the scientific communities are supplemented by a new platform: the interdisciplinary planning team together with the future users. Moreover, in the case I have chosen, the members of the team have to decide on ecological modernization: what are ecologically sound building materials? how can energy saving technology be applied? how can we save the tree that is now growing in a corner of the building site? To be able to answer some of these questions they must rely on results from laboratories; for other questions they have to learn from practical experiments with new technology or new ways of social organization in other buildings. All questions, however, have to be studied in the context of plans and alternative plans for the building. There are at least three levels of objectifying communication: the level of the individual disciplines, the level of buildings (drawing on the experiences with one building to improve the quality of other similar buildings) and the level of the individual plan. Popper's fasificationism seems to be appropriate as a principle in communication at the mono-disciplinary level (as far as this level is concerned with universal laws). At the levels of interdisciplinary communication on issues with complex contexts and without universal pretensions, falsificationism does not work.

I will return to this discussion in a later section. Leaving interdisciplinarity and the differences between the true and the good for later sections too, the interesting question here is: how do these members of the project team communicate on knowledge and interpretation? What we observe in such cases is a process of learning. Starting with the users' programme and looking at the objectified knowledge of participating disciplines, an *intersubjective shared understanding* develops. There may be conflicts, competition, arguments, compromises, but a successful team, that develops a useful approach to be applied to more buildings will do so on the basis of shared understanding.

In Habermas's Theory of Communicative Action, shared understanding is a basic element of *communicative rationality*. It differs fundamentally from the *rationality of goals and means*. The latter is based on the situation of actors that can only see each other as instrumental objects (means) or as competitors seeking to attain the same goal. In communicative rationality, however, the issues are mutual understanding and acknowledging interpretations as valid.[2] The rationality of goals and means is linked to *knowledge is power*; communicative rationality is linked to being accountable for decisions, examining their underlying values and assessing their consequences. In this respect Habermas comes close to Popper.

pragmatism

There is also a close relationship between Habermas's thinking and the philosophical school of *pragmatism* in which communication and learning are linked to practical projects, for instance the case of the team of planners and users designing a new building. John Dewey's instrumentalism or *pragmatic theory of knowledge* has become well known by his *learning by doing* approach. Dewey, who elaborated on the ideas of Peirce and William James, was also very influential in theory and practice of education. Together with others he introduced the project approach in education, that developed into a problem oriented way of linking theory to practice, based on working in groups of students (Van Woerden et al. 1988).

At the philosophical level his maxim was:

> "That which guides truly is true." Plans he considered as: "..hypotheses to be worked out in practice, and to be rejected, corrected, and expanded as they fail or succeed in giving our present experience the guidance it requires." Experience to him was the interaction between human subjects and their material environment: "In its primary integrity experience recognizes no division between act and material, subject and object, but contains them both in an unanalyzed totality."[3]

Here Dewey clearly expresses his views on epistemology. Bertrand Russell, who is closer to the positivists' position, criticizes these views:

2 *See Habermas, 1988, p. 65. In this essay, being part of Post-Metaphysical Thinking , Habermas highlights some central concepts from his Theory of Communicative Action; See also Van Vucht Tijssen&Van Reijen, 1991, p. 27; Zonneveld, 1991a, p. 73.*

3 *These fragments are from Dewey's Reconstruction in Philosophy, published in 1920. I quote from Friedmann, 1987, p.189.*

"The most important difference between Dewey and me is that he judges a conception on its consequences, whereas I judge it on its causes." (Russell, 1970, p. 741)

Obviously Russell gives priority to causes as a foundation of truth. But is there really a contradiction between Russell's and Dewey's position? As we have seen already in the case of the building team discussing truth and usefulness, there are different principles for communication about the validity of statements. The principles relate to different levels of context complexity. They also relate to different aims of scientific work as will be discussed in a later section. Consequentional reasoning cannot replace causal reasoning. In planning we need both. Surely laboratory testing to establish general physical laws should play a role in learning about the interaction between man and nature. However, the use of these general laws in different practical contexts also needs to be explored. This is how we may learn to understand which truth is good in specific contexts. Therefore, we may consider Russell's and Dewey's views complementary rather than contradictory.

There is another interesting point in the quotation from Dewey. In the practice of doing things, he states, the separation between the observer and the observed, between subject and object is disappearing. This fits very well with the concept of working with nature, as discussed in section 4.1.

Dewey's pragmatic *learning by doing* approach is an important source of inspiration for *the social learning tradition in planning* that will be discussed in chapter 7. The link between knowledge and action is a central issue in planning. But there is also an important link between action and knowledge: learning from practical real-life experiments to objectify what can be used in similar cases.[4]

Thus, the discussion of the tradition of "separating the observed and the observer", has brought us to recognize the importance of communication, pragmatism and social learning. The third tradition described in the first part of this section is related to reductionism; to "separating the object from its own context". Is objectifying possible without isolating parts from wholes? Does the systems approach provide an answer to this issue?

OBJECTIFYING IN CONTEXT, THE SYSTEMS APPROACH

The tradition of reductionism in science has been related to Cartesian thought leading to an atomistic view. Here I am concerned not with the origin but with the implications of this approach; with the strong tendency of many scientific disciplines to take problems to their own corner (preferably in the lab) and to focus on general laws. Popper's falsificationism addresses this approach to science. One exception may be cause to refute the statement about a universal law. This approach to scientific learning does not seem to fit ecology, especially not in a planning context.

4 *Innes (1990, p. 33), discussing the use of social science knowledge in policy making, also explicitly refers to Habermas and Dewey as sources for an approach which, linking communicative action and social learning, "leads to the improvement of knowledge, and which offers a basis for an ethical stance in practice."*

learning in a non-reductionistic approach

There are other traditions, however, in less reductionistic sciences, that do not fall into this universal-law category. In geography, for example, a distinction is made between idiographic and nomothetic methods (Neef, 1967, p. 73). The latter is the research tradition looking for general laws, the former is another tradition analyzing individual cases or situations, for example individual landscapes. Here the specific context of a special case is the object of research. The evaluation of plans can be included in this tradition. We may compare the individuality of a landscape with the individuality of a plan. In his study on Popper, Faludi rightly claims that the falsification principle is not made for plans, as they are unique solutions fitting to a specific situation (Faludi, 1986, p. 117).

Between the *idiographic* and *nomothethic* research traditions there is a third, focusing on comparative analysis of individual cases and looking for regularities in the patterns and processes of interaction that these individual cases share. This approach is contextual, it analyses *objects in context..* The category is called *geosynergetics* by Schmithüsen (1976, p. 69). Landscape ecology belongs to this family. One of the results of such studies is a typology. Finding one irregularity is not being seen as an argument to abandon the typology. In such a case it is more common to create another type. There may be reasons however, for re-examining the underlying values of the typology. Therefore these values should be made explicit.

In planning there is a similar approach to develop types, or planning concepts that fit certain categories of planning situations. In his study on Dutch planning concepts Zonneveld (1991a) proposes adapting Lakatos's *methodology of research* programmes to be used in the process of learning that is appropriate for this category of statements. Lakatos deviates from Popper's falsificationism as he no longer confronts a theory solely with empirical data but primarily with rival theories. Following Lakatos, Zonneveld proposes distinguishing between the *hard core* of a planning concept (the strategic spatial concepts) and a *protective belt* created by additional concepts. As long as the planning concept satisfactorily guides operational decision-making, the concept is maintained. If it fails to provide adequate answers to planning problems it may also be maintained, but only until there is a planning concept that performs better (Zonneveld, 1991a, pp. 41-48).

Chapter 8 of this book discusses a programme of *guiding models* as a protective belt around the hard core of the Ecological Conditions Strategy along these lines.

systems approach

As a reaction to reductionism and the related extreme specialization of scientific disciplines, the systems approach seems to offer opportunities for the study of *objects in context.* The systems approach originated as a *conceptual approach.* Two quotations may illustrate this:

> "Perhaps the most important point to be grasped concerning systems is their conceptual nature. In any real-world situation there will be a very large number of systems that can be identified, each depending upon the objectives and viewpoints of the observer" (Howland, 1963)

In the face of simplicity, then, the system scientist becomes precise, expedient and quantitative. But when confronting the complexity of our social political or economic sectors, he becomes more poet than statistician, more grand theorist than laboratory technician." (Sutherland, 1975) [5]

But rather than throwing light on the different ways of looking at objects in context considered from different points of view, many applications of the systems approach created new complex objects. The approach, especially when it is combined with model-building, creates the illusion of representing the one real world that can be manipulated in this way. The intelligent proponents of systems analysis were quite aware of this, and always stressed that "like beauty, the system is in the eye of the beholder" (Chadwick). But the great achievements of the systems approach in drawing attention to complex interrelationships are overshadowed by the impression of the context-free objectivity. According to Faludi (1987, pp. 42-46), many authors embracing the systems approach fail to examine critically the choice of system boundaries. Strictly speaking, systems are also objects in context. Their context and the reasons for defining their boundaries in this context, have to be explained in communication about systems. The word system cannot replace context.[6]

Acknowledging the criticism, I still will use the system approach as a conceptual tool, drawing on fundamental studies by Van Leeuwen (1973, 1985).

What are the implications of this section's discussion on the Ecological Conditions Strategy? Because that strategy is ecological, it focuses on objects in context. In discussing these objects there is no objective truth beyond discussion. Objectifying means making the underlying values and interpretations explicit , for instance those related to standards, theoretical constructs and analytical reductions. Communicating and learning about complex decision situations may assume the form of learning by doing in practical experiments. The learning process may include platforms at various levels, from the making of plans to the improvement of strategic guiding models.

5.2 The role of disciplines

A way of seeing is always a way of not seeing.

Kenneth Burke[7]

The previous section has shed more light on the concepts of objectifying and learning. I will now relate these concepts to creating conditions, the issue central to

5 *I have taken these quotations from Capella's illuminating study on planning and design theory. (Cappella, 1985, pp 2.3-2.5)*
6 *W. de Groot (1992) also prefers to speak about context rather than about systems. The key chapters in his Environmental Science Theory are on problem in context and action in context.*
7 *Quoted by Colby, 1990, p. 199.*

the Ecological Conditions Strategy. Who creates conditions? In order to be used in different ways by households and enterprises, structural conditions must first be planned. Experts and politicians play a major role here. What is the role of different disciplines in this context? And how may we position ecology? What discipline is this? Or is my approach to ecology an attempt to "conduct the whole orchestra of disciplines"?

ECOLOGY

Let us start with the fear of social scientists about "ecologism"; the alleged imposing of a concept from the natural sciences to the social sciences? I can imagine that the option for a broad interpretation of ecology, as expressed in chapter 3, has not exactly taken away this fear. But, as I will demonstrate, this fear is not justified.

Ecology originated in the biological sciences where it refers to the interrelations between plants, animals and their abiotic environment. Although never excluded in principle, most biologists did not welcome the broader meaning that includes man. They prefer to have a clear biological definition.[8] The meaning of ecology started to widen in the twenties, when researchers of the Chicago school of human ecology applied ecological concepts to sociology.[9] This generated much discussion, because, in the first half of the century all sorts of naturalistic concepts within the mainstream of the social sciences had just been discarded. Given this background, the still persisting opposition to ecologisms is understandable (Levy, 1992). Of course, the working of a complex system cannot be explained by one single scientific discipline. In fact, ecological approaches have been introduced to the domains of anthropology, sociology or economics to find answers to new questions about the complexity of interactions between social and physical processes.

Looking for a useful concept of ecology for this book, it may be best to start with the ecological strategy.

An ecological strategy indicates a direction for steering social processes by guiding decisions about technology, economics, land use and government. The reasons for this strategy are related to an understanding of the social causes of environmental problems. The empirical support obviously has to come from a number of disciplines, both from the natural and from the social sciences. These empirical sciences, however, do not develop options for steering; that is the domain of technologists and planners. Scientists could do very little without the active participation of reflective practitioners.

If I speak about ecology in this broad context it cannot and does not imply one discipline. Rather ecology refers to the evolving ecological awareness among

8 *Ecology was first introduced by the German scientist Ernst Haeckel in 1866 (Schroevers (Ed), 1982, p. 58). To indicate the branch of biology, Dutch biologists prefer to write and speak about oecologie, more close to the Greek original oikos, thus leaving the ecologie version for general purposes.*

9 *Social scientists like Park and Burgess borrowed concepts from ecology and used them in their studies on the distribution of ethnic groups in cities (Nelissen, 1972).*

researchers and practitioners of many disciplines. The Ecological Conditions Strategy aims at developing a *shared understanding*, not by conducting the orchestra of disciplines but rather by asking questions. These questions intend to guide a learning process about the conditions for many roads towards ecologically sound development. To this end, it is essential to understand the differences in the participating disciplines.This is what this section is all about.

Thus, ecology, as used in this book, refers to a field of research and practice which requires the cooperation of many disciplines. The next difficult word in the Ecological Conditions Strategy is "conditions". Here too, there is a discussion about disciplines. Most disciplines focus on causes and effects or on goals and means. To which of these two categories belong conditions?

CAUSES, REASONS AND CONDITIONS

In the field where research and planning meet, a distinction is made between causal and final reasoning. The former is to do with causes and effects, the latter focuses on goals and means.[10] Let us start with some questions this distinction evokes.

causal and final

The causal and final dimensions, of course, are not separated worlds. On the one hand, final reasoning should have a causal basis. On the other, many causal chains are not linear but circular: the effects influence the causal processes through feedback mechanisms.

In the complex reality of ecological planning where changing contexts are the rule rather than the exception, it is important to avoid a narrow one cause - one effect or one goal - one policy instrument philosophy. The former may lead to simplified deterministic thinking. The latter may lead to voluntaristic simplism. Most features and processes, however, even in a simple urban park, are not determined by one cause and neither may they be changed by one policy instrument. At the level of the general discussion between the natural and social sciences the alleged determinism or voluntarism may form a barrier of historical prejudice. In my view, nature does not determine human behaviour, nor can human beings voluntarily change nature. Or, to put it in more fashionable terms: society is not makable; neither is nature.

To describe the interactions between society and its physical environment we need more space than is offered by the causal and final vocabulary of causes and effects, goals and means. I prefer to speak about "conditions" and "reasons", two terms that make it easier to discuss ecological issues without falling in deterministic or voluntaristic traps.

10 For instance Hoogerwerf, 1992. He adds normative reasoning, thinking in norms and values, as a third category. In this book I consider norms and values in their relation to activities. Thus, they are not seen here as a separate category but mainly as a part of the final reasoning or as a part of causal reasoning. Both categories heavily rely upon objectifying , which, as shown in last section, is intimately linked with norms and values.

conditions and reasons

The relationship between man and nature may now be described in the following way: Nature and life cannot be regarded as causes of human action, they create the conditions. Perceived relationships with life and nature can form reasons for people to make certain social choices. Present environmental policy is a system of such choices. At this time there are good reasons for adjusting human action better to the rules of nature. Setting up a strategy for ecologically sound development is no more than working out conditions for this adjustment.

Leaving a discussion on reasons (or motives) for a later section, I would like to stress here that speaking about conditions not only creates space in more general discussions on ecological issues. There are important practical implications too.

end-of-pipe versus source oriented

In environmental planning practice there are powerful magnets pulling the discussion away from indirectly working conditions towards directly operational causal or final relationships. Direct relations can be made clear with hard figures; indirect conditions are more difficult to prove and more difficult to fund. One of the magnets, in the scientific community, is the tendency to objectify direct causal relationships by reducing and standardizing the context. I discussed this in section 5.1. Another magnet is related to policy and making decisions. Here, there is a preference for direct final relationships that are considered effective and efficient. Two examples may illustrate this problematic synergism which creates a strong magnetic field:

It is technically possible to *remove* pollutants like nitrate from groundwater, during the process of producing drinking water. The method is expensive but its effects are measurable. Preventing nitrate from entering the ground, however, is not as easy. It requires a change in the farming practice of applying more fertilizer and manure than crops can take up. Changing this ecologically unsound practice, however, requires bringing about a change in a complex economic and social system. Creating conditions for this process of change requires interventions with effects that are more difficult to measure.

The capacity of combined sewers, carrying waste water and rainwater, is inadequate in heavy rainfall. In such cases sewer overflows operate discharging diluted sewage into receiving surface waters. This is considered one of the main sources of urban water pollution. One solution is to build storage basins at the overflow points. These basins remove pollutants. The system is expensive, but the investment and the effectiveness can be calculated accurately. Another solution is to prevent rainwater from running into the sewers. This is a source-directed approach that requires integrated measures at the level of buildings and areas of urban green. Chapter 9 will discuss more details of this environmental problem and its solutions. The effects of single measures are difficult to measure.

The two examples have one thing in common: looking at the problem of reducing pollution and using effectiveness and efficiency criteria, the emphasis is laid on causal and final relationships that can be demonstrated with hard figures. This inevitably leads to the end-of-pipe solutions that remove pollutants. However, if we want to focus on preventive, source-directed solutions, things are more complex and require a process of creating conditions for ecological modernization that changes environment-use activities. Most official environmental policy plans claim to give priority to prevention, but the tendency to focus on causal and final reasoning leads them to give preference to end-of-pipe solutions.

Clearly the language of causal and final reasoning is not sufficient to communicate about ecological modernization, that is, about prevention of environmental problems. We need to create space for the concept of *conditions.*[11] Besides these practical considerations, some references to theory are appropriate here:

Firstly, I mention De Jong (1992), who states that thinking in conditions:

"is the common root of planning and empirical research. It differs from cause and implication by not leading to probable effects or logical consequences. It just makes something possible." (De Jong, 1992, p.10)

Secondly, I refer to Habermas who makes a distinction in principle between communicative rationality and a rationality of goals and means , as mentioned in section 5.1. I conjecture that conditions (and reasons) can be important concepts in communicative rationality. Here the shared understanding can develop that is essential for a learning process about more ecologically sound alternatives.

This, of course, does not mean we do not need the empirical base of causal reasoning nor the elaboration of goals and means. In the context of an Ecological Conditions Strategy we need to combine causal and final reasoning with thinking in terms of conditions.

Having clarified the position of conditional reasoning, compared with causal and final reasoning, I now will return to the role of disciplines, which is intimatel;y linked to ways of reasoning.

THE AIMS OF SCIENTIFIC DISCIPLINES

If there is to be communication between disciplines in planning processes, their differences must be understood. We will first look at the different aims of scientific work before turning to different roles in the planning process.

different scientific disciplines, different aims

The biologist looking for plausible explanations of the living world and the mathematician trying to find the correct derivation of a formula have different aims. It is commonly thought that science can prove things to be true. Bateson (1979), however states: "Science probes, it does not prove." Strictly speaking science cannot prove. Only mathematics can. This would imply the mathematician cannot be called a scientist. I use a wider interpretation in which all intelligent work reflecting upon experiences and performed in the framework of a learning process

11 Research on the use of knowledge has shown that the most common model in the interaction between social science research and policymakers is the enlightenment model: "knowledge affects policy in a tacit way by changing the way policymakers understand issues." (Innes, 1990, p. 12) See also Ter Heide, (1992, p.8).

may be called scientific work. Learning is not the privilege of the official Sciences. Frustrating learning processes in other professions by calling them unscientific is not conducive to the improvement of practice. It is more interesting to look at the different aims of scientific work. In a planning process, disciplines with different aims have to cooperate.

Three categories of aims may be discerned:

1. The logical aim, *the correct*, the aim of tautological systems like mathematics.
2. The empirical aim, *the truth*, the aim of the natural and the social sciences.
3. The normative aim, *the good*, the aim of the technical and planning sciences.

In this I follow W. de Groot (1992, p.12) in his fundamental study on the theory of environmental science.

The Ecological Conditions Strategy, being a planning strategy, has a normative aim: good conditions (see section 4.1).

applied science

In my personal quest, described in chapter 1, I experienced the impossibility of *applying* ecological concepts developed in biology to planning issues. This, of course, does not exclude the use of ecological knowing that insights. But in the context of planning new *knowing how* principles have to be developed in a learning-by-doing process that explicitly includes values rather than deliberately trying to neutralize them. Koningsveld (1991, p.104) also criticizes the common idea (also held by Popper!) of transplanting or applying theoretical universal knowledge to technology or to planning. The persistent idea, held by the community of fundamental scientific researchers, of scientists and science translators (applied scientists) is probably related to this misunderstanding. This idea does not reflect reality. The technical and planning sciences have their own theory related to their own object. The object of biology is nature, the object of ecological planning is working with nature. The latter is related to, but cannot be derived from the workings of nature. Strictly speaking, therefore, applied science does not exist.[12]

But presumably the concept of first thinking then doing has deeper roots. It is the basic in the beginning was the idea thinking that goes back to Christian and Greek philosophy and is the founding principle of the Cartesian two-worlds model, separating man and nature and mind and body. I have discussed this in section 4.1.

On logical grounds, Ryle (1949, pp. 29,31), who is also a critic of the two-worlds model, states that knowing how (related to competence) cannot be derived

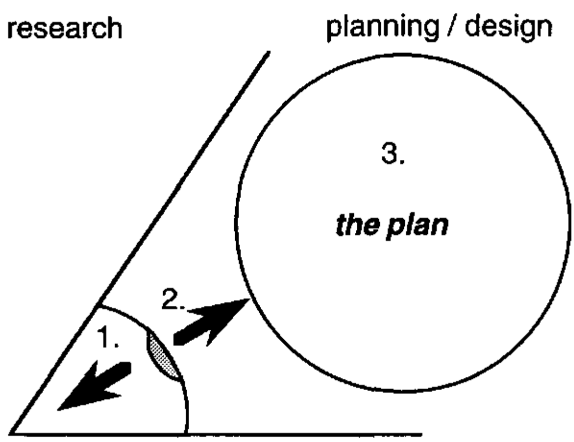
12 *According to W. de Groot (1992, p. 16) this family consists of three types of disciplines:1. Ethics (general values and normative procedures, good rules of conduct) 2. Problem-oriented disciplines (good solutions, usually for recurrent problems of social order, law; of health, medicine; or of the environment, environmental science) 3. Design-oriented disciplines (good plans or good decisions for specific situations). These disciplines create good conditions for activities, and in doing so they seek to prevent problems. According to De Groot they are opportunity driven rather than problem driven. Civil engineering, architecture and planning belong to this group.*

from knowing that. I referred to his phrase "Efficient practice precedes the theory of it" was quoted already in chapter 4. The theory of knowing how is the theory of activities. In section 5.1 I have discussed Zonneveld's approach to the learning process focusing on planning concepts. In chapter 8 I will opt for a similar approach to learning that uses guiding models as the equivalent of hypotheses. They are not derived from research on how nature works but on how we work with nature.

Disciplines that may be called scientific, broadly speaking, have different aims. Planning and design belong to the normative sciences , the aim of which differs from the empirical sciences. How do these disciplines act in a planning process?

THE CONTRIBUTION OF DISCIPLINES TO PLANNING

Empirical and normative disciplines both play an important role in planning. How do they relate to each other? In figure 5.1 I have drawn a diagram to illustrate their position and to make clear how they "keep an eye on the plan". I will first focus on the formal positions and the accompanying values before I turn to the process of cooperation in practical settings.



disciplines	1. empirical sciences	2. problem-oriented sciences	3. design-oriented sciences
aim	*the true* explanatory (general)	*the good* effective, efficient (categorical)	*the good* appropriate, legitimate (specific)
product	hypothesis prognosis	solution, standard	plan, policy

Figure 5.1:
Disciplines keeping an "eye" on the plan.

The *empirical sciences* take the object to their own angle. The arrow points towards the angle and the converging lines symbolize the reduction that is necessary to arrive at researchable questions. If the object is the plan the disciplines take it to their own angle to test it with the help of their own methods. Many empirical sciences tend to concentrate on discovering general rules. Others like some branches of geography, landscape ecology (see section 5.1), history and anthropology search for an understanding of specific situations. Assessment studies that evaluate plans or the impacts of plans, as in Environmental Impact Assessment, are of special importance.

The *problem-oriented sciences* look in a different direction indicated by the arrow that points at the plan. Their aim is to produce good solutions which are as true as bad solutions. Good is usually related to effectiveness and efficiency. Effective is related to the question "does it produce the desired result?". Efficient is about the question "is it the best result for the least effort or input?". As a rule, the problem-oriented sciences focus on categories of problems; they develop standards.

The *design and planning sciences* are also searching for the good, but here other criteria are used. To the architect, beauty may be decisive. A more general criterion may be *appropriateness.*[13] The criterion for the policy-maker is legitimacy. The relevant question is how do things fit together?. The design and planning sciences are concerned with finding specific answers for specific situations.

Planning is often identified with problem solving. But planning is not identical with solving a problem or a category of problems. Faludi (1987, p. 3) argues that planning addresses the problem of coordination and therefore may be called a discipline that solves problems of the second order. This implies that planning is also concerned with problem prevention, not only in a problem-oriented approach but also in the context of creating conditions for activities.

Two types of research deserve special attention because they link elements of empirical research and planning: strategic research and scenario studies.

Strategic research, also called development research (Ter Heide, 1992, pp. 7, 16-21) occupies a special position. This type of research is plan or project oriented, but it also focuses on policy development. This means it includes analyzing social and environmental developments aiming at drawing up an agenda and critically assessing policy plans and policy performance.

Scenario studies are a special case too.They have some similarities with a planning process. In scenario studies a distinction is made between extrapolating

13 Also called fit, for example by Alexander (1964) and Lynch (1981). The Netherlands Scientific Council for Government Policy (WRR, 1992) only mentions three criteria to asses environmental policy instruments: effectiveness, efficiency and legitimacy.

projective scenarios, and prospective scenarios. The latter are usually elaborated along empirical lines by following a "what if" track. Using of empirical models they may simulate possible futures by changing the input data or assuming different combinations of empirically known processes.[14] Though many disciplines may participate, usually both projective and prospective scenarios remain within the domain of the empirical sciences. Prospective scenarios however, may also be approached from a more normative side. This occurs if the problem and design-oriented sciences are developing different alternative options to solve a problem or to meet a challenge. Thus, strategic scenarios are generated.[15]

Since the strategic research and the strategic scenario studies represent the categories most linked to strategic planning, I have selected them to participate in the framework of the Ecological Conditions Strategy that will be presented in chapter 8.

Planning addresses the problem of coordination. It is indeed a problem, as the results of empirical research, the proposed functions and technologies, do not as a rule fit together, however true, effective and efficient they may be. In the search for good plans planners need the other disciplines to deepen research on feasible options. Planning is cooperation and this is exactly why it is so vital to understand the values underlying the aims and approaches of different disciplines. In the next section I will discuss how these disciplines in practice keep an "eye" on the plan.

FROM "WEDGES OF THE CAKE" TO "POINTS OF VIEW"

We have surveyed the possible contributions of different disciplines, but how do these groups of researchers, planners and designers actually look at their role in the making of a plan?

In the first part of this section I referred to ecology as a field of new questions asked within the domain of traditional disciplines. Ecological approaches have been introduced into the domains of anthropology, sociology, economics and other branches of science, to find answers to new questions about the complexity of interactions between social and physical processes. Urban ecology is one such field in which new questions are being asked.[16] Many social scientists, however, regard the city as a socio-economic system only, and sometimes find it difficult to accept that the city is also simultaneously an ecosystem. In the reductionist tradition many disciplines tend to look at a complex whole like a city as something that can be divided into wedges like a cake.

14 *Examples of this approach are the economic scenario studies by the Dutch Central Planning Bureau (CPB, 1992a,1992b)*

15 *An illustration of this category is the The Netherlands Now As A Design project that produced 4 planning and design studies. They were based on Central Planning Bureau scenarios reflecting the normative options of the main political currents in the country: Christian democrats, liberal democrats and social democrats (NNAO, 1987)*

16 *As demonstrated by Burgess et al. 1994; Cadman & Payne,1990; Douglas, 1983; Koning &Tjallingii, 1991, to mention just a few*

the points of view concept

The discussion on disciplinary territories is fruitless and unsolvable as long as the issue is perceived as a wedges of the cake problem. As shown in figure 5.2, the points of view approach seems to be more fruitful. Different disciplines may look at the whole system; they can only see part of it from their point of view. This is Burke's point: "A way of seeing is always a way of not seeing." Together the perceptions from different angles may help us in understanding the complexity of interactions that is typical for seemingly simple matters like the design of an urban square or a problem with street litter.

The circle in figure 5.2 may be seen as the system but also as the plan. In this case it becomes clear that ecology is not seen as the discipline that produces the scientific underpinning of the claims of one sector, but as a part of many disciplines doing scientific work and keeping an eye on the plan as a whole.

In every angle of figure 5.2, the eye of figure 5.1 can be drawn. An ecological approach to planning may formulate criteria to test plans, and this procedure lies close to the empirical science tradition, but in that case the researchers take the plan to their own angle. In the philosophy of the ecological strategies approach, however, it is more appropriate to develop guidelines for good conditions and good activities. In a project group engaged in the making of the plan, ecologically oriented researchers and planners from different backgrounds work together.

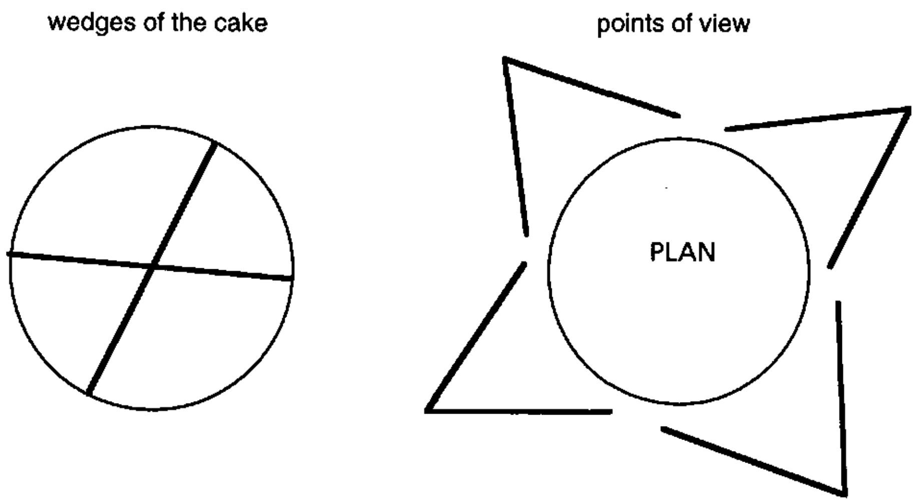


Figure 5.2:
Two ways of looking at the role of disciplines.

theory and practice

In the exchange of views with the rapporteurs from various European countries prior to the 1992 UN-ECE Ankara conference on urban ecology, the discussion on the position of ecology related to other disciplines turned out to be an important issue, for example in the French situation, as reported by Levy (1992). In a professional world closer to practice, local planners and designers are less occupied with theoretical discussions. Workable solutions are found during the practice of the making of plans, as discussed for the Scandinavian situation by Malbert (1992). The points of view approach may also offer a theoretical answer to the question about the position of ecology. Ecological problems and opportunities are intimately linked with the plan as a whole. An ecological strategy needs the contributions of different disciplines looking at the whole from different points of view.

disciplines and sectors

Working on plans for an urban or rural environment, however, does not automatically solve the dispute about disciplinary territories. On the contrary. In many cases disciplines have their strongholds in sectoral agencies. It is not unusual to see urban planning being divided in well defined separate tasks for services, for infrastructure, for social housing, for green areas etc. As long as the sectoral division of tasks follows conventional pathways the boundaries of the wedges of the cake are considered with some mutual respect. Introducing a new approach however, such as sustainable building or ecological modernization, is asking for trouble. In section 7.2 I will say more about the sectoral versus integral debate. At this point I will merely mention my own experience in many project teams that it is in these teams, more than anywhere else, that a shared understanding may develop. There is no guarantee that it will develop. But good project organization, the adoption of a points of view concept and a climate of learning by doing create good conditions. The Morra Park case, to be discussed in chapter 11, may illustrate this point.

disciplines and integration

Disciplines also argue about who should coordinate the whole. Designers sometimes claim they are the discipline that masters form, being the totality of the plan. In Dutch Urban Planning there has been a lively debate on this issue between planners with a social science background and urban designers with a background in architecture (Van Hoogdalem et al., 1986; Faludi, 1996a, 1996b). In their explorative inquiry, Ter Heide & Wijnbelt (1994, 1996) interviewed designers and researchers about their ideas about integration. They conclude:

> "Most designers see themselves as integrators, as responsible for compiling plans from the materials provided by others, including researchers. Many researchers disagree: in their view the integrator role should be played by project managers, or could be allotted on an ad hoc basis depending upon the sort of product required." (Ter Heide & Wijnbelt, 1994, p. 136)

This seems to confirm the gap between designers and researchers signalled in the Kromme Rijn case in chapter 2 and in section 3.4, and indicated in figure 5.1 by the own angle to which researchers take their objects. If researchers do not keep an eye on the plan they are absent from the integrative process of plan making. In that case what right do they have to challenge the designers' role?

Yet, the whole of the plan is more than form and spatial organization, thus there is more than the traditional designers' discipline can offer. There is also social organization and ecological organization at the level of a plan. This should not necessarily lead to total engineering. Creating conditions may combine flexibility with a sound basic structure. There are signs that planners/researchers are becoming increasingly willing to give more attention to the making of whole plans by "linking knowledge to action" (Friedmann, 1987) and by focusing on planning concepts (Zonneveld, 1991a; Faludi, 1996a). Faludi and Van der Valk (1994) point out this development in their account of the history of ideas in Dutch urban planning. In local practice, when project teams sit round the table, also researchers take part in making plans. Drawing on his practitioner's experience, Arts (in Ter Heide & Wijnbelt,1994, p. 112), even denies the existence of a gap between researchers and designers.

These views and experiences confirm my statement on the role of disciplines drawn in figures 5.1 and 5.2: All disciplines should keep an eye on the plan and contribute to the making of good plans. Looking at the whole from different angles is a more fruitful procedure for these disciplines than occupying wedges of the cake or claiming a monopoly for integration.

Creating ecological conditions can only succeed if these conditions are embedded in the plan's social and spatial context .This requires a learning process in which all disciplines participate. Scientific ecological work may form part of the empirical, problem-oriented and design and planning disciplines that have to cooperate in this learning process.

5.3 A two-tier approach to values

Objective truth is not above discussion, it is not value free, as we saw in section 5.1. In section 5.2 we saw different values at work in various disciplines. But how should values be handled when making decisions about ecological issues? In this section I will first examine the lessons to be learned from economic planning.

Assessing values and making decisions are part of economic life and therefore, not surprisingly, part of economic theories. What do these theories teach us about working with ecological values in economic life? How may these views contribute to the theory of an Ecological Conditions Strategy?

FROM CONVENTIONAL TO ECOLOGICAL ECONOMICS

In the last decades, economics has become environmentally aware. This has resulted in a lively debate on the place of environmental values in economic systems. Least controversial is the instrumental level: the most efficient way of achieving desired levels of environmental protection. The most disagreement is about how to determine these levels.

incentive instruments

Let us first look at the instrumental level. Efficient policy instruments attach a price to environmental costs and benefits, either by taxing pollution or by subsidizing environmental improvement. A different approach is to issue permits that are tradable between firms. The government could determine a maximum level of pollution and then issue polluting permits. Economic agents for whom this is cheap will reduce pollution rather than paying the tax or buying the permit. Thus, there is freedom for agents to choose their own way and the sum total of environmental improvement is reached efficiently. If the maximum level of pollution is established in the context of an ecological strategy, this example illustrates how to create good conditions for the operation of markets for the benefit of the environment.

Economic theories disagree on the establishment of maximum levels and other environmental values. Once these decisions on values are taken, there is much more agreement on the use of instruments.

The convergence of economic schools on the choice of policy instruments and the differences on the establishment of collective values is illustrated by the Netherlands Central Planning Bureau's report Scanning the Future (CPB, 1992a). This report presents four scenarios based on three leading economic schools of thought: Neoclassical theory, Keynesian economics (in this case akin to what is called institutional economics) and Free market economics.[17] How do these different schools think about environmental values?

private bargaining and values

The extreme free market perspective almost completely rejects the role of the government. The economists of the property rights or public choice theory school argue for privatizing the environment by assigning property rights to environmental assets. A minimal (laissez faire) government will leave the caring for environmental quality to the invisible hand that is thought to result from private bargains in the free market. The question of values attached to environmental quality is thus left to private market decisions (CPB, 1992b, p.14; Jacobs, 1994, p. 68). According to this economic theory, the result is no environmental policy and no need for a discussion on how values of the environment should be determined collectively.

the neoclassical approach[18]

Most economists, however, do not take this extreme position because they do not think an invisible hand and property rights[19] will help us through problems of climatic change, polluted rivers or biodiversity. Therefore, they do have a problem

17 In the neo-classical scenario, called Balanced Growth and in the European Renaissance scenario with Keynesian inspiration, it is foreseen that international agreement will lead to an eco-tax at the European level, being an effective incentive leading to stabilization of energy consumption by the year 2015.

18 The main sources of this short summary are CPB, 1992a,b; SER, 1991; Jacobs, 1994 and Söderbaum, 1994. The latter is an analysis of three neoclassical textbooks (Randall, 1987; Pearce &Turner, 1990; Tietenberg, 1992).

19 See section 4.2 for a discussion on the tragedy of the commons, demonstrating the failure of an invisible hand in some categories of environmental problems.

of finding and agreeing on environmental values.

The influential *neoclassical school's* approach to this problem is to break down environmental issues into constituent goods and services, the commodities for which the economists can construct supply and demand curves. Supply curves are based on the costs of measures to protect the environment. In the case of a woodland that may be protected the value is estimated, for example, by calculating a *shadow price* (the costs involved in planting a new woodland elsewhere) or by calculating *opportunity* costs (the profits that could have been made on the site of the woodland). Demand curves are determined for instance by inquiries in which a representative sample of the population is asked about their *willingness* to pay for the environment commodity or about the value of compensation. Supply and demand information then allows the economist to perform a cost-benefit *analysis* in which the costs of a level of protection can be compared with its aggregate consumer value.

The outcome of this method to establish environmental values is a choice of resource allocations. For a further discussion on values it is important to understand the basic assumptions underlying the neoclassical position. Jacobs (1994) examines five premises of what he calls the neoclassicist's *commodification of the environment*:

1. The *methodological individualism*. Unlike such things as defence and police, which also neoclassicists consider *common goods*, the environment is placed in the context of economic behaviour of individuals.
2. "Individuals behave in a self-interested and consistent manner to maximize their utility." (*the Homo economicus premise*)
3. This individual "ideally operates in competitive markets."
4. "The neoclassical approach takes preferences and technology as exogenous to the economic system. It therefore treats them as given rather than as objects of analysis."
5. "Neoclassical analysis is based on the currently existing preference of consumers, on which it does not presume to make value judgements." Therefore it " tends to regard itself as morally neutral, a positive rather than a normative subject. (Jacobs, 1994, p. 70)

This is in sharp contrast with the view of a group of new economists that "economics are no more than a means to an end within a context of values." (Cadman & Payne, 1990). Most institutionalists probably would not go that far, but their criticism of neoclassicism also comes up against the value issue.

the institutionalists' criticism

Jacobs discusses a number of problems raised by the commodity approach:

As the approach only counts individual preferences, the cost-benefit optimization does not pay right to a number of aspects:

1. The distribution of resources: "the willingness to pay criterion cannot be divorced from ability to pay, which leads inevitably to inegalitarian outcomes."
2. Future generations do not have a say and in the same way the interests of other species are excluded.
3. The Homo economicus premise makes it unlikely for social choices to be made through some political or collectively organized process and for the decisions to be legally enforced. (Jacobs, 1994, p. 76, 77)

So the real choice is between a methodology that seeks to objectify people's preferences (hiding the value choices implied in the method) and one that deliberately opts for a discussion on values in a social context.[20] The latter is the choice of the *institutional economists* like Jacobs and Söderbaum (1994). Their thinking is in the tradition of Tinbergen, Galbraith and Myrdal, economists opting for a more important role of political decision-making at the institutional level.

The criticism is clear and so is the general direction of the search for answers. But what are the implications of this approach in decision making about environmentalt issues? This question is central to the journal Ecological Economics, a breeding ground of new ideas on the relationship of ecology and economy. The journal unites the critics of the neoclassical approach.

alternatives of ecological economics

Because of their relevance to environmental planning, I will here discuss two alternative solutions to economic issues which have their origin in the ecological economics approach: innovation, and the role of environmental issues at the macro-economic level.

1. Innovation. The conventional (neo-classical) view is to consider the resource base as essentially limitless. According to this view, scarcity of resources will automatically generate substitutions for these resources. Technical progress is infinite. The ecological economics approach is not that optimistic about technology, but holds a prudently sceptical view. Costanza, Daly & Bartholomew (1991) suggest satisfying both the sceptics and the optimists by deliberately introducing a programme of technological innovation. One way to stimulate innovation is the introduction of high consumption taxes (eco-taxes, green taxes) that will raise the price of natural resources. Thus resources will be conserved for future generations and the predicted technical change will be induced more rapidly.

This proposal is very much in harmony with the idea of learning by doing discussed in section 5.1. In that context it seems logical to combine technological with social innovation.

2. Ecology at the macro-economic level. One of the main ways in which ecological and neoclassical economics differ is in their approaches to macro economics. According to ecological economists the environment is, before all, a macro-economic issue. The reason for this position is illustrated by Daly (1991) with the example of loading a boat.

"The micro allocation problem is analogous to allocating optimally a given amount of weight in a boat. But once the best relative location of weight has been determined, there still is the question of the absolute amount of weight the boat should carry." "Optimally loaded boats may sink under too much weight - even though they may sink optimally!" (Daly, p.35)

20 This is an illustration of the more general discussion on objectifying and values of section 5.1.

The total weight that can be carried by an ecosystem, being the larger whole around the economic system, is called the carrying capacity. How to determine this value is a macro-economic question that cannot be solved with micro-economic tools. Acknowledging the micro-economic domain for some issues such as allocation, there clearly is a need for discussing environmental values at two levels .

This conclusion brings us to a discussion of the "two-tier value theory" formulated byTalbot Page (1991), an American economist belonging to the ecological economists group. ·

PAGE'S TWO-TIER VALUE THEORY

In this theory the first tier provides the circumstances, the "nurturing conditions" under which the second tier may function. They are related in the same way that setting the rules and playing the game are related.

> "The first tier includes the macro-economic prerequisites for micro-economic markets to flourish. These prerequisites include (reasonably) stable prices, (reasonably) full employment, (reasonably) even distribution of income. .. The second tier includes ordinary legislatures, courts, markets and individual behaviour....This two-tier value theory provides a framework for thinking about sustainability. As a circumstance for a viable liberal state, we add the sustainability principle to the first tier." (Page, 1991, p. 68/69)

Some principles may help to separate the two-tiers conceptually.

1. The level of abstraction in the first tier is higher. An illustration is the difference between the Constitution and ordinary legislature.
2. The principle of non interference. The instruments of the fist tier "should be broad, avoiding minute control in the day-to-day workings of markets and the ordinary second tier institutions."
3. The two-tiers may have different decision procedures, reflecting the broader concern of the first and the narrower interests of the second tier.
4. The first tier is an open system that encloses the second tier. This implies it is not possible nor desirable to define first tier sustainability instruments exactly. That should be left to the second tier. Page gives the example of a firm that has to decide on the research budget. "The process is inexact in principle, but even inexact it is better to have some research budget than none." In cases like this he suggests to use rules of thumb and learning by doing. Page (1991, p. 70, 71)

Like Jacobs, Page also criticizes the neoclassicists' inclination to formulate economic policy on the basis of a specific image of man, a *predefined individual*, as Page calls it. According to him it is inappropriate to approach non individuated problems like intergenerational equity and species extinction with highly individuated tools. These problems therefore belong to the first tier.

two tiers and ecological conditions

Following the two-tier value theory, we now may formulate creating ecological conditions in terms of structural conditions based on first-tier value discussions leading to first-tier decisions. These decisions do not require a *predefined individual,* they require a public debate on common values. Values related to pollution, resources and biodiversity should not be made dependent on the efficiency criteria of an economists' construct: Homo economicus.

Looking at the issue in this way, my position is far from the neoclassicist point of view. Taking into account however, the emphasis on ecological conditions as structural conditions, there seems to be no difference in principle with the neoclassicist's view on infrastructure as a common good. Be this as it may, in practice there will be contrasting views on the nature of first-tier, macro-economic values.

THE FIRST TIER

Collective decisions are required to decide about first-tier issues. What kind of value statements do ecological economists propose? I will discuss some of these proposals here under the title "guiding principles", formulated to guide economic activities.

guiding principles for production

Based on his analysis of the carrying capacity Daly gives the following guiding principles :

1. The human scale (population level times per capita resource consumption) should be kept within carrying capacity.
2. Technological progress for sustainable development should increase efficiency rather than throughput.[21]
3. Renewable resources should be exploited on a sustained yield basis. This includes the sink function of resources. Waste emissions should not exceed the renewable assimilative capacity of the environment.
4. Non-renewable resources should be exploited at a rate equal to the creation of renewable substitutes. (Daly, 1991, pp. 44-45)

These guiding principles are of a general nature. Implementing them requires more concrete guiding models that show the way to work with these principles in agricultural and industrial production. The terms guiding principles and guiding models are mine. I wrote them in italics because we will meet them as key concepts in the elaboration of the Ecological Conditions Strategy in chapter 8.

The four macro-economic principles all refer to production and waste. In chapter 8 I will call this "working with flows", because this is what it involves ecologically: material flows to be followed from cradle to grave. These principles do not guide us in cases like Amelisweerd where qualities of areas are at stake. The case of areas will be discussed below. There is also a third possibility: to directly address

21 *We will meet this principle again in a different form in the ecodevice, a conceptual model that will be discussed in chapter 8.*

the actors in economic life. In doing so the social context of overloading the boat is taken as a starting point.

guiding principles for actors

Opschoor (1989, 1991) approaches environmental problems from the actors' side by asking: What are the driving forces behind environmental degradation? He distinguishes an important complex of factors, which he describes as market-mechanical environmental degradation. As a self organizing mechanism, the market has many virtues. But as discussed already, environmental qualities are not sold on markets and environmental degradation may be caused or aggravated by the shortcomings of the market mechanism. Opschoor lists these market imperfections in the following way:

> *Accumulation.* This is the problem of overloading the boat as described by Daly. Looking at this problem from the actors' side, this pursuit of economic growth independent of environmental limits is a process stimulated by:
> - The desire of individuals for higher income and more wealth,
> - Firms fighting for survival in competition with others.
> - The government seeking social stability. Growth creates conditions for giving something to the poor without taking it from the rich.
> - Technological development.Being able to produce more with less labour leads to structural unemployment. The repercussion is increased production and consumption. These processes explain a good deal of the growth policy as supported by the conservative, liberal, Christian-democrat and social democrat streams in the European political landscape. (Opschoor, 1991, pp. 178-180)

Individuals, firms or governments that seek to balance these processes with concern about a good environment face other shortcomings of a market economy. Opschoor discusses these as:

> *Distance.* Decision makers at the decentralized micro-economic level are uninformed and uncertain about the decisions of others. This results from the distance in time (future generations) or in space (third world) or simply because competitors do not communicate. Distance aggravates another process:
>
> *Displacing problems.* Competition leads to problems shifting to the weakest party with the lowestpurchasing power. This can be the future (the discount rate subordinates the interest of future generations), the environment, or nature. (Opschoor, 1991, pp. 180-182)

These main points in Opschoor's analysis crop up in one way or another in the writings of many ecological economists, for example in the congress proceedings edited by Costanza, 1991. A comparable analysis could be made for issues like health, safety, employment and working conditions. Such an analysis leads to proposals concerning institutional change.

Formulated as *guiding principles* the conclusions following from the analysis above may be summarized as follows.

1. The institutional basis for sustainable development should create conditions to reduce the growth-inducing forces mentioned above.
2. Conditions should be created for sustainable self-organizing economic and

social processes (market and cooperation).
3. The effects of distance should be diminished by information and communication.

The institutional change indicated here is meant to improve the mixed economy. In my view this should not imply a move towards the extremes of reinforcing the role of the state or the free market[22], but by creating better conditions for sustainable self-organizing economic and social processes. This implies that there are roles for many actors.

This discussion of guiding principles that may counteract "market-mechanical environmental degradation", reveals the intimate link between environmental and social values. This is illustrated by two ongoing debates on practical proposals.

TWO PRACTICAL ISSUES

A deliberate reduction of growth is what the protagonists of a *basic income* have in mind. The issue has been discussed in the context of lifestyles in section 4.2. Van Parijs (1994), proposes partly disconnecting labour and income and thus alleviating the stress on the labour market brought about by creating an autonomous and voluntary unemployment. As a result, he expects in increase in the amount of time spent on work that is not for the market and not for the state. This complies with the proposals of Robertson (1990) to increase the informal economy in a scenario he describes as Sane Humane and Ecological (SHE). The Dutch Central Planning Bureau (1992b) discusses *a negative income tax* proposal that comes very close to the basic income idea.

Shifting the income tax to an eco-tax or green tax on energy and materials, is a policy instrument that is gradually gaining wider support as it both enhances energy efficiency and creates employment. Labour intensive repair and recycling is one of the branches of industry that will benefit from this.

The two-tier value theory does not prescribe in detail which values should be used in different stages of decision making.The theory is rather a two-tier decision making method that distinguishes between decisions about goals and context in the first tier and decisions about optimizing means in the second tier. In other words it separates creating ecological conditions from performing ecologically sound activities. This method is not limited to purely economic decision making. In the last section of this chapter therefore, I will discuss the potential for two-tier decision-making in the context of some environmental planning cases.

22 Or, to use the terms of the Central Planning Bureau's scenario studies (CPB, 1992b), not by moving it towards dirigism nor towards the jungle.

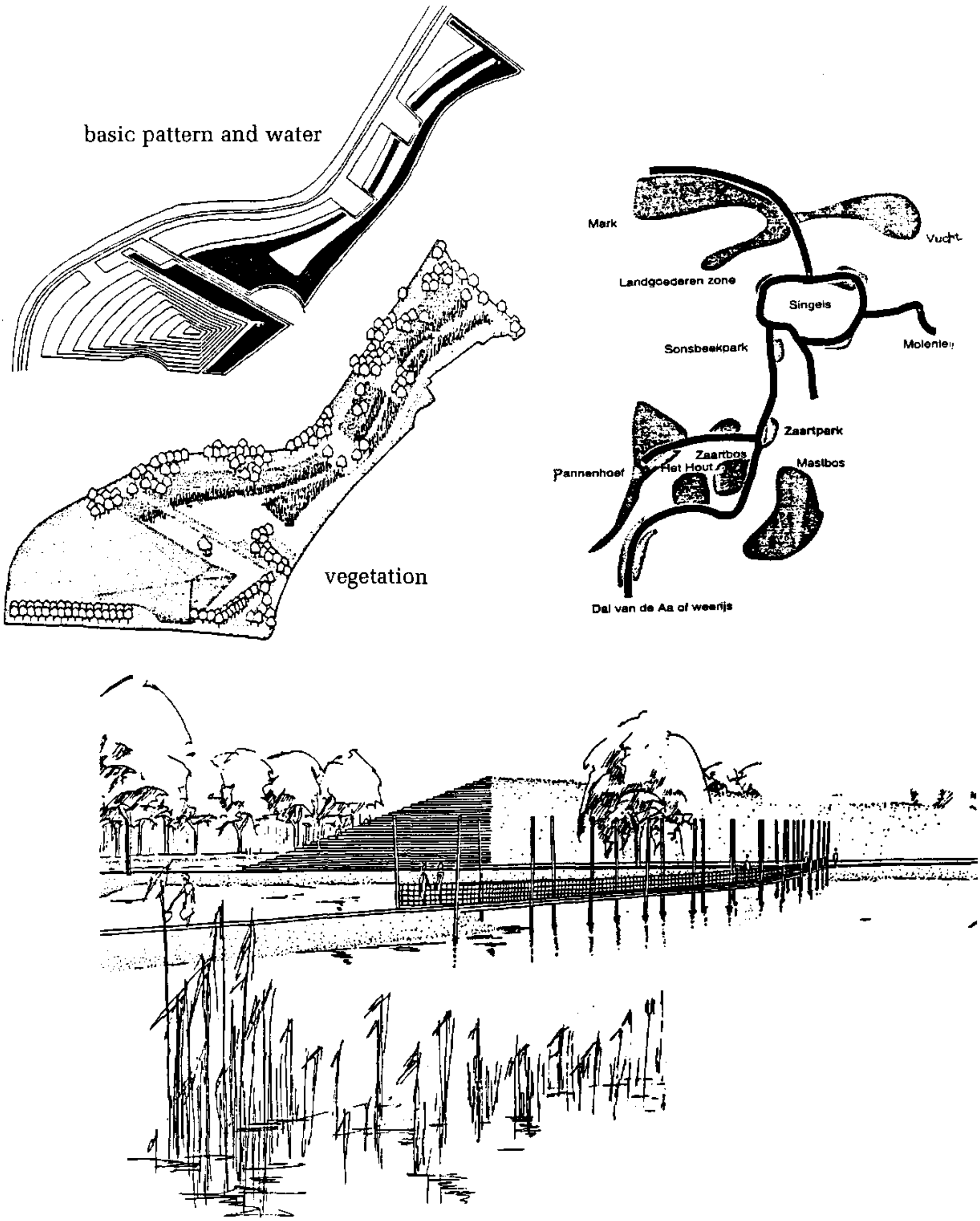


Figure 5.3:
The Zaartpark and the Green Network of Breda.
source: Municipality of Breda, H+N+S consultants.

5.4 Two-tier decision-making

There are many different ways of creating first-tier conditions. One way, in physical planning, is to consider structure planning as the stage at which first tier conditions are created.

THE ZAARTPARK CASE

The Zaartpark case in the Dutch city of Breda (figure 5.3) is an interesting case that demonstrates the potential of a two-tier approach:

In 1991 a small park (6 ha) was laid out in one of the river valleys in the city of Breda. The Zaartpark is well designed and has many functions for the local residents who participated in the making of the plan. It also adds an important habitat to the spatial ecological network for plants and animals. And, last but not least, it performs an important function in the water system by providing storage for the clean water of the Zaart, a brook that runs into a small polluted river. The project costs 1.6 million guilders (approx.1 million US$).

The planning history of the Zaartpark is very relevant to our discussion.

The Parks Department had not planned and budgeted the project for 1991, so initially, no funds were available. However, the city had made two strategic and structural arrangements in its Green Structure Plan, adopted by the municipal council in 1986. First, the GSP contains a map of the green network providing a clear picture of the priorities for investments in green areas. Secondly, a financial arrangement had been made enabling the Parks Department to use money generated by privatizing of public green spaces for funding projects connected with the green network (Langeveld, 1992; Verburg, Langeveld & Van den Hurk 1994).

Under these conditions the money paid by a local hospital to buy land for the extension of its parking lot was used to start the project. Moreover, taking advantage of the structural position of this site in relation to the water system, an innovative plan was designed that made the Zaartpark a pilot project for the planning of similar places in the water systems of Breda and other cities.

The case is illuminating in the context of the two-tier method. The first tier decisions on the *green network* and on the funding system created *good conditions* for the second tier decisions about the project itself, including decisions about the efficiency in performance. Thus a small quantitative loss of land could be used as a lever to gain an important qualitative improvement in the green network.

Some local authorities in The Netherlands are currently considering one-tier methods that seek to objectify the value of green areas using general criteria of biodiversity and use.[23] In this way an attempt is being made to increase the value of these areas in decision making. It is expected that the value of these areas will be taken more seriously and, if unavoidable, more compensation can be claimed for their loss. Far from being objective , however, these methods usually involve many implicit unexamined values, highly debatable and liable to induce controversy rather than suggesting solutions. The Zaartpark case shows an elegant alternative: a

23 One example is the Amsterdam local authority project that involves an attempt to include all aspects of environmental quality in an index system (Rosdorf et al., 1993). For a critical review see Tjallingii & Jonkhof (eds.), 1995.

two-tier approach which creates financial and spatial conditions in the first tier and engages in a process of plan-making in cooperation with the local residents in the second tier. In this way values are made explicit and discussed at the appropriate level.

The Zaartpark case is an example of decision making about areas. In many aspects this category differs from the decisions on (production) flows and actors discussed earlier in this section. Nevertheless the case can be described in terms of the two-tier approach. Page's four principles also make sense in this case although the values concerned are different.

AMELISWEERD REVISITED

To what extent does the two-tier method provide answers to the dilemmas of the Amelisweerd case? It is worth reconsidering the case because the description given in chapter 2 shows a typical one-tier decision process.

Decisions on issues like the location of road sections, the design of road verges and mitigating measures are typically second-tier decisions. But these issues were not the core of the conflict. That core was the public's resistance against building more and more roads, causing the destruction of more and more woodland in a process with no end and no visible alternative. This is a real *first-tier* issue, involving values comparable with Daly's *human scale.* At this level strategies that address the dilemmas of ever growing mobility and transport are required. Macro-economic instruments like the introduction of an energy tax are appropriate here, as are strategies that aim at influencing the modal split, from transport dominated by private car to transport dominated by trains and buses. At the time these issues were being debated publically, but they were not on the political agenda. Only much later did they became a real, though as yet unsolved, political issue.

Another approach would be to look at the Amelisweerd case as a first-tier spatial issue. As was shown in the Zaartpark case, this would require a first-tier discussion on the regional structure plan. This would have included making decisions on the regional road infrastructure in relation to the green and water structures. Tunnels or other possible solutions to conflict situations would have been considered at an early stage. This is what is now happening in the western fringe of Utrecht. Ultimately, however, if traffic flows continue to grow, the spatial problems will become unsolvable as will the problems of congestion. In chapter 10 I will discuss these problems in the wider context of suburbanization.

In hindsight, the Amelisweerd conflict probably escalated because typically first-tier problems were approached like second-tier decisions. As a result the problem was perceived as a case of weighing conflicting interests. To a certain extent this is what it was. But instead of investing more energy to look for alternative solutions as indicated above, most energy went in sharpening the conflict on the arguments for and against the one decision. True problems, however, do not ask for a single decision but for several alternative solutions.

First-tier decisions should be taken first, because at an early stage more alternatives are available at no extra cost. In the Amelisweerd case that moment had passed: the narrow space created by the first decisions was used to the maximum, but that maximum was too narrow to avoid the escalation of the conflict.

We may now have found a better way to describe the conflict of the Amelisweerd case. The two-tier approach, of course, does not guarantee a specific solution in such cases, but the approach offers an alternative for the unsatisfactory practice of monetary and non monetary valuation.To conclude this section I will compare the two-tier approach with some valuation methods commonly used in decision making about issues that involve many values.

COST-BENEFIT ANALYSIS AND MULTICRITERIA ANALYSIS

In section 3.1, in discussing the *values of nature* approach, I made some criticisms of cost-benefit analysis and multi-criteria analysis. Let us now look at these methods from another side, against the background of the macro - micro or two-tier discussion.

It is common sense to weigh pros and cons when making decisions. But to use cost-benefit analysis for this weighing procedure is more than common sense. It is a choice that involves many values. Söderbaum (1994), who analyzed three recent neo-classical textbooks, found the cost-benefit method to be one of the cornerstones of the neoclassical approach. He shares the criticism already mentioned: the reduction of first-tier issues to second-tier decisions and the reduction to the reasoning of Homo economicus. W. De Groot (1992) also refers to these issues in his critical review of cost-benefit methods. He prefers the two-tier approach in decision making: "The deep and long term course is to establish that preservation and sustainability conditions must be met before the bidding can start."

A cost-effectiveness method has been developed in response to the difficulties of monetarizing benefits. The goals are expressed in their own values, whereas the means are in monetary values. This is an improvement that enables us to assess the costs of alternative means to reach a given end. Not only efficiency but also effectiveness is brought in more explicitly as a criterion. However, consensus about goals is a prerequisite for this method and so is a relatively simple one-means to one-end structure of the problem.

A further step is the development of multicriteria analysis, in which all issues are treated in a goals achievement way, i. e, by assessing the degree of achieving the goal set for each issue. The planners may conduct the analysis by themselves, but for specific interests they can rely on information from sectors. Institutionalized or private groups that have interests in the future plan are encouraged to formulate their own goals in their own values. Monetarizing is possible but not necessary. In the alternative proposals it may be assessed to what extent these goals are achieved (Voogd, 1983).

In spite of the improvement over cost-benefit analysis, multicriteria analysis also remains a second-tier method. Land-use functions are weighed as if they were comparable. It is questionable, however, whether in a regional plan for example, the sector groups should be invited to underpin their claims in an early stage. As things go, these claims are exaggerated, to create some space for negotiation. Such a procedure is not an institutional structure that creates a growth reducing climate. According to the two-tier method the first stage should rather create good conditions in terms of road and water infrastructure or in terms of institutional or financial arrangements as in the Zaartpark case. Different groups may be invited to give their ideas about this structural basis. They should be encouraged first to think about their place in the whole rather than about increasing their gains. The claims will come in anyhow in the second tier. At this stage, however, not only claims but also the criteria from the first-tier context should guide the second-tier decisions. This is not a recipe for averting conflicts, but an approach to make values explicit at two levels: at the level of carrying conditions and at the level of competing activities. Starting with the first implies creating a carrying conditions criterion that may be useful in the second-tier stage of the competing activities. The HAL-case may illustrate this point.

the HAL case

The regional plan for the HAL area, comprising the municipalities of Heer Hugowaard, Alkmaar and Langedijk (HAL), an urban area north of Amsterdam, is an interesting case. National and Provincial plans provide for urban extensions comprising 14,000 new dwellings and the accompanying infrastructure to be realized in the period between 1993 and 2005 in this area. An Environmental Impact Assessment (EIA) is required for a project of this size. As a member of the EIA committee of independent experts I took part in the formulation of guidelines for the EIA report and in the assessment of the report.

The EIA procedure took place in the period 1991-1994. The EIA report (Grontmij, 1992) is built around a multicriteria analysis for 25 potential building locations in the area. In the decision-making procedure some choices were made that make the case an interesting one in the context of the discussion in this section.

1. The EIA multicriteria analysis was performed for deciding about building locations. The regional structure plan was made in a parallel process. The final decisions about the regional plan were made after the EIA-linked location decisions had been taken.
2. Environmental considerations played an important role at the stage of location decisions but were nearly absent in the regional plan's proposals for the road infrastructure, the water system and the green areas network.

The multicriteria analysis itself first describes the effects of development on a number of environmental qualities.This is not a value-free description. It rests on a number of assumptions, all recorded correctly but in all cases open for debate. Some issues may illustrate this.

The point of departure is a conventional building procedure and a layout that does not respect the underlying landscape structure. A new district built on the basis of an innovative ecological approach, such as the Cherry Orchard plan described in intermezzo 1, would have shown quite a different picture of scores. The option to use the opportunity of building on the site to get priority for a cleaning up operation of contaminated soils, to mention just one example, is left out. As a result the new building locations are sited away from contaminated soils.

The result of these descriptions and the subsequent weighing is a matrix in which all these effects and interpretations are aggregated. The matrix is intended to offer a general scope for decision makers. The matrix, of course, does not reveal the existence and the relevance of many value discussions, like the two just mentioned. The matrix is misty, it contains much information but it hides the real connections of the stories behind.

At the end of the EIA procedure an environmentally friendly alternative was selected. Later, this plan was rejected because the uneven distribution of locations among the three municipalities was unacceptable to the local governors.

A few remarks on this case:

1. The criticism of one-tier decision making is confirmed in two ways. Obviously the procedure does not sufficiently reflect the regional system that had been broken into a great number of possible locations. Translated into a two-tier approach, the decision making should first have been centred on the regional structure. At this level the carrying conditions should be planned in a sustainable way. Given the importance of environmental qualities related to traffic and water structures, it is vital to start with the regional level.

2. Secondly, the residential district layout is also left out. The choice of very conventional building is regrettable. In this way EIA leads to evasive planning, not to creative solutions. Instead, in a first-tier stage, a decision should have been taken about the goals and incentives for innovation.

3. The comprehensive matrix presentation suggests a simple basis for decisions. However, the plus and minus scores in some alternatives seem to outweigh each other; in other alternatives they add up to a positive or to a negative overall picture. But in a complex case like this, the simplicity is false. Integration is not identical with aggregation. This is not how things work in interactive systems. Designs or scenarios might perform better and be more communicative about the interactions in these cases. A matrix may supplement but not replace them. A cost-benefit or multicriteria matrix could be very useful in a more informal way as a part of the design process to select options in the making of the plan. This implies that the context is well defined and visible.

4. The omission of thelegitimacy criterion , turned out to be a mistake. Either the even distribution criterion should have been used as a precondition in decision making or, priority should have been given to a change in local governmental change, for example, creating a new municipality. Both options imply first tier decisions.

5.5 Summary and conclusions

Statements about ecological conditions cannot be based on objective truth that is beyond discussion. Contrary to positivist belief, objectifying is not about leaving values out but is about making values explicit and discussing them. In this respect I follow Popper. Analytical science, focusing on discovering universal laws and therefore reducing the context of the researched objects is one source of information. But a process of learning by doing in a real life social and environmental context is essential for planning. In this respect I follow Dewey and Habermas. This learning process may be structured with the help of Lakatos's research programmes.

Causal (cause and effect) and final (goals and means) ways of reasoning are not sufficient in environmental planning. The concept of conditions should be added. It creates space to consider factors that operate indirectly and make things possible. Generating ideas for ecological conditions to be created in a social context is not a task for ecology as a branch of biology but for the ecological orientations that have developed within many traditional disciplines. The plan should not be divided between the disciplines like the wedges of a cake. A fruitful approach is to consider different disciplines as points of view looking at the whole plan from different angles. The project organization for the making of plans may offer a platform for a process of *shared understanding* and for *communicative rationality,* to use Habermas's terms.

If there is agreement about environmental objectives, many economists agree about the use of policy instruments. They disagree, however, about how to assess environmental values in the formulation of objectives. The influential neoclassicist approach translates environmental values into commodities: goods and services that can be bought by individuals. Decisions about environmental issues are thus reduced to market decisions. The strategy is to increase the price of the environment on the market.

Institutional economists and ecological economists criticize this view. They believe that the environment is not a commodity but a common good. A more appropriate way to approach decision making is to distinguish two tiers, one tier that decides on values relevant for creating conditions and a second tier of individual and market decisions. The two-tier approach fits in with the ecological conditions strategy. Some case studies illustrate the way a *two tier approach* can be used in environmental planning. This leads to strategy of first-tier decisions on spatial and financial structures, creating conditions for second-tier decisions about location choice and the layout of plans. Thus an alternative is offered to the unsatisfactory use of cost-benefit and multicriteria methods in these cases.

6. RISKS AND LEARNING

Rigour alone is paralytic death,
but imagination alone is insanity.
Gregory Bateson

INTRODUCTION

The previous chapter's discussion of objectifying and the role of values is a useful basis for the theme of this chapter: the debate on environmental capacity. The debate focuses on *sustainable development*, a concept that has become widely known since the Brundtland committee's report (WCED, 1987). What is sustainable? In the first section I discuss one answer to this question: the concept of ecocapacity , an attempt to calculate the carrying capacity of the global environment. Calculations on the ecocapacity show a wide gap between the present and a sustainable situation. But how reliable are the calculations? And how alarming are these figures if we put them in the perspective of potential technological innovation? What risks do we run if we do not meet the targets? And what social risks are involved in enforcing them?

Underlying these questions is a debate on *risks and uncertainties* and therefore this matter should be looked into first. This is the theme of second section. How do empirical sciences deal with uncertainties? And what is the planner's approach to not knowing and risks? After examining different fields of experience *learning* emerges as the most important element of the answer to these questions.

In the last section I will return to the discussion of environmental and social risks. To what extent can learning processes guide us in dealing with uncertainties in environmental policy, and in environmental management?

6.1 The ecocapacity debate

According to the Brundtland committee,sustainable development

"meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED, 1987, p. 43). Ever since, the concept of sustainable development has been an issue in policy making and in public debate. Ecological economists think it should be part of the macro-economic structure that creates conditions for the operation of the market. Is it possible to define the carrying capacity of the earth for human activities? In this section I will discuss attempts to formulate precise figures that indicate the ecocapacity.

SUSTAINABLE DEVELOPMENT IN A NORTH - SOUTH PERSPECTIVE

The ultimate goal of ecological strategies has to be considered in the context of global sustainability. The concept of sustainable development links concern for the present and for future generations. Moreover, since the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro, *biodiversity* (the global variety of plant and animal species) has been added to Agenda 21, the environmental programme for the next century (UNCED, 1992). This implies that concern for other species is on the agenda as well as intergenerational responsibility.

To put the issues in the global perspective it is salutory to listen to the analysis of leading experts from developing countries, from the South. At the Rio conference an authoritative report was presented by the South Commission[1]. Their message is clear:

"The South needs strong economic growth, including advances in both agriculture and industry, to provide a decent livelihood for all those entering the labour market. This process of growth will entail a significant increase in the use of natural resources, to which the international community will have to adjust if the South is to attain its development goals without harming global ecological stability."

This statement sharply demonstrates the social and economic dilemmas we face. The poor countries of the world will not accept strict environmental regulations unless they get a fair chance to improve their standard of living. The prerequisite of global consensus is global equity.

Equal rights for development is not the only issue here. Many see population growth as a major constraint to environmentally sound development. The South Commission assumes that only economic growth can generate the standard of life and the level of education that are the key conditions for population control programmes.

Another relevant aspect is the commission's view that environmental degradation results from underdevelopment *and* overdevelopment. Overexpoitation and squandering of resources are both major causes of environmental impairment. The commission therefore advocates including a stringent environmental policy in economic development.

ALARMING FIGURES ON ECOCAPACITY

What are the consequences for the North of this legitimate claim for development? Weterings & Opschoor (1992) answered this question for the year 2040, taking into account an unchanged economic policy and a moderate prognosis of population growth. A *prudent position* about the earth's capacity to carry environment-use activities, leads to targets for the reduction of environmental pressure to sustainable levels.

1 *The committee was chaired by Julius Nyerere and published its full report as: The challenge to the South, The report of the South Commission. Oxford University Press, 1990. I quote from a summary made by Terhal, 1993.*

On a global scale this leads to the following reduction targets, in percentages of the levels expected if present policy remains unchanged: fossil oil, 85%; natural gas 70%; coal, 20%; copper, 80%; biomass, 60%; CO_2 emission, 80%, acid deposition, 85%. If, however, all citizens in North and South are given equal rights to use the earth's environmental capacity, then the share of the world consumption or emission by the North should be cut drastically. This implies reducing the North's petroleum consumption from 80% to 2% of the world's consumption by the year 2040. Other reductions would be: natural gas from 80% to 5%; coal from 80% to 12%; copper from 90% to 3%; biomass from 25% to 6%; CO2 emission from 74% to 3%; acid deposition from 100% to 2% (Weterings & Opschoor, 1992, pp. 25/27).

On the basis of these figures on sustainability it is possible to estimate[2] the *ecocapacity* or carrying capacity for a country or a region. In this way ecocapacity is defined as, the space available for development, expressed in *sustainable* levels of resource consumption and emissions.[3] As a rule of thumb one could say that in the North the environmental pressure should be reduced to approximately 5% of the present level during the next 50 years.

REACTIONS TO ALARMING FIGURES

There are different ways to react to these alarming figures. At this point, I will discuss three contrasting views and comment on them from the three positions in figure 5.1, the empirical, the problem-oriented and the planning position. These positions have different aims that are reflected by the questions they ask: The empirical question is: are these figures true? The problem-oriented question is: can we find good (effective) technical solutions to these problems? The planner's question is: can we find good (legitimate and appropriate) solutions in a social context? The three views are as follows:

1. The figures are not true.

From an empirical point of view this reaction is justified because many of the underlying calculations are based upon disputable assumptions. There are uncertainties in almost every step of the development of the models that produce these figures. A famous example of this reaction is the wave of criticism that followed the publication of the first report for the Club of Rome (Meadows et al., 1972; Pestel, 1988). However, if the figures would have been less alarming, they would not have been less debatable.

From a problem-oriented point of view the discussion about exact figures is not that important as long as the gap between the present and the sustainable situation is wide. As long as polluting emissions are still rising, it does not really matter by what reduction percentage we could reach sustainability. To be effective we first have to come to grips with the problem. We may start developing good non polluting alternatives or good purification technology. There is no need to wait until the endless discussions about *objective figures* have been settled.

2 *Ecocapacity , the term proposed by Weterings & Opschoor (1992), refers to the regional capacity as derived from the global carrying capacity. There are, of course, also local ecological conditions such as the vulnerability to erosion.*

3 *These figures were taken as the working hypothesis for a research programme on Sustainable Technological Development (STD) was set up by the Dutch government.*

From a planning point of view it is important to understand the motive behind many discussions about objective figures. If issues like heath, safety and environment are perceived as unpleasant necessities, then only objective and thus convincing figures will be acceptable as a basis for limiting regulations.[4] In this context discussions about the truth of figures tend to create confusion. If the experts do not agree, how can ordinary citizens know what to do?[5]

The difficulties citizens have in filtering contradictory environmental messages communicated by mass media may even result in mistrust of politicians, policy-makers and environmental experts. This was found to be an important factor in the comparative analysis by Burgess, Harrisson and Filius (1995) carried out in Nottingham (England) and Eindhoven (The Netherlands). The problem is partly related to the mix of information, commercial advertizing and *infotainment* that is characteristic of modern media. But within the scientific community too it will be impossible to find undisputable figures about long term effects of environmental impairment. Uncertainties are inescapable. So different opinions will occur but, of course, especially dissident opinions are *news*.

From a planning point of view it seems wise not to link policy strategies to precise but disputable figures, but to the direction in which solutions should be sought and to basic principles of conduct. As an illustration it is worth mentioning the Brent Spar case:

> Early in 1995, the Shell oil company announced it was going to dump the Brent Spar, an old North Sea oil platform, in the sea. Calculations about environmental effects and risks of sinking compared to dismantling on land showed this was the safest and most efficient solution. Shell convinced the British government which issued a permit for the operation in a part of the Atlantic, northwest of Scotland. The Greenpeace organization produced other calculations which showed more serious environmental risks. With these different opinions of the experts the factual discussion reached an impasse. Greenpeace, however, succeeded in convincing the public with a normative argument that reduced the problem to six words: *the sea is not a dump.*
>
> After much publicity and successful boycotts by the public, Shell gave in. A few months later Greenpeace England apologized to Shell, for having overestimated how much oil was still in the platform.

Clearly, as in the Amelisweerd case discussed in chapter 2, precise but disputable figures may be neutralized by counter calculations, equally disputable. More fundamental, first-tier, guiding principles are decisive for the basic decisions. I will return to this issue later in this chapter.

4 *I have mentioned this line of reasoning in discussing deontological ethics in chapter 5.2.*
5 *The Dutch columnist Jan Blokker aptly expressed this feeling. After complaining about the absence of wise men who could settle disputes among experts about the environmental effects of big projects, he writes: " So eventually - ashamed and head bowed- I will have to admit... to grandchildren who want to know...: that deep in my heart, or perhaps even by nature, I have never wanted anything to do with that Environment, because a committee of wise men has never stood up and been able to do the precise calculation for me." (Blokker, De Volkskrant, 24.6.1995).*

2. The figures are not alarming.

A classic example from the USA is The Resourceful Earth (Simon, (Ed.) 1984), a publication that was stimulated by the Reagan Administration and acted as a reaction to Global 2000, Report to the President (Barney (ed.), 1980) a report commissioned by President Carter. The latter report presented rather alarming figures on environmental issues. The Resourceful Earth, however stressed the innovative power of science and technology and gave a more optimistic picture that required less governmental initiatives. This controversy reflects the normative positions already discussed in the section of 5.3 on neoclassical and institutional or ecological economics.

From an empirical point of view the almost carefree optimism of The Resourceful Earth is not shared by most researchers. There is little doubt about the influence of technological innovation, both to reduce the environmental impact of activities and to increase environmental capacity. Innovations have helped us through in several periods of crisis in the history of mankind, as Wilkinson (1973) described in his Poverty and Progress. Ecological problems precede technical innovations, but the new era is not reached without social crisis, poverty and misery. So there is real-world evidence of the problem solving potential of technological innovation. But this does not justify a laissez-faire policy, because the historical contexts were different from the present situation. Modern economy with all its opportunities to shift problems to other areas and future generations, will not automatically create the scarcity that will trigger new technological developments. Modern technology with all its far-reaching environmental effects, will not automatically work for the benefit of all.

From a problem-oriented point of view the question of how alarming these figures are is related to estimated risks. In a recent report of the Netherlands Scientific Council for Government Policy (WRR, 1995) it is stated that most environmental risks do not threaten the survival of the human species. According to the Council, the ecocapacity figures, therefore, are not absolute criteria that should be excluded from bargaining. Moreover, to determine the ecocapacity is "exceptionally difficult and often even scientifically impossible" (WRR, 1995, p.35). Sustainable development, the report states, implies looking at possible solutions in a situation of ecological risks but also of economic and other social risks. The weighing of these risks and the uncertainties that go with them is a political issue. The WRR describes four different *action perspectives* that include different value judgements about risks and thus take different positions towards the *alarming nature* of the ecocapacity figures mentioned above. The four action perspectives vary in their pessimism, but all four take the environmental issue seriously.

From a planning-oriented point of view the Council's approach differs from that of Weterings & Opschoor (1992), who first determine the ecocapacity and then translate this into absolute constraints for activities. By contrast, the Council's report takes the activities themselves as a starting point. The four action perspectives, *Utilizing, Saving, Managing and Preserving,* vary in their risk-avoiding or risk-accepting attitudes, and take both environmental and social risks. The relative constraints follow from weighing both categories of risks into account. In a next section I will look at this approach more closely. At this point it is sufficient to highlight the procedure. The *action perspectives* are translated into potential activities that serve as a basis for scenarios showing possible long- term ecological and social processes (WRR, 1995, pp. 40-47).

Thus the alarming nature of the ecocapacity figures is put into perspective by confronting them with economic and other social risks in a planning context. Some people will find that the resulting scenarios do not go far enough in bringing about sustainability, others see them as going too far to enable society to cope with such change.

3.The figures justify declaring a state of emergency.

The 1972 report to the Club of Rome combines figures about limits to growth with warnings about global collapse and so does the most recent report (Meadows, Meadows & Randers, 1991).The doomsday scenarios and the resulting proposals for eco-dictatorship were mentioned in section 3.4.

From an empirical point of view, Meadows, Meadows & Randers justify their warnings by referring to the process of exponential growth that is characteristic for population and capital growth. If we do not develop efficient negative feed-back mechanisms these two motors of economic growth will suffocate the earth. As already mentioned, however, these figures are accompanied by many uncertainties .

From a problem-oriented point of view there are many reasons for taking the message seriously. These figures indeed provide arguments for immediate action. Good goals, however, do not justify bad means. The problem is more than survival alone.

From a planning-oriented point of view, creating scenarios that show the alarming consequences of current trends may have a positive impact, provided concrete options for action are available. Real catastrophes do sometimes have positive effects, as demonstrated by the Chernobyl disaster: in The Netherlands, it gave an extra motivation to the energy saving and pollution control options that were elaborated at that time in the context of the first National Environmental Policy Plan (NEPP) (Ministry of Housing, Physical Planning and Environment, 1987). On the other hand, if bad news is not connected with means to act positively, the effect sometimes may be counterproductive. In the Nottingham - Eindhoven research project, mentioned above, the researchers found:

> "There was general agreement that environmental bad news was more likely to drive people into apathy and despair than it was to stimulate new awareness and a determination to implement change." (Burgess, Harrison & Filius, 1995, p.14).

TRAVELLING AS A METAPHOR

None of these three reactions to alarming figures is really satisfying. There is, however a fourth reaction that can be formulated in the context of an ecological strategies approach: T*he problem is urgent but let's start with the first steps.* To concentrate the debate on the alarming figures resulting from the ecocapacity estimates evokes feelings of panic or demotivation. It results, on the one hand, in discussions about the need to take undemocratic measures *to save the world* and, on the other, a debate centring on the social risks of measures and the need for trade-offs.

Whatever the interpretation of figures, the message of the ecocapacity figures should be taken seriously. If we look at the issue of an expanding production and consumption system in the context of a world with limited resources and an environment vulnerable to pollution, then the need for fundamental change is clear. And, given today's environmentally disruptive practices, there is a long way to go.

Developing a strategy for ecological change, therefore, may best be compared with planning a long journey. If the destination is far away and it is uncertain when we will get there, then it will be wise to set off in the general direction and *to make travelling meaningful and agreeable in itself.* This implies creating steps that are self-motivating and choosing means that are meaningful and not just means to an end.[6]

carrying and limiting conditions

In section 4.1 a distinction was made between a *carrying conditions* approach that asks "can it be done in an environmentally friendlier manner?" and a *limiting conditions* approach that asks "how far can we go without running too much risk?" The ecocapacity approach and its WRR critics stay within the limiting conditions or risks perspective. In an Ecological Conditions Strategy I have opted for *good conditions* that put carrying and stimulating conditions first. This implies, for example, starting with incentives for technological and social innovation. By so doing the development of activities is steered from within towards the ecocapacity targets. As stated in 5.3, both the technology optimists and the pessimists might be satisfied by this approach.

The good conditions approach implies that it is not sensible to spend much time and energy in an attempt to settle the disputes about exact figures. If we accept a level of uncertainty about the absolute magnitude of the figures, the message is clear. Our activities at the micro level should be tuned to sustainability at the macro level. This implies a strategy based on a simple and common sense principle:

Good activities do not pollute and do not squander resources; they create environmental quality as well as quality of life.

But what if the good conditions approach is not sufficient to bridge the gap indicated by the alarming figures?

6 *In section 4.1, following another line of reasoning, I arrived at a similar idea that was described there as* the rehabilitation of the instrument.

The attempts to determine the carrying capacity of the earth for human activities are both revealing and confusing. They reveal the chasm between present and sustainable development. The reactions to the alarming figures are equally confusing. How can we cope with the uncertainties and risks that seem to be intimately linked with our present situation? Is the bargaining of environmental and social risks really inescapable? Before looking deeper into these questions I will first analyze in a more general way how research and planning cope with uncertainties.

6.2 Uncertainty and learning

It goes without saying that coping with uncertainty is not only relevant in the context of global environmental problems. In order to get a wider understanding, in this section I will explore the theme from different angles. Starting with uncertainty in ecosystems, I will then examine the role of uncertainty in the process of biological evolution and in trial and error thinking. I will then look at making decisions about uncertainties and risks in the physical environment. Finally, then, uncertainty is related to disagreement and conflicts. Learning in different forms turns out to be an important strategy to cope with uncertainties. Having discussed uncertainty and learning in different contexts we will be ready to return to the issue of trade-offs between environmental risks and social risks in the last section of this chapter.

ECOSYSTEMS AND UNCERTAINTY

To start with, it is worth looking at the ecological studies of areas less visibly dominated by man. How do so called natural ecosystems react to uncertain threats from the external world?

Ecologists distinguish two strategies that ecosystems use to maintain their stability: *resistance* and *resilience.* The first is more static and defensive: perturbations are excluded. The second is a strategy to absorb stress or to return after perturbation. The trees and grasses of tropical savannas soon recover after the frequent but irregular fires, a good example of a resilience strategy. If these fires arrive at the edge of the rainforest, they are held back by the absence of ground-covering herbs and the moist air in the forest. In this way the forest is protected by resistance (Tjallingii, 1976). The plant and animal communities inhabiting the forest and savanna ecosystems, have gone through a long evolutionary process that produced these different strategies to cope with uncertainty. Traditional *shifting cultivation* cultures have passed through a cultural process of learning leading to practices that are attuned to the stable and uncertain features of these ecosystems.

In maintaining protected areas, modern managers and technicians tend to focus on resistance strategies. Holling & Clark (1975) argue for a more important role of management strategies that work with the dynamic rhythm of ecosystems.

> "This view leads to a strategy of management that can attempt to work with the natural dynamic rhythm of ecosystems, that attempts not to eliminate fluctuations but to transfer them into directions less in conflict with man's desires; that attempts to design systems which are not so much fail-safe but safe in the inevitable event of *their failure.*" (Holling & Clark, 1975. p. 250)

An example of the resilience strategy in the case of river management would be to increase a floodplain, creating temporary storage, as an alternative to the resistance approach, which is to build higher dikes.

Moving from *fail-safe* to *safe-fail* (safe in the event of failure) in environmental management, is to leave the command and control track and to opt for interaction instead of defence. In this interaction human management and planning systems may learn from the mechanisms nature has developed to survive in situations of uncertainty and change. Actually, the evolutionary process that developed these mechanisms may be compared with a process of learning, as Gregory Bateson does in his Mind and Nature (Bateson, 1979).

LEARNING IN NATURE AND IN THE HUMAN MIND

Bateson draws the parallel between genetic change and the process of learning, both of which he describes as *stochastic processes*, i.e. processes based on unpredictable differences (randomness) and rigorous selection.

Biological processes are different at the levels of the individual and of the population:

"Evolution must always, Janus-like, face in two directions: inward towards the developmental regularities and physiology of the living creature and outward towards the vagaries and demands of the environment. These two necessary components of life contrast in interesting ways: the inner development - the embryology or *epigenesis* - is *conservative* and demands that every new thing shall conform or be compatible with the regularities of the status quo ante...This is minimal necessary conservatism."

"In contrast, the outside world is perpetually changing (and) no animal or plant can ever be *ready made...*" In the *innovative* interactions with the outside world, "the creature itself..must acquire certain somatic characteristics by use, by disuse, by habit, by hardship and by nurture. These *acquired characteristics* must, however, not be directly incorporated into the DNA...The individual body undergoes adaptive change under external pressure, but natural selection acts upon the mutations stored in the mixed gene pool of the population. " (Bateson, 1979, pp. 234-235)

The stochastic processes, thus, occur at two levels, at the individual (somatic) and at the population (evolutionary) level. In both cases there is *difference* and *selection*. Bateson compares these processes with what occurs in the human mind:

Here the development of ideas is steered by *imagination and rigour*, " the two great contraries of mental process". "I assume that the mental processes generate a large number of alternatives and that there is a selection among these determined by *something like* reinforcement." (p.161)

"..there is a hierarchy of somatic adjustment dealing with particular and immediate demands at the superficial (most concrete) level and dealing with more general adjustment at deeper (more abstract) levels. The matter is exactly parallel to the hierarchy of learning in which proto learning deals with the narrow fact or action and *deutero learning* deals with context and classes of context." (p. 169) [7]

7 *Though coming from an entirely different point of departure, there is an interesting parallel between Bateson's* proto *and* deutero *learning and the two tier approach of decision making, discussed in section 5.3. In passing, two other parallels are worth noting: 1. Popper's evolutionary theory of knowledge (Faludi, 1986, p. 60) with* conjectures and refutations, *is very similar to Batesons view of thinking as a stochastic process. 2. Lakatos' s methodology of research programmes (Zonneveld, 1991, p. 43) with its more abstract hard core and more concrete* protective belt *are very similar to the deutero and proto learning.*

The perpetually changing outside world is the source of uncertainties living organisms have to cope with. A process of learning is the answer both at the evolutionary level and at the individual level. According to Bateson the essential element in learning is the stochastic process of combining the new and the conservative, the unpredictable and the norm, the imagination and the rigour: in Bateson's words: "..the new can be plucked from nowhere but the random. And to pluck the new from the random.. requires some sort of selective machinery to account for the ongoing persistence of the new idea."

Stochastic is used by Bateson in a special manner, focussing on the processes. Usually stochastic is linked to probability, to ways of reducing uncertainty by calculating the likelihood that things will happen. This brings us to the practice of risk analysis that plays an important role in decision-making. To what extent can we calculate uncertainties?

A PROBLEM-ORIENTED VIEW OF UNCERTAINTY

In a recent paper, Faucheux & Froger (1995) discuss the limits of conventional *stochastic methods* in environmental decision making. Here,stochastic refers to methods using probability distributions as their point of departure. This implies they focus on the smaller set of stochastic processes that can be predicted on the basis of recorded frequency distributions. This smaller set is only part of the larger set indicated by Bateson.

Drawing on a tradition in economic literature Faucheux & Froger distinguish between *risk* (weak uncertainty), *strong uncertainty* and *ignorance*.

In figure 6.1 the relative position of these concepts is shown as related to a probability distribution of events varying in precision and in reliability. In the case of *risk* there is a unique probability distribution based on a reliable classification of possible events. As in the case of river floods, the danger of the event and its frequency is known from historical records. *Strong uncertainty* is the case of a plurality of probabilities, not fully reliable and not cumulative. The upper limit is near ignorance, a situationin which none of the conceivable probability distributions is reliable.

According to Faucheux & Froger, many global environmental problems belong to the strong uncertainty and near ignorance category. This results from the absence of historical precedents and the irreversibility and the complexity of these problems.

If we do not know which outcomes are possible and how many there are, the frequency approach cannot be applied. Initially only subjective estimates (*expected values*) can be used for a start. In some cases these initial estimates can be corrected by new information. In probability theory, Bayes's theorem shows ways to calculate probability on the basis of new information. In principle, this is a way of learning. The *a priori* information is adjusted with a *posteriori* information (Van Doorn & Van Vught, 1978).

Faucheux and Froger, however, argue that Bayesian theory only works if there is a stationary stochastic process, persisting long enough to allow the decision maker to adjust it. This approach is inappropriate for intergenerational problems. If one

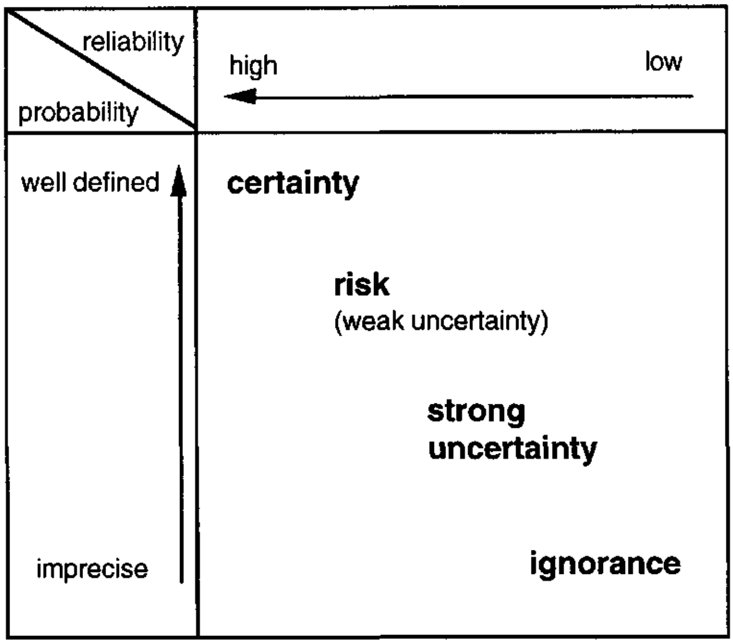


Figure 6.1:
An analytic view of uncertainty and decision making.
source: Faucheux & Froger, 1995; slightly modified.

considers a problem like the loss of biodiversity there is also the irreversible nature of the process that makes it impossible to readjust.

Ignorance is not only a lack of information, a *not yet knowing*, but may also be caused by the absence of an underlying determinism.

Bateson has described the impossibility of predicting the form of the star in the glass caused by a stone hitting a window. He qualifies these processes as *divergent sequences*. Ilya Prigogine and others have described these categories of processes in the context of chaos theory. Non linear systems show a self-organizing potential related to *sensitive dependence on initial conditions*. The Dutch meteorologist Tennekes explained why, despite the availability of more reliable data and despite the development of increasingly powerful computer programmes, experts do no longer believe it is possible to produce weather forecasts for more than a week or so a head (Tennekes, 1991).[8]

To deal with the difficulties posed by strong uncertainty and ignorance Faucheux and Froger propose what they call a *procedural rationality*. The central idea is to make *satisfactory choices*, not aiming at optimal solutions but at providing more insight into the nature of the conflicts. In their approach this results in sustainability indicators related to resources, pollution and energy efficiency (exergy).

8 *Tennekes became well-known for an earlier study on the limits of the search for certainty with the title: "Then I would rather live in uncertainty!"*

The indicators correspond to the macro-economic *guiding principles* formulated by Daly (1991) and discussed in section 5.3. Faucheux and Froger operationalize these principles by showing the sustainability indicators for imports and exports. Thus it becomes visible to what extent a country shifts environmental problems to the ecocapacity of a larger area.[9] This information is relevant in decision making under conditions of strong uncertainty and ignorance, especially if options that reflect *no regret decisions, a prudent approach or a precautionary principle* are considered. These principles belong to the first-tier values,which many believe should guide first-tier decisions.

Bearing in mind the previous section's question of a trade-off between environmental uncertainties and social risks, we may now use the information from the preceding paragraphs to say more about environmental risks. But we need to know more about the social risk's side of the question. How do planners look at uncertainty?

A PLANNING-ORIENTED VIEW OF UNCERTAINTY

To look at the problem from this angle let us first go to a simple scheme, presented by Christensen (1985) and shown in figure 6.2.

According to Christensen, there are four categories of uncertainties.

In her scheme she relates them to goals and technology. I have changed technology to means because the scheme seems to be relevant for non-technical *means* too. The four categories are:

A. Agreed-upon goals and well understood means, the ideal case for optimization. Here, for instance, conventional drainage and flood prevention models are used to plan a scheme that meets the local conditions. This situation and routine organization "allow planners to achieve public expectations of governments predictability, equity, accountability, efficiency and effectiveness."

B. Agreed-upon goals and unknown means, the case asking for a *learning* or experimentation approach. Many problems of health, safety and the environment fall into this category. Innovation contradicts routine. "Without a known technology, standards of efficiency and effectiveness are meaningless. Thus, officials addressing an unsolved problem ought to be held responsible not for such bureaucratic standards but...for a constructive search for a solution."

C. No consensus about goals, but well-known means. A situation that calls for bargaining. As an example of this situation Christensen takes the case of a conflict over a site chosen for a new industry by developers and defended because of its ecological value by an environmental group. Both groups know very well what means are required for what they intend to do, they merely disagree on the goal. The issue is to accommodate diverse preferences in a specific situation. "Each deal is thus unique, the bargaining process is antithetical to bureaucratic routines that yield identical results in any situation." The outcome is therefore not predictable.

9 *The method is similar to the approach of Weterings & Opschoor (1992) that produced the alarming figures discussed in section 6.1. Another way to make this displacement problem visible is the ecological footprint method, developed at the university of Vancouver (Wackernagel et al., 1993).*

D. No consensus about goals, and unknown means. These situations may be called the *wicked problems*, after Rittel & Webber. Christensen takes poverty as an example. Periodically, officials generate agreement on a goal and a search for solution (category B). "But continual failure to win the wars and continual redefinition of what the enemy is cause commitment to crumble." To find a way outof this impasse, order must created in the field of means or goals. The problem may then become a case in one of the other boxes. (Christensen, 1985, pp. 64-65)

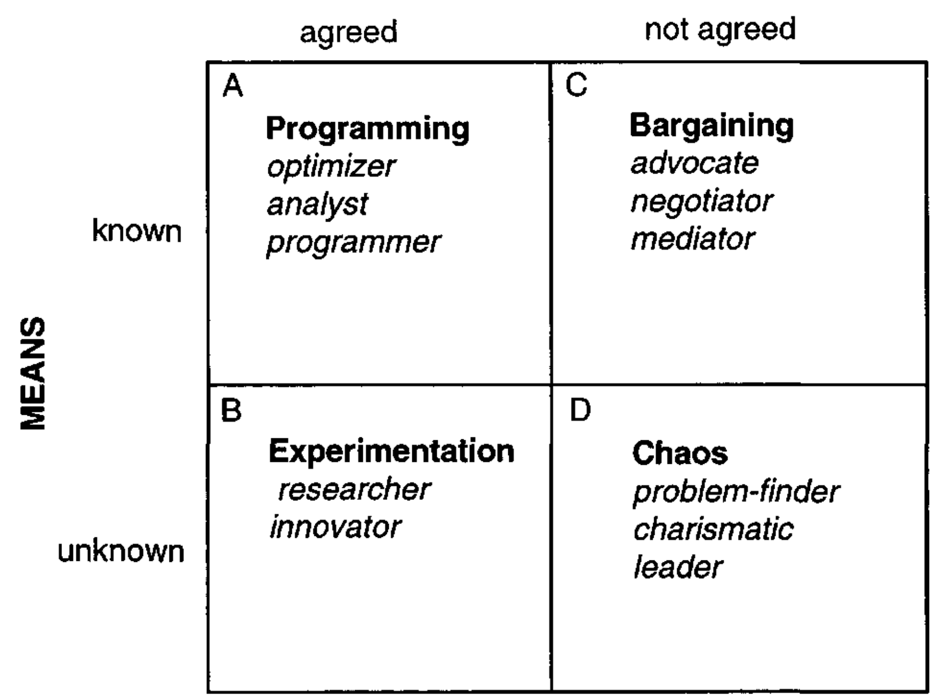


Figure 6.2:
Planning strategies and planning roles in conditions of uncertainty.
source: Christensen, 1985; slightly modified.

From figures 6.1 and 6.2 it becomes clear that the analytical, problem-oriented view of 6.1 does not cover the boxes C and D from 6.2. Disagreement on goals is beyond the scope of figure 6.1. Christensen's diagram offers a good frame to discuss these disagreements and the related uncertainty.

bargaining

In box C Christensen links disagreement on goals with *bargaining*. Yet the category of situations indicated here is quite different from the market place where bargaining is daily practice. The seller and the buyer may disagree temporarily, but they are not in conflict. They need each other, they both have an interest in making the deal. By contrast, conflicting parties in a planning situation do not have a common interest in making a deal. In many cases they will not perceive the problem that way. This is especially so in the case mentioned by Christensen. Developers and environmentalists not only fail to see that they need each other, there is often bitterness on both sides about the conflicting interests: "the frustrators of sound economic growth" versus "the destroyers of a common good". Moreover, environmentalists feel they are always on the losing side as long as economic growth does not internalize environmental values at the macro-level. The comparable case of Amelisweerd demonstrated that in such a case bargaining is not the answer. In section 5.3 we have seen the bargaining (or micro-economic) approach to this category of conflicts results from reducing a multilayered problem to one tier. A two-tier decision making approach may already offer a better planning tool to this category of uncertainties. This, however, goes beyond the simple scheme.

interrelatedness of decisions

Reacting to Christensen's paper, Faludi argues she is

> "neglecting uncertainties caused by the *interrelatedness* of various areas of choice...her argument concerns problem solving/decision making in general [and not] strategic choice or planning as attending the interrelations between decisions."
> (Faludi, 1987, p. 107)

One example of interrelated decisions in environmental planning is the case of high investments for energy production or waste treatment plants (see, for instance, Attwell, 1991). Decisions at the central level are related to decentral efforts being frustrated in attempts to save energy or to prevent waste. Certainty at one level may increase uncertainty at another. This example also illustrates the difficulty of drawing a clear line between goals and means.

Uncertainties about interrelated decisions are an important element in the work of the British Institute for Operational Research (the "IOR school" as Faludi refers to it).[10] The Analysis of Interconnected Decision Areas (AIDA) is a method developed by this planning school to deal with the interconnectedness of decisions. It is one of the answers that is developed to avoid what Christensen calls *premature consensus* or *premature programming*. Here she refers to the tendency to take problems to the corner of box A in a premature stage, artificially forcing multidimensional problems to a single scale procedure of optimizing. As we have seen, the bargaining approach proposed in box C may also be premature. This is a phenomenon frequently encountered in practice. The HAL case discussed in the section on cost-benefit analysis (5.4) is a typical example.

Bringing together the remarks on bargaining and on the interrelatedness of decisions, I may conclude there is indeed a difference between *good conditions* (the strategic level, first tier decisions) and *good activities* (the operational level, second tier decisions). Decisions at these two levels are interrelated, but the structuring and shaping of the problem precedes the operational level, which may include, but is not identical with bargaining about activities. It is this structuring and shaping of the problem that is supposed to be the difficult task of a problem-finder, indicated in box

10 Faludi (1987, p. 88 ff.) gives a great deal of attention to this school of planning thought that is expressed in the work of the planners Friend, Jessop and others.

D of Christensen's scheme. The challenge here is to find the *common* language that has a structuring potential in coping with the chaotic situation.

In a planning context, conflicts may play a dominant role. There is a whole literature on conflicts and negotiating, but at this stage I will only discuss a few aspects that are relevant in the discussion on uncertainty and learning.

CONFLICTS AND LEARNING

A typical case of the C category occurs if two parties are at war. They disagree on goals but the means are well known: shooting and shelling. Unless one of the parties wins - and even then-, there will be no prospects for peace until both parties realize there are unknown means, namely the means to develop the minimum tolerance required to achieve peaceful co-existence. In the diagram this implies that both parties have to acknowledge their position in category D before they can move to category B, to learn about the means to install and maintain peace. The acceptance of disagreement of goals and the awareness of unknown means to shared basic needs seems to be a prerequisite for learning. On the other hand this acceptance and awareness may grow through small joined projects that may have great symbolic value. A view on planning as a learning process does not deny conflicts but assumes that learning is essential to solve them or to live with them. [11]

positions, interests and needs

Hickling, drawing on the IOR school experiences, has made an interesting diagram to demonstrate the three layers of interaction that are relevant in a situation of conflict (fig 6.3.). First there is the layer of *positions* closely linked with honour, pride and integrity. The distance between positions may be large and very difficult to bridge. Symbolic gestures may play a major role in coping with this level of a conflict. Then there is the layer of *interests*. These may also be very different, but, as a rule, they are less charged with emotions. Bargaining and trade-offs may be a feasible option at this level.

At the bottom there is the layer of needs. Here, in principle, there is a common base for negotiations. In the example of two parties at war, this is the layer where the need for peace is to be found.

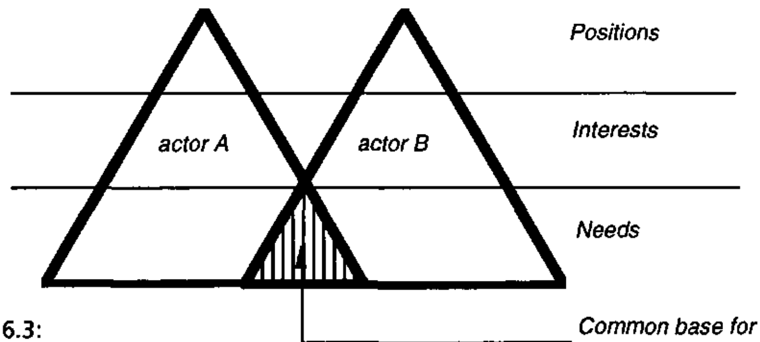


Figure 6.3:
The common base for negotiation.
source: Allen Hickling; taken from Malbert, 1994.

11 *There is a whole literature on Environmental Dispute Resolution that discusses these issues. See, for instance, Van de Klundert & Glasbergen, 1995.*

However, I doubt whether this a useful model to cope with environmental conflicts such as the Amelisweerd and Houten cases discussed in chapter 2. The Amelisweerd controversy was at least partly at the positions level. Attempts to bring it back to the interests level by proposing trade-offs on a common scale failed. It is hardly conceivable that a negotiator would have been able to bring the parties together to the common language about a common base. *Time* plays an important role in conflicts like the Amelisweerd case. Once big investments have already been made for one solution, other options become academic.

If we look at ways to *prevent* conflicts the Ecological Conditions approach opens up prospects.The Cherry Orchard case (intermezzo between chapters 3 and 4) and the Zaartpark case (section 5.4) both focus on the common base level: the environmental infra-structure. The approach seeks to internalize ecology at the level of common needs. In this way the strategy starts where uncertainties related to different positions or different interests do not prevail. Whether these common needs are accepted as such is open to debate. In cases like this the debate is part of decision making by the municipal council. The presence of albeit small pilot projects to demonstrate the importance of ecological conditions, may become part of the council's learning process.

LEARNING ORGANIZATIONS

From different points of view learning seems to be important to cope with uncertainties. But what is learning in a social context? One example is found in some big public and private organizations.

Learning has become an important issue in management science (Swieringa & Wierdsma, 1990; Senge, 1990). It has emerged in reaction to the need for companies and other organizations to survive in rapidly changing economic and social contexts.

Learning refers not only to the performance of activities or to operational choices but even more to basic assumptions, deeply embedded in the organization; *mental models* in Senge's terms. Since the early seventies big companies like Shell Oil have developed the strategy of a learning organization to cope with major uncertainties like those related to the oil crises. The company's success largely depended on the capacity to reconsider basic *mental models* like the deeply rooted idea of an ever-growing market. By introducing and working with different scenarios, staff were trained to develop flexible strategies to respond to different contexts (Senge, 1990; Schoemaker, 1993; Becker, 1994). In this way organizations prepare themselves to cope with uncertainties. One important aspect of this way of learning is an understanding of the interrelatedness of decisions.

The discussion of fundamental uncertainties related to alarming figures triggered our short analysis of approaches to uncertainty in this section. En route we have discovered other interesting aspects relevant to other elements of the Ecological Conditions Strategy, but having looked at uncertainties from different angles let us now return to the discussion of section 6.1 on a possible trade-off between environmental and social risks as put forward by the Netherlands Scientific Council for Government Policy (WRR, 1995).

6.3 Environmental risks and social learning

The WRR reacted to the alarming ecocapacity figures by presenting a proposal for weighing environmental and social risks. I will demonstrate that this is a blind alley. The learning approach, emerging from section 6.2, offers a better starting point for environmental planning under conditions of both social and environmental uncertainty. This section therefore explores some aspects of learning in different categories of environmental planning.

WEIGHING ENVIRONMENTAL AND SOCIAL RISKS?

In the WRR report risk is used as a general term to indicate perceived threats. Risks to the environment are compared with social risks. The four action perspectives (*utilizing, saving, managing* and *preserving*) have different trade-offs in mind between environmental and social risks. Now what is a social risk? In a description of risk perception the WRR states:

> "Consumption, and hence the assault on scarce resources and the generation of waste is, among other things, a function of the number of households and, therefore, consumption is growing. The curtailment and *internalisation* of undesired environmental effects can touch, therefore, on deeply felt rights and freedoms. Interference with these - such as the freedom of production and consumption or the size of households - can produce reactions that cut across the desired objectives." (WRR, 1995, p. 42)

The concept of attitudes towards social risks is made operational by attributing different combinations of policy programmes addressing consumption and production to the four action perspectives (WRR, p. 44): *Utilizing* is opting for maintaining high consumption and only moderate adaptation of production.*Saving* opts for low consumption but only moderate adaptation of production. *Managing* is a perspective with high consumption but a real change in production. *Preserving* is a perspective with low consumption and a real change in production.

I will now discuss the food issue and the energy issue to illustrate the WRR approach of weighing environmental and social risks.

risks and the food issue

The WRR has estimated social risk for different environmental issues. The future of food production, for example, is discussed with two dietary options: a *Western* or a *moderate* diet. The latter contains less meat. For reasons that do not become clear from the report, the WRR feels there is a *social risk* in creating conditions for a more moderate diet. Therefore the moderate diet is attributed to the *saving* and *preserving* action perspectives. (WRR, p. 60)

The WRR then draws up scenarios based on the four action perspectives. In an evaluation the outcomes of the food scenarios are compared with current trends. The trend in food consumption is described as:

> "For those who can afford it the Western diet acts as a natural norm. For the remainder, who have to survive on what's left, the Moderate diet becomes an unaffordable luxury." (WRR, p.68)

As true as this observation of the current trend may be, the WRR, obviously does not perceive it as a problem, compared with the social *risk* of raising meat prices to stimulate people to switch to a more moderate diet. The ecocapacity approach of Weterings & Opschoor (1992), following the South Commission, makes quite different choices and these lead to different strategies, implying clear policies to reduce meat consumption.

The food issue illustrates how the weighing approach is based on debatable assessments of risk. My critical point, however, is not the assessment of different views as such, but the fact that weighing leads to a decision not to engage in a programme of change towards more sustainability. The approach is static.

risks and the energy issue

The energy issue is another example. The *utilizing* perspective states:

"The measures that need to be taken in order to hold down a rise in the concentration (of greenhouse gases) represent a social and political risk that does not weigh against the risk of an enhanced greenhouse effect." (WRR, p. 79)

It is not quite clear what the social risks really are at the local level. Therefore it also remains unclear whether the weighing rests on more that fear of political risk. The only way to escape from these static and abstract discussions comparing uncertainties with uncertainties, is to turn to a concrete process of learning. Political risks are avoidable if the measures proposed fit in a well prepared plan for a process of learning and change. A good example of this more dynamic approach is given by the energy policy in the Dutch town of Schiedam.

learning and energy policy: the Schiedam case

In 1984 the first *minimum energy* houses were built in Schiedam, demonstrating that a terraced house with a yearly energy consumption of 400 m^3 natural gas was a realistic option. This is a substantial improvement, the normal energy consumption of a standard house being 2140 m^3/year. Later, the municipality introduced an energy performance standard for average single family houses of 600 m^3/year. All new houses built in Schiedam have to meet that standard and therefore insulation programmes and all sorts of solar energy projects were started. Later, also a renovation programme started. The extra investment was recouped by energy savings. The local architects and builders saw the programme as a real challenge (BOOM, 1989).

This case demonstrates a realistic bottom-up approach, starting with pilot projects that dispel the practical uncertainties and ending with a local programme that shows the socially accepted contribution a local community can make to a variety of environmental problems that accompany energy production and consumption. The environmental effect is a energy reduction per single family house to 1/4 or 1/3 of the original level, and in this case there are no social risks. Even if the pilot project had failed, it would have been only a minor drawback from which much could have been learned.

A case like this clearly demonstrates the inadequacy of the WRR approach in which energy conservation is considered synonymous with a change of life-style.

This, of course, is frightening people and as a consequence even embarking upon a process of learning is perceived as a *social risk.*

LEARNING AS ANTICIPATING RISKS

The Schiedam case and many others illustrate the feasibility of an alternative course of reasoning and doing. Most social risks, as described by the WRR, are actually what politicians fear might happen if they propose fundamental changes. The pilot project approach, which could include a wide range of different issues, shows a step by step procedure to overcome these political uncertainties. Besides real world pilot projects, role playing and different kinds of simulation could also reduce the level of uncertainty about social and environmental risks.

The ecocapacity approach is an attempt to estimate the magnitude of the global environmental issue. The WRR answer is a risk assessment comparing even more uncertain social risks with the environmental risks. There are other ways to approach the environmental issue. I do not say to solve the problem, because among all uncertainties one thing, I believe, is certain: the global environmental issue is not a problem that can be *solved* in a given period.

There is no need to be absolutely certain about the magnitude of environmental risks to understand that good activities do not pollute or squander resources. From this point of view it is a waste of time to elaborate scenarios with arbitrary trade-offs between the risks of climatic change and nuclear energy production. Taking both risks seriously means giving priority to a programme of technological and social learning essential to prevent both problems, in this case activities that focus on energy conservation and renewable energy.

learning and pilot projects

The learning approach with small pilot projects, it may be argued, does not substantially reduce environmental degradation. This, of course, is true. But the choice is not between a radical change and small pilot projects. If there is broad political support for a far reaching programme, then the alarming figures produced by the ecocapacity approach could guide us. The WRR report, however, contends there is no broad political support; it is even risky to try and gain more support. At this point the learning approach offers an alternative that is worth considering and does not involve risks that are to be feared. The pilot project approach also stays far from the ecodictatorship tendencies resulting from pleas for a state of emergency as described in sections 6.1 and 3.4. Karl Popper proposed *piecemeal engineering* as opposed to *total engineering*, stressing the dangers of totalitarianism of different kinds (Faludi, 1986, p.63). The learning through pilot projects comes close to Popper's idea.

Developing alternative practices, albeit at a small scale, is a prudent approach that may reduce social risk: the risk of not being ready if social change takes place. The case of manure in Dutch agricultural policy may illustrate this point.

the manure case

A learning process of the pilot project type is anticipating situations of real social risks. The *manure issue* in Dutch agriculture clearly demonstrates how these risks become reality if the learning process is postponed and neglected.

Since 1984, successive Dutch governments have announced their intention to pass legislation on the maximum application of manure on arable land. After much delay concrete plans were proposed in 1993. They were met with massive demonstrations and vigorous resistance by farmers who claimed the new rules would financially ruin them. The plans were delayed and modified but when the time came for political decisions in 1995, there were more desperate demonstrations. At the political level the decisions have been taken, but the battle with the farmers goes on. Environmental policy and the farmers are becoming enemies. Yet, from an environmental point of view, tough measures are already too late, as an increasing number of drinking water wells are having to be closed because of the high nitrate content of groundwater under intensively farmed land (Mülschlegel, 1991). Back in the sixties warnings were being given about the environmental risks of applying more fertilizer and manure to the land than crops can take up. But as long as high profits could be made from these risky practices the farmers and the government were not prepared to act. Though there were a small number of pilot projects, these were not part of an anticipatory policy programme of learning and innovation. In the nineties, matters have run their course and now the price to be paid is a real social threat to many farmers and a real environmental threat to groundwater.

The manure case highlights a possible role of learning in a context of social change. Learning may explore the alternatives that are needed in case the problem is finally put on the political agenda.[12]

Learning, of course, is not limited to situations of social conflicts or social risks. As we have seen in section 6.2, learning can also be an important element in organizations. To explore the possibilities of the learning approach in the context of an Ecological Conditions Strategy, I now turn to the role of learning in organizations responsible for environmental management. How flexible are these organizations? How do they cope with uncertainties and change?

STATIC AND DYNAMIC QUALITY

The antagonism between change and fear of risks may be compared with Bateson's rigour and imagination, the two elements that together form the basis of the stochastic process as discussed in section 6.2. Learning basically needs the two of them: the imagination required to develop new alternatives and the rigour of selecting compatible solutions. If we take the quality of the organization as a starting point the two antagonistic ingredients may be described as *static* and *dynamic* quality. The distinction is made by Pirsig (1991) who describes it in the following way:

"Dynamic quality is the pre-intellectual cutting edge of reality, the source of all things, completely simple and always new. ...Static quality emerges in the wake of Dynamic quality. It is old and complex. ...Good is conformity to an established pattern of fixed values and value objects. Justice and law are identical. Static morality is full of heroes and villains, loves and hatreds, carrots and sticks. Its values don't change by themselves. Unless they are altered by Dynamic quality they say the same thing year after year" (Pirsig, 1991, p.133).

12 See the concluding remark of the Amelisweerd case in section 2.2.

LEARNING IN MANAGEMENT PRACTICE

The static and dynamic qualities are easily recognizable in organizations responsible for environmental management. It is interesting to compare the approaches in two fields: green area management and water management.

In Dutch municipal *parks departments* there used to be a static *quality* of maintenance standards where weeds were weeds. Within a few years, so called ecological management practices were introduced in which a number of weeds were reclassified as herbs. A real paradigm shift! The new approach, however, did not replace the old. In most municipalities traditional and *ecological* maintenance now occur side by side. For the staff and for the public this has meant a radical shift of basic ideas about static *quality*. A great deal of *dynamic quality* is required to perform the learning process necessary to develop new values, new objectives and new practices. Decision making, design, management and maintenance all have to be tuned to the new situation. For a thorough analysis of the organizational issues concerned, see Van Asperen (1983).

In Dutch *water management* the static *quality* used to be based on fixed water levels. Their maintenance was secured by pumping out water in times of rainfall and letting in water in dry periods. In the last ten years the drawbacks of this system have become apparent: drought caused by the pumping and pollution caused by inlet water. At present, a value shift from *level management* to storage *management* is gradually taking place. This implies a real paradigm shift (a shift in static quality) for the staff of the water boards: from an emphasis on drainage and discharge to an emphasis on retention. Here too, great *dynamic quality* is required for the learning process to transform management concepts and standards.The new approach requires *adaptive management* a term coined by Geldof (1994; 1995) in his interesting study on the conceptual changes involved in water management.[13]

Learning is an important aspect in both fields of environmental management. The approaches of Van Asperen and Geldof, however, show remarkable differences that are only partly related to the *area oriented* task of the parks departments and the *flow oriented* task of the water boards. Van Asperen focuses on improving internal communication and learning processes within an organization, especially between the designers and the people responsible for the maintenance of green areas. His concepts are based on the *output planning approach* that starts by formulating concrete targets and subsequently goes back to the necessary steps required to reach these. This way of looking at planning we have already met in discussing the *target image approach* in section 3.2. This approach may be called operational *learning*. In terms of static and dynamic quality, the approach seems to be well suited to the task of improving static quality. The capacity of *improving* as such, however, is dynamic quality. In this case it involves learning within the organization and in the contact between the parks department and the public.

Geldof's analysis of changing paradigms in water management is based on the conceptual tools of chaos theory and the behaviour of *complex adaptive systems*. He focuses on the adaptivity of water systems and management systems to new situations in, as he calls it, *the survival landscape* for the organization. In his approach the emphasis is on strategic learning. To a large extent, the two approaches are complementary. They provide good starting points for embedding learning processes in both the strategic and the operational stages of planning. The two examples demonstrate ways of *ecological modernization* in environmental management.

13 See section 9.3 for an extensive discussion of water issues involved.

6.4 Summary and conclusions

Authoritive estimates of the earth's carrying capacity lead to the conclusion that the use of energy and materials in industrialized countries should be reduced to 5% of the present level within the next 50 years. There are different reactions to this alarming figure: a. The figure is not true. b. The figure is not very alarming, technological innovation will provide a solution. c. The figure is very alarming and justifies a state of emergency and coercion to bring the world back to a sustainable track. How to deal with the environmental and social uncertainties involved in this debate?

In natural ecosystems two strategies occur for survival in conditions of uncertainty: *resistance* and *resilience*. Their equivalents in technology and policy science are control and interaction. Control is not possible in cases of strong uncertainty. This is the case of biological evolution where the combined mechanism of mutation and selection is the basic principle. According to Bateson this is a general principle for coping with uncertainties: generating difference and selecting the alternative that is compatible with continuation under changed circumstances. Thought processes and planning processes may also be described in this way: a form of learning consisting of imagination in the generating of alternatives and rigour in the procedures of selection.

Important categories of uncertainty about environmental issues include those where probability cannot be based on historical records of events and those, described by chaos theory, where small causes may have big effects. Planning theory has described fundamental uncertainties resulting from disagreement about goals and means. It is not progressive control but learning and interaction that are opening up prospects for working with uncertainties.

If we apply these insights to the discussion on alarming figures, it becomes clear that the abstract weighing of environmental and social risks is a blind alley. Learning is a promising alternative. If there is not enough political support for general incentives, a programme of learning from pilot projects may still be started. This approach is does not involve *social risks*, rather this may enhance social support. Moreover, if, for example, an energy crisis increases public support, the alternatives are ready. In this way the problem and the solutions may be placed on the political agenda simultaneously. This requires process of learning in anticipation of change. In the next chapter I will elaborate the learning approach in relation to *social learning* as a planning tradition.

The discussion on risks should not lead the discussion away from learning as a way of *ecological modernization*, being a part of regular environment-use activities. If the road to sustainability is long and the targets are far away and uncertain, it becomes more important to keep an eye on the sustainable direction, but to let these activities be guided by the use of ecological potentialities of the local landscape and by the opportunities for a quality of life. Small projects may be important as steps towards sustainability but they have a meaning of their own.

Travelling may be meaningful in itself. Pessimists may argue these efforts will not *save the world.* They should remember Luther's dictum: "Even if I knew the world was going to end tomorrow, I would plant my tree today."

The conclusions reached in this chapter imply that the Ecological Conditions Strategy should be oriented towards internalizing learning processes in *normal work.* In addition to creating structural conditions, the strategy should generate alternative solutions in pilot projects.

INTERMEZZO 2: DILEMMAS ON THE EDGE

Being always an important element of planning, learning has to play a special role in ecological planning.Taking ecological issues seriously requires change. But what can be changed, for example in the context of an expanding town? Before discussing more theoretical aspects I use this intermezzo to present a case that may illustrate how things go in practice. What is learning in a practical planning situation?

THE DRACHTEN CASE

introduction

Situated in the northern part of The Netherlands, Drachten is a town of approximately 50,000 inhabitants that is presently facing the need for further expansion. Figure 7.1 shows the present situation. The town is bordered on the southeast and the northeast by motorways and to the northwest there is an industrial area, so the first option to be considered for new residential areas is the southwest. Not surprisingly *this* is the option proposed by the municipal housing and planning department. The first proposal of this kind was supported by the municipal council. But the local planners and politicians were not entirely satisfied and asked for advice about the southwestern edge in a regional context.[1]

The actual development at Drachten was not an isolated case. Starting with small scale projects, Drachten assumed a leading role in *sustainable building* in The Netherlands with its Morra Park *pilot project*, a new residential area that will be discussed in section 11.3. The climate created by working on these small projects led to a degree of interaction between local politicians, planners and external advisers that facilitated the discussion on the structural issues at the scale of the region. In a recent article (De Haas, 1995), the local planner and initiator described this true example of a pragmatic and yet fundamental process of *social learning*.

dilemmas

Unlike the building of residential areas, planning the structure of further expansion was not a case for pilot projects. Our analysis started by examining the southwestern edge but soon envisaged locating new residential areas in relation to the structure of the whole town.

One major dilemma emerged at the outset: the future building site was planned in what was still the most beautiful landscape in the area. Drachten is almost entirely surrounded by old reclaimed peatland areas, the heritage of the town's history, which have only limited qualities in terms of scenery and wildlife.

1 *I was a member of a team of advisers that was invited by the local authority to elaborate ideas for the soutwestern urban fringe. The report was published as: Kuiper Compagnons, Kristinsson, IBN-DLO 1994: Aanzet Stadsrandvisie Drachten. Gemeente Smallingerland. [A view on the urban fringes of Drachten].*

However, the area to the southwest is different. Here, there was no peat to dig. A lobe of Pleistocene sands extends into lower lying land with lakes west of Drachten. There are height differences of a few metres, old fields and hedges, small woods and a little river that runs into a lake. In short, this is an area that already has many qualities and potentially can become the ideal urban fringe landscape. Should this be the place to build?

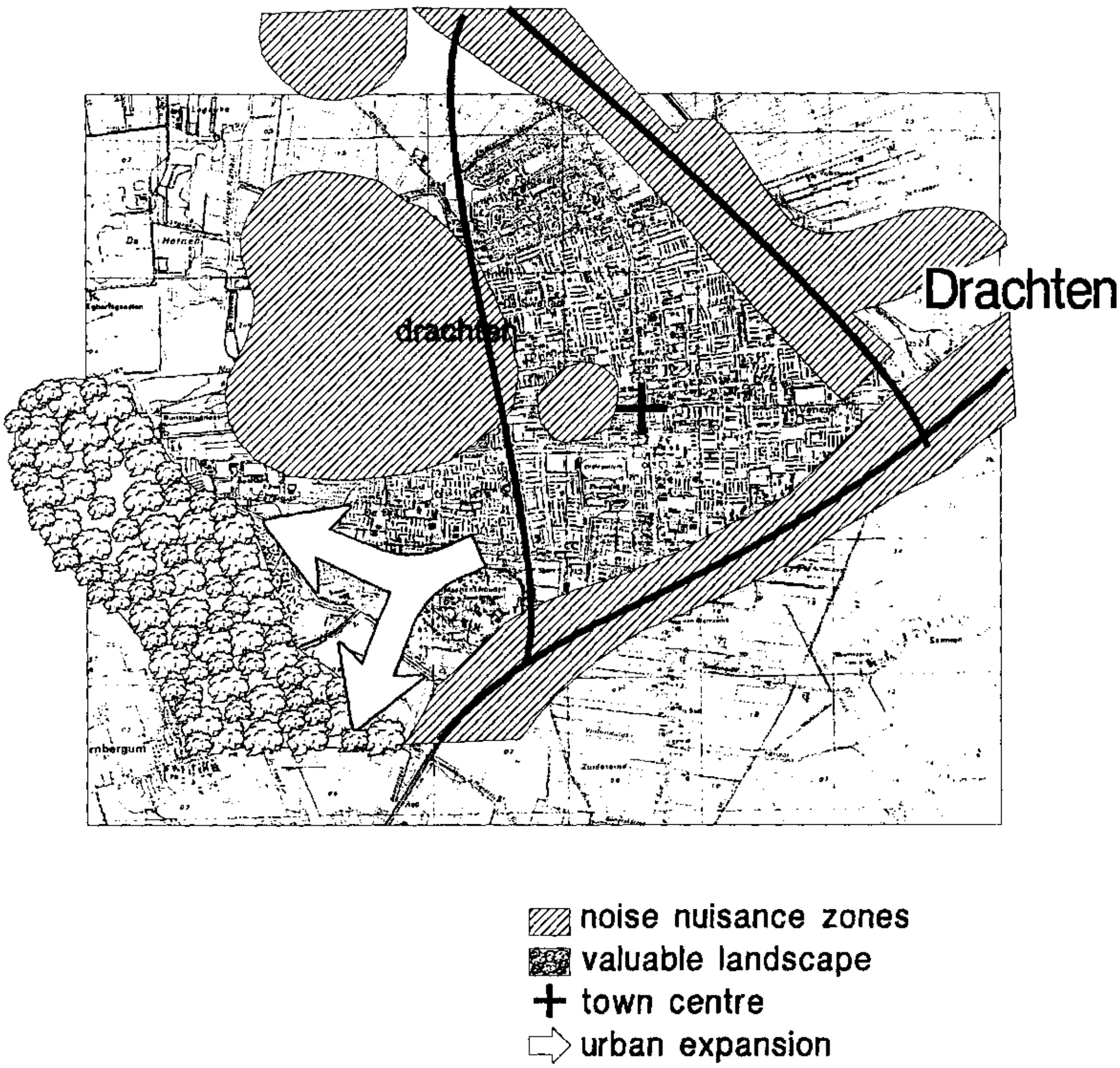


Figure 7.1:
Dilemmas facing the planners of Drachten's new residential areas.
source: Smallingerland local authority.

If we look at the dilemma from the point of view of wildlife and environmental quality, there is the problem of the noise nuisance isolines. These lines indicate the zones where building is prohibited due to environmental quality regulations that take the noise level of 55dbA, measured on the facade of a building, as the maximum permitted. As shown in figure 7.1, isolines indicate noisy zones along the motorways and around factories in the industrial area. As a result, residential building in open areas close to the town centre or close to the motorways is not possible. This leaves the option of building in the southwest. Hence, the best intentions for ensuring environmental quality in residential areas threaten to destroy wildlife and scenery in the urban fringe.

Another related dilemma concerns the quality of life in the residential areas. At present, there are less attractive areas in the east abutting onto the noisy motorways that also form a serious barrier for pedestrians and cyclists. One edge of the town is very attractive for walking and cycling, but this is precisely where the new residential areas were projected.

Then there is the dilemma of traffic development. In the proposed plan new extensions were planned relatively far from the town centre, pushed farther away, as it were, by the presence of the noise nuisance zones. As a result, more cars can be expected on the roads leading to the town centre. This would lead to more noise, more barriers and more traffic accidents. Here too the paradox is that the noise nuisance zones intended to reduce the negative effects of car traffic are leading to the threat of increasing these very effects.

Taking decisions on the basis of the existing motorway structure and legal regulations would aggravate the problems and ignore the opportunities.

PROPOSALS

Together with the local planners and politicians in the steering committee of the project, the advisers decided to draw up the strategic plan on the basis of the underlying processes and to undertake actions to come to grips with the dilemmas. Thus, the following proposals were made, illustrated by figure 7.2:

1. Design solutions are drawn up allowing building close to the sources of industrial or traffic noise (figure 7.3). Noise levels on the facades are high, but these facades act as noise barriers themselves. As a result, noise is not a problem for people living or working in these buildings. The idea is not new. The Byker Wall project in Newcastle (England) designed by Erskine in the 1970s is a good example. But the standard practice of measuring the noise level on the facade ruled out this option.
2. This design proposal therefore required special permission from the Ministry of the Environment. After a presentation of the dilemmas and the ways to solve them at the Ministry in The Hague, the municipal and provincial authorities negotiated an official consent to go ahead with these plans.
3. Thus conditions were created for building near the industrial area and alongside the motorways. Building here makes it easier to surmount this

barrier to extending the town.

4. A spin-off that may benefit the entire region is the higher density of dwellings near the site designated for a railway station. This makes it more likely that the station and rail link will be built in the near future.
5. These proposals paved the way for a detailed design of *nature* and landscape in the southwestern fringe for the benefit of recreation and plant and animal life.

In 1995 the municipal council decided to adopt these proposals. The original plan to concentrate urban expansion on the southwestern edge gave way to the approach illustrated by figure 7.2.

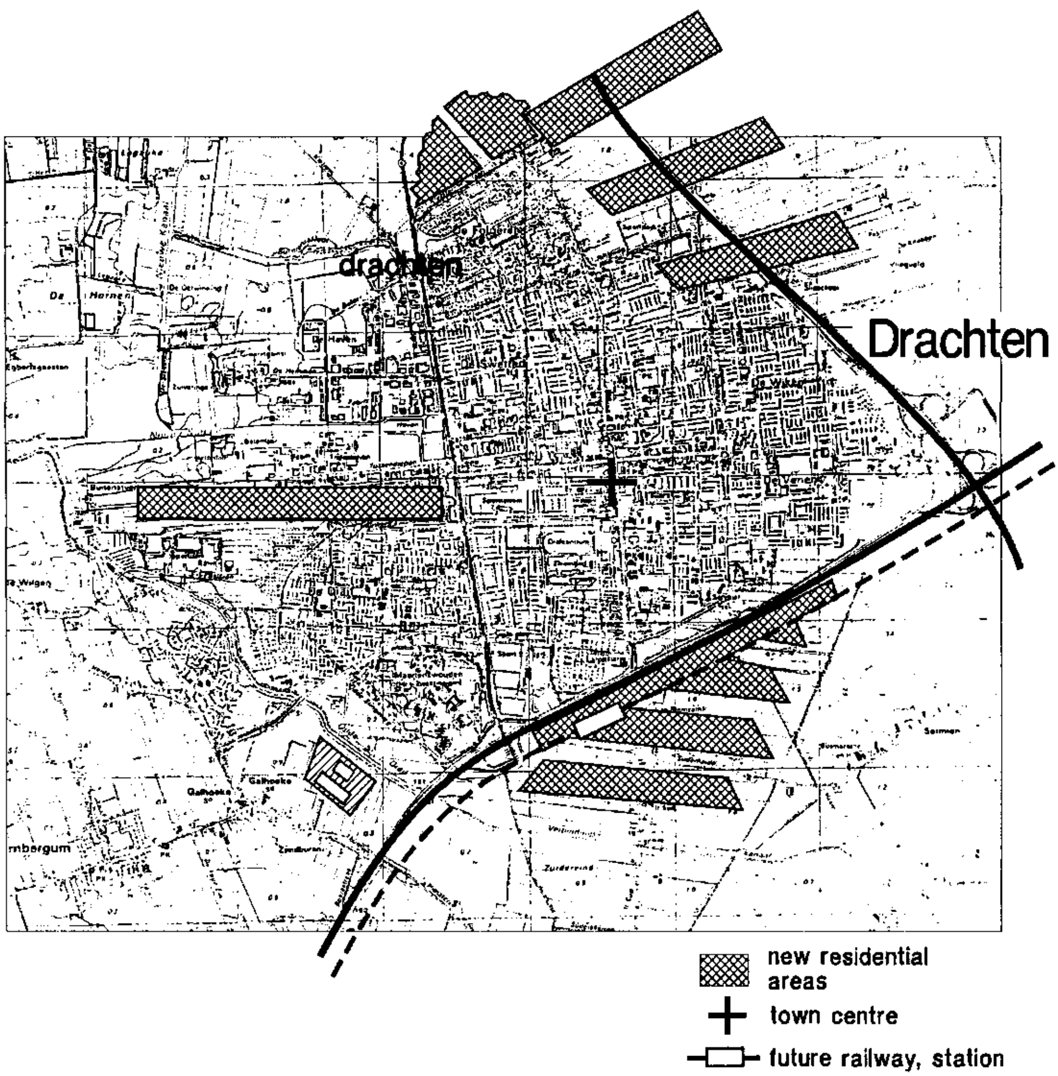
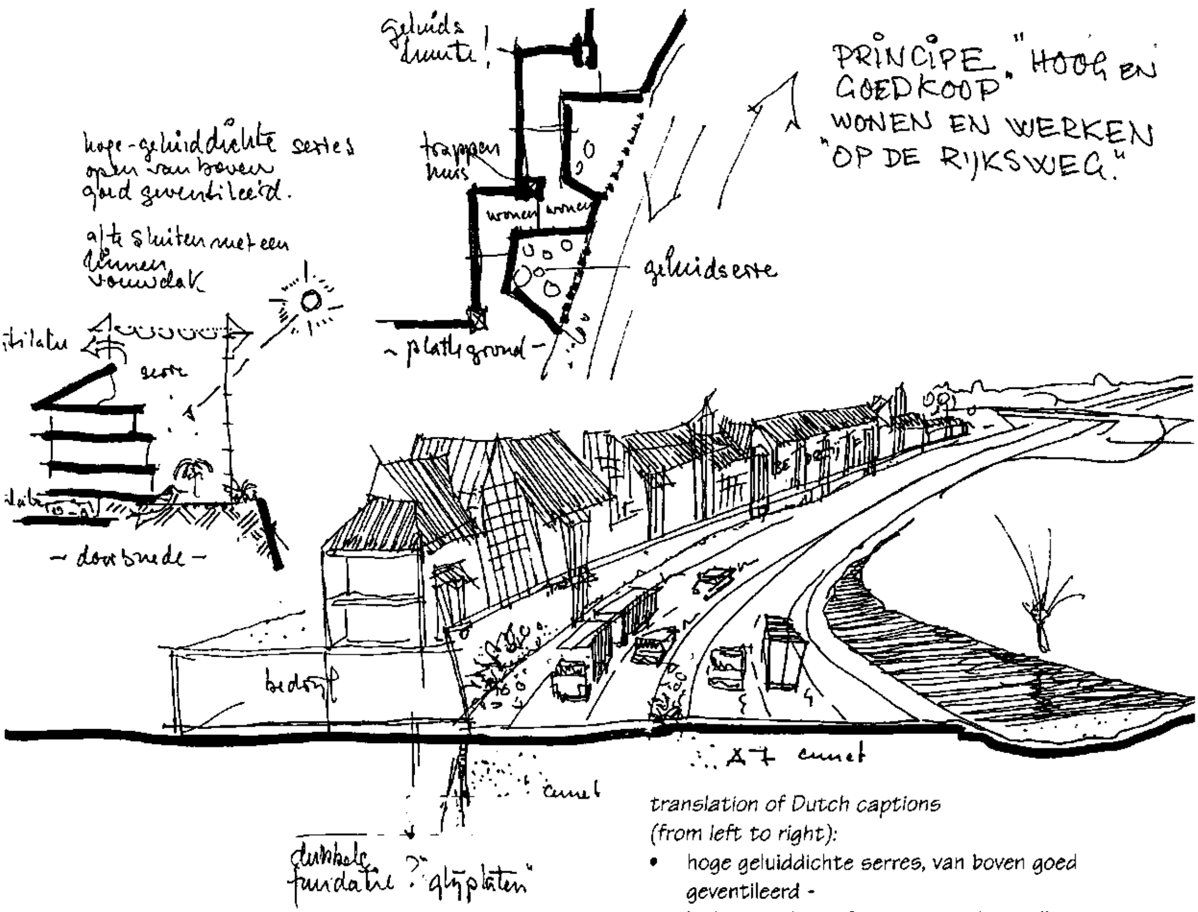


Figure 7.2:
Using potentialities and creating conditions.,
source: Kuiper Compagnons et al. 1994.

The first proposal can be characterized as evasive planning, leading to a loss of landscape diversity and increased traffic encouraged by irreversible urban sprawl. The new proposals use the potentialities of the existing landscape to create a new *rich in contrast* area with a more concentrated town development, creating better conditions for public transport and bicycle use. By adopting this structure plan, the local authority acts as a guide for other actors to participate in a more sustainable approach to urban development.

In comparison with the Kromme Rijn case discussed in chapter 2, the Drachten case demonstrates an alternative: a way of exploiting interaction between surveying and planning to open up new prospects.



translation of Dutch captions (from left to right):

- *hoge geluiddichte serres, van boven goed geventileerd -* high, sound-proof conservatories, well ventilated from above
- *doorsnede - section*
- *plattegrond - floor plan*
- *Principe "hoog en goedkoop", wonen en werken op de rijksweg - principle "high rise and cheap", living and working on the motorway*

Figure 7.3:
Building next to the source of traffic noise.
source: Jon Kristinsson, architect.

7. ACTORS AND INTERACTION IN PLANNING

INTRODUCTION

The intermezzo of the Drachten case is not a spectacular story, but it contains almost all the elements discussed in the preceding chapters in the context of a planning procedure. In doing so it anticipates the present chapter which focuses on the way different actors are engaged in planning. This is not identical with hearings and other forms of direct citizen participation. The Drachten case clarifies how the public debate on overall expansion policy and the structure of the traffic network is primarily a debate of *politicians*, representing citizens, and various groups of *experts*: researchers, technicians and planners. The interaction of these actors is decisive for the structure plan. This plan creates the conditions for citizens and enterprises for taking their own decisions. Making ecology a vital part of these conditions is the heart of the Ecological Conditions approach.

In chapter 4 the importance of creating *carrying conditions* has emerged. Through chapters 5 and 6 various issues have been discussed, leading to a plea for *learning processes* to be given a prominent role. In the context of global and local environmental problems, this learning is directed at change, at making our activities more sustainable. The theme of this chapter is the question how these two, carrying conditions and learning processes, may be given their place in planning by the participating actors.

Section 7.1 first discusses the *social learning tradition* and its position among the four planning traditions presented by Friedmann. The section focuses on two groups of actors: experts and politicians. They represent science and practice, knowledge and action. Therefore Habermas's interaction models of these two groups are compared with Friedmann's planning traditions. Subsequently, the role of actors in operational and strategic decision making is discussed, taking Faludi's *operational and planning decisions* as a point of departure and focusing on decisions about *creating conditions.*

Section 7.2 focuses on the role of actors in sectoral and integral planning. The government may assume different roles, characterized here as the *referee* and the *guide.*

This chapter rounds up the discussion of fundamental issues that forms part II. Section 7.4 aligns the issues in two *discourses*: the *language of control* and *the language of interaction.* The latter will be the basis of the Ecological Conditions Strategy, to be discussed in part III.

7.1 From knowledge to action

In this section I will further examine the role of learning in environmental planning practice and theory. It seems natural to start with the social learning tradition in planning. My main source is Friedmann (1987) . The second topic is a further analysis of learning and creating conditions in strategic and operational decision making. Here Faludi's Decision-centred View (Faludi, 1987), is my point of departure.

SOCIAL LEARNING AND OTHER PLANNING TRADITIONS

social learning

Friedmann (1987) describes the *social learning* tradition as one of four leading traditions in planning theory. Social learning goes back to the American philosopher and educationalist John Dewey, as already mentioned in section 5.1. It originated in the period between the Great Depression and World War II, a period full of disillusion about both the market and the state. Under these circumstances the pragmatic approach of *learning by doing* had something to offer. is Lewis Mumford is another great theorist of this tradition (see also Hill, 1985).

In the philosophy of *social learning* knowledge is seen as emerging *from learning by doing.*

> "Existing understanding (theory) is enriched with lessons drawn from experience, and the 'new' understanding is then applied in the continuing process of action and change." (Friedmann, p. 81)

The social world is not seen as corresponding to immutable social laws. Change is possible. It goes through social experimentation and learning from success *and* from error. The emphasis is on dialogic, non hierarchical relations, tolerance of differences, and openness in communication. Small task-oriented groups with face-to-face contact are the principal focus of the social learning approach.

In describing the social learning tradition, Friedmann does not refer to this model, but social learning is, in fact, very much in harmony with Habermas's *pragmatic model* (Habermas,1968, p. 126). Referring to Dewey's *pragmatism*, Habermas develops his ideas on *herrschaftsfreie Kommunikation* (non-oppressive communication) as one of the core concerns of the pragmatic model, which implies interaction of experts and politicians on both facts and values. It is in the interest of these two groups of actors to combine a scientific approach with a critical look at the basic values. In section 5.1 this approach was mentioned in the context of *objectifying*. In the social learning tradition the central issue is the interaction of different actors or stakeholders in a planning situation.

As discussed already in section 6.2, the *learning organization* approach has led to the development of a professional practice for guiding human interaction in management situations on the basis of psychologically understanding the functioning of small groups. At the planning level, the Strategic Choice Approach

(Friend & Hickling, 1987) is conceived primarily as a way of learning. Surprisingly, Friedmann does not refer to this planning school, but Faludi (1987)is strongly influenced by it.

The position of social learning in the planner's landscape is clarified by Friedmann's description of three contrasting traditions:

social reform

This tradition focuses on the role of the state. This may lead to options that are centralistic to a greater or lesser extent, but in any case reforms are believed to come from the top. Planning is perceived as the application of scientific knowledge to public affairs. A rationalized socially just society is the dream. The social reformers interpreted their role as "talking truth to power" (Wildavsky).[1] Thus, they believe that facts and values can be separated. This basic idea goes back to the work of the sociologist Max Weber.

Habermas (1968) refers to this view of interaction between experts and politicians as the *decisionistic model*. Science has to produce the facts, and politicians are responsible for the decisions.

Discussing the issue of *objectifying* in section 5.1, we saw that making such a clear distinction between facts and values is an untenable position. The Drachten case may serve as an illustration of the practical impossibility of strictly separating facts from values. These criticisms from the fundamental and from the practical side, however, refer to the outspoken decisionistic position. In practice, politicians and experts, of course, do have different responsibilities.

policy analysis

This planning tradition developed as a family of methods that combine systems engineering with management and administration science. It is seen as a neutral tool rather than a social message. Its principal role is advising the government and its agencies. Rational decision making is its central paradigm. Strongly influenced by Neo-classical economics, policy analysis considers the allocation of resources as the core problem. This results in a central role of what Friedmann calls *allocative planning.*

Friedmann's description comes close to Habermas's technocratic *model.* In this model there are, in fact, very few things left over to decide for politicians. The optimizing of decisions is perceived primarily as a technical task done by experts.

In Friedmann's critical review of this tradition we find a number of issues encountered earlier when discussing cost-benefit analysis (section 5.3) and in Christensen's diagram in section 6.2. In short: premature *taming* of complexity, reducing multi-value and complex issues to one tier, quick and clear so called *objective* methods. In a critical discussion on policy analysis, Archibald (1980),

1 *Quoted by Faludi (1987).*

writes, almost in despair:

> "But where in the literature, and where in the training of analysts, is attention given to methods of improving *imagination*, judgement, analogical and associative thinking, inventiveness and ingenuity? What proportion of books and articles and classes are devoted to such topics, compared to the space and time devoted to improving rigor and technical skills? It is a minute fraction of the total verbiage on policy analysis." (Archibald, 1980; quoted by Friedmann, 1987, p. 171; italics are mine)

Rigour and imagination, these are the key words of Bateson's view of the two processes essential to evolution and to learning, as discussed in section 6.2. Policy analysis, we may conclude from this quotation, overestimates rigorous selection and underestimates the imaginative creation of alternative solutions.

social mobilization

This is the title given by Friedmann to such different approaches as the planning traditions of Utopians, social anarchists and Marxists, which have in common a rejection of the existing social order that includes the poverty of an underprivileged underclass. They also agree on the need to structurally change this social order, not by gradual reform from the top but bottom-up. They have, however, contrasting views on the appropriateness of means to achieve their aims. The Utopian communes create their own world far from the dynamic capitalist society. The social-anarchists seek to realize social emancipation by collective action but are suspicious of all hierarchical systems, especially the state. The Marxists focus on class struggle and revolution.

Friedmann's paradigm is to conceive of planning as "linking knowledge to action in the public domain". In this perspective, social *mobilization* is also a planning issue. Planning is not in principle exclusively a function of the state, it may support emancipation movements in their struggle to free human values from social oppression. Friedmann develops a theory of radical planning. (Friedmann, pp.303-306) In this approach the role of the planner is to offer his or her skills, "embedded in critical thinking", to oppositional groups, whose existence is essential for a healthy society.

Looking at the interaction between experts and politicians, the social mobilization tradition may be considered as specific case of Habermas's *pragmatic model.* In this case experts and politicians, or oppositional groups outside politics, work together on the basis of shared values.

This short review shows the position of the social learning tradition in relation to other traditions. All traditions have their own way of coping with ecological issues.

PLANNING TRADITIONS AND ECOLOGY

Environmental issues, both at the local and at the global scale have been brought to the surface of political debate as a result of *social mobilization.* Both utopian projects and mass demonstrations have played an important role in the emancipation of environmental issues and this process is by no means at an end.

Gradually, in the last twenty years, as legislation proceeded and the schools produced the first generation of trained environmental experts, more professionals have entered the scene and consequently the *policy analysis* approach is taking over. A recent evaluation of 9 Dutch land-use plans for new urban areas with a *sustainable building approach* revealed that policy analysis was the dominant planning style (Webster, 1995).

The social reform tradition has been very late to discover environmental issues. In the social democrat movement, which has been the breeding ground of planners for social reform, environment and nature were subordinate to the social emancipation struggle (Harmsen, 1992). The founding of more radical political parties with a *red and green* programme in Germany, France, Britain, The Netherlands and other countries, is a recent feature. Still more recent is the discussion about *ecology* as a political issue in the traditional social democrat parties.

In the social *learning* tradition it was especially Lewis Mumford who extended social learning to ecological learning:

> Beginning with the crawling of an infant in his home, the systematic contact with the environment should broaden out until it includes the furthest horizon of mountain top and sea: in a bout of sailing, fishing, hunting, quarrying or mining, every child should have a first hand acquaintance with the primitive substratum of economic life...The next step toward a rational political life...is the hitching of these concrete experiences to local surveys, more systematically undertaken. The soil survey, the climatic survey, the geological survey, the industrial survey, the historical survey, on the basis of the immediate local environment are the next important instruments of education. (Mumford, 1938) [2]

In the last twenty years, many local environmental education centres have been set up to work in this spirit. They work with shoolchildren and adults and have widened the scope of the much older tradition of field biology education to a programme that includes local environmental issues.

Because of its kinship with the basic ideas developed in the preceding chapters, I am inclined to opt for the social learning approach to play a central role in an Ecological Conditions Strategy. This, however, does not imply the exclusion of all elements of the other traditions. There are close links.

links between social learning and other traditions

The link between learning and *social mobilization* has become visible in a great number of *grassroots* initiatives that have practised learning by trial and error. These projects and groups have always played an important role in environmentalism as a movement. More recently the *pilot projects* way of learning as an official governmental strategy has been gaining ground. In a way, this means the pioneers are being institutionalized and this may be described as a *social reform* approach. Ecological themes play a major role in the new programmes set up by several European countries and by the European Union. Some of these programmes were

2 *The quotation stems from Mumford's essay The Culture of Cities and is taken from Friedmann, 1987, p. 199.*

discussed briefly in section 4.1.

In some cases there is also a close link between *policy analysis* and learning.

Bressers & Coenen (1989), in a review of policy evaluation studies, describe the learning process in water pollution control in The Netherlands. In the 1970s the pollution of surface waters with organic pollutants and heavy metals declined drastically. Industrial waste water itself became less charged with pollutants. It was unclear, however, whether this resulted from economic recession or from the official government policy to issue permits and to control compliance with regulations or, perhaps, from other factors. Evaluation research in the early 1980s revealed the levy on waste water discharge, introduced to finance the construction of waste water treatment plants, was the major factor. It was this incentive that urged companies to re-use water and develop a cleaner technology. (Bressers & Coenen,1989. pp. 343-344)

As a result of the learning process related to these evaluation studies, the role of regulating levies became more important in environmental policy. The learning process contributed to the Netherlands Scientific Council for Government Policy's advice to shift the emphasis from direct regulation to incentives (WRR, 1992). Lessons of this kind can only be learned by doing.

These *links* demonstrate the capacity of the learning tradition to combine with other traditions.[3] In practice there will be many combined options. There are, however, good reasons to give priority to the learning tradition, including its interactive pragmatic approach: Objectifying depends on an explicit exchange of views about context and values (see section 5.1); these discussions cannot be reduced to abstract weighing (see section 5.4); managing uncertainties requires interactive learning (see section 6.3). The Drachten case illustrates the practical need for an interactive approach.

Having clarified the position of social learning in comparison with other traditions, we must examine different decision situations in order to elucidate the practical implications of this approach.

DECISIONS AND LEARNING AT TWO LEVELS

Let us start with the case of infrastructure planning, being a form of creating structural conditions. At first sight, learning seems hardly relevant in this context. One cannot build a short stretch of the road as a pilot project. However, in the context of *two-tier decision* making , as discussed in section 5.4, it is conceivable to opt for a social learning approach to *mobility* that may, on the long term, generate alternatives for the road. Long-term options can be explored by a programme of experimental projects including: attractive public transport facilities, residential areas with limited car use, road-pricing, incentives through high parking fees etc. In the current situation a short-term ecological approach can only lead to experiments with habitat creation in road verges. In the long term the mobility system is at stake.[4]

3 *This will only be possible, of course, insofar as planning traditions are not dogmatic. Dogmatism of any kind is incompatible with learning.*
4 *See also the Chaining Waters case in section 10.4*

The mobility case, just as the manure case discussed in section 6.3., shows there can be learning at two levels. In figure 7.1 these are represented by a small and a wider learning cycle, both, in their own way, related to ordinary practice: the shaded part of the diagram.

As a part of day-to-day decision making, learning may improve the static quality of the organization. Politicians, technical experts and officials may operate within the existing frames and terms of reference. Research is limited to routine issues. Designers stick to standard practices. Their plans make the standards fit to the particularities of the users and the physical situation. More radical changes aiming at ecological modernization or sustainability cannot be introduced in this way.

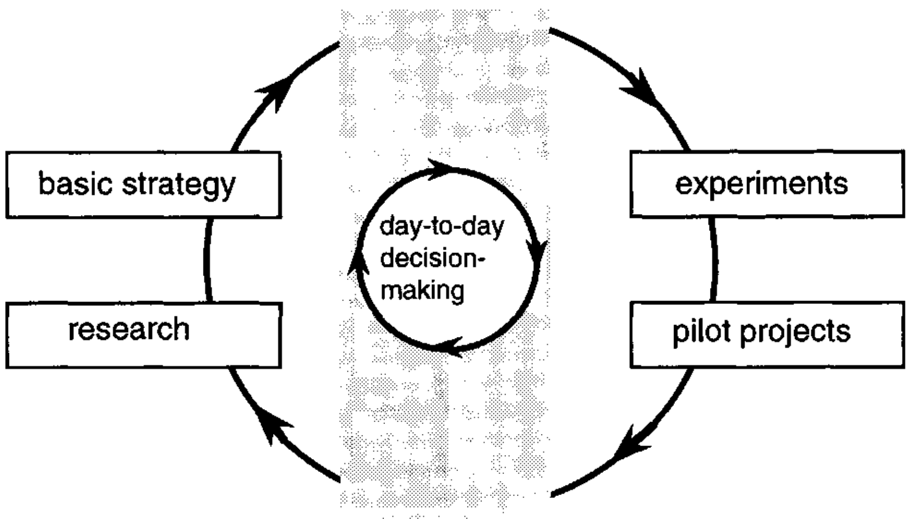


Figure 7.4:
Learning at two levels.

A special way of strategic learning has to be developed to perform that task. This is indicated by the wider learning cycle, which starts by taking a step back, to create time for research and for generating an innovative strategy. The next step is to jump over day-to-day practice and engage in experiments, pilot projects that are ahead of the existent routine. What is learned from these pilot projects may be useful for day-to-day practice. Researchers, planners and designers may play a more prominent role in the strategic learning cycle, but politicians have important responsibilities in this cycle as well: communication with the general public, linking general aims to first steps, initiating and funding the long-term learning process. Moreover, what is to be learned is not only technology but, even more, how people work with it. It is not only *knowing that* but even more *knowing how.* Learning by doing requires different groups of actors to participate.

The diagram illuminates the case of many environmental problems, perceived as *decision situations* with no options for change. Caught in the frame of existing conditions as they may be, a learning approach is conceivable. On the basis of this understanding of the two levels of *learning*, chapter 8 will propose a structure of the learning process in the context of the Ecological Conditions Strategy.

Besides "learning","creating conditions" also has emerged as a basic principle for the Ecological Conditions Strategy. How do actors in a planning context decide on ecologically sound conditions? To examine this issue I will first look more closely at different types of decisions. As a starting point I take Faludi's distinction between operational and planning decisions.

OPERATIONAL AND STRATEGIC DECISIONS

In his Decision-centred View of Environmental Planning Faludi (1987) chooses decisions, not plans, as a basis for his planning theory. The function of plans, he states, is to improve decision making: "..even the noblest plan is *useless*, unless it translates into operational decisions.." (Faludi, 1987, p.118)

Operational decisions he defines: "are those which result in definite commitment". These decisions change the world. Contracts, budget decisions or building permits, for example, are commitments that cannot be reversed without incurring heavy costs. These often require direct negotiations between actors that lead to irreversible agreements. By contrast *planning decisions* "only entail tentative commitments...They are a necessary support for operational decision making." Spatial structure plans and environmental policy plans, for example, contain a *commitment package* of planning decisions.In this case the commitment is less definite. This is the strategic level that guides decisions. "Planning is a secondary activity grafted onto ordinary problem-solving, ..[it] is rearranging decisions, not intervening in the material world as such." (p.128)

decisions about creating conditions

Applying the two types to decisions concerning *creating conditions* , we may distinguish between *hard conditions* (roads and rules) that are irreversible or difficult to change, and *soft conditions* such as a programme for learning or a structure plan. If we think about ecologically sound conditions, then hard irreversible conditions such as traffic and water networks may protect clean water or quiet, but they also may spread noise and pollution. *Good conditions*, in this context, may act as durable carrying conditions. Bad *conditions*, with negative environmental impacts, may impose long-lasting barriers that are difficult to overcome. The two faces of hard conditions will be used in elaborating specific *guiding models* in the framework of the Ecological Conditions Strategy. Guiding models concerning traffic and water networks, for example, will be discussed in chapter 10.

An ecological strategy should explore ways to postpone operational decisions creating structurally *bad conditions* in order to create time for a learning process developing environmentally friendly alternatives. Most environmentalists, for example, think that the building of large new power plants should be postponed to create time for developing decentral power production (solar, wind, combined heat-power production). I discussed these options in Ecopolis (Tjallingii, 1995, pp. 63-70).

The environmental impacts of the power plant as a large *central* solution by comparison with the small *decentral* options are open to debate. Major uncertainties accompany this debate. However, for that very reason it would be wise to avoid large irreversible operational decisions. Chapter 9 elaborates strategic options in the context of the ongoing central versus decentral debate about managing *flows* like energy, water, waste materials and traffic.

This debate is crucial for an Ecological Conditions Strategy. Decision making on these issues is not a technical matter, that can be left to technical experts who legitimately reason according to the *efficiency* and *effectiveness* criteria of their own disciplinary corner, as discussed in section 5.2. More than any other category of decisions, irreversible operational decisions on infra-structure, or other hard structural conditions, require the participation of many actors and the use of *appropriateness* as a criterion. This implies that these decisions cannot be left to *second-tier* optimization procedures; they are real *first-tier* decisions, as discussed in section 5.4. This point will be further elaborated in section 8.3.

decision analysis

One implication of the decision-centred view is the need for *decision analysis* (Faludi, 1987, pp. 123-124). If planning is to guide operational decisions, answers should first of all be found to questions like: "which decisions?", "who decides?", "how can decision takers can be influenced?". These questions are concerned with the *decision situation*, the context of operational decisions. To be effective, plans should be tuned to the decision situation and the actors involved should have a shared definition of this situation.

The Drachten case may illustrate this point. From the decision analysis in this case it was learned that *roads and rules* as existing hard conditions seemed to stand in the way of good solutions. Roads could not be changed, but a further analysis of the noise nuisance regulations revealed there was an ongoing debate on these rules. This led to a decision to conduct some design research to generate practical options for building close to the motorway. Armed with these feasible options, a strong case could be put in negotiations with the Ministry: implementing the rules unchanged would lead to impacts running counter to the intentions of the rules, and there were good alternative options.

decision analysis and survey

In the Drachten case, the idea about creating good conditions guided the research priorities. This is an illustration of the intimate interaction between research and planning. To stress this point Faludi quotes Rittel & Webber: " The information needed to *understand* a problem depends upon one's idea for *solving* it." (Faludi, p.117) Thus, right from the outset, the planner should be aware of the type of decisions that might be taken to solve problems. In this way a decision-centred view of planning links analysis to decisions. In Friedmann's words: it links knowledge to action. The importance of this point is its integration of normative science and empirical research at the project level.

·This idea is at variance with the *object-centred view* of planning, exemplified by Patrick Geddes's maxim "survey before plan".[5] The underlying idea is to assembly substantive *objective* knowledge until the right course of action emerges as a result of a *creative leap.* (Faludi, pp. 8-11)

From my own experience as a soil and vegetation surveyor, described in the first chapters, I know that good surveyors may achieve an understanding of a landscape and its ecological and cultural conditions, that most planners will never acquire. Nonetheless I fully agree with Faludi's critique. Survey is important *in* planning, it is not something independent that precedes planning. Maps do not give value-free information. All maps, even topographical maps but, even more, soil maps and, still much more, land suitability maps, are based on value-laden choices. Planners who are not aware of the hidden values or do not understand them in their context, may miss or even misuse the information. The Houten case, described in section 2.3 clearly demonstrates the communication failures that may result. Chapter 11 discusses a step by step approach for the design of water systems, based explicitly on the method of surveying guided by ideas to solve the problem. The idea of *objectifying in context*, as discussed in section 5.1 is thus applied to the situation of survey in the context of design.

Faludi's decision analysis is, in fact analyzing the relevant context for the objectivity of a decision. With hindsight, I may conclude this is what went wrong in the Kromme Rijn case (chapter 2): on the one hand researchers performed their surveys without a proper analysis of the decision situation; on the other hand the planners and politicians used a narrow definition of the decision situation, excluding the wider circle of learning of figure 7.1. In other words: the actors responsible for knowledge did not cooperate enough with the actors responsible for action. Or may we conclude that the sharp distinction in itself between "actors of knowledge" and "actors of action", expressed in disciplinary and sectoral territories, is a barrier to interaction?

7.2 Sectoral and integral

The previous section discussed knowledge and action and the role of experts and politicians in a general way. Most experts, however, are specialized; they work for special sectors in which their prime concern is not a balanced integral plan but results. As a result there are conflicts, between sectors and between actors working on sectoral and integral planning tasks. How do we cope with these conflicts and to what extent may the underlying strategies be useful if linked to an Ecological Conditions Strategy?

5 *The Scottish biologist and regional planner Patrick Geddes (1854-1932) was one of the first to acknowledge the role of regional nature and culture in the making of plans. He has had a significant influence on Lewis Mumford. Having the same professional background, I consider him as my inspiring predecessor.*

As an introduction, I have to clarify the concepts "integral " and "sectoral ". Planning, as discussed it in the previous section, is concerned with the common framework, creating physical and organizational conditions for a variety of activities. In this section I will call this integral planning, as opposed to sectoral planning, that focuses on single environment-use activities.

THE ENGINEER'S MODEL

The traditional approach to integral planning is the *engineer's model of planning*: the plan is a picture of the final result; plans are first made and then implemented. Faludi's Decision-centred View breaks with this tradition. He explains this in the following way:

> "Environmental planning has its roots in architecture and engineering. Often this heritage is blamed for the neglect of social aspects in planning. But the engineering style is not limited to those with a technical education.. It is wedded to the idea of problem-solving based on substantive understanding.... In many instances it is a suitable approach, but it does not fit environmental planning. There, it suggests that the problem is that of designing *a better future* based on technical specifications and standards of good design. Those harbouring such ideas have never come to terms with the fact that the environment is being designed constantly by all of us. We all make our shells according to our needs... Environmental planning needs to accept that it works indirectly." (p.218)

This suits the idea of creating conditions. Social processes and ecological processes cannot and should not be built like houses. This does not imply, however, a complete retreat of integral planning to procedural matters.[6] But there is indeed a tendency in integral planning to opt for a neutral role which is often identified with a procedural role.[7] In a decision-centred view plans are made to provide guidance in order to improve decision-making. This implies substantive and procedural guidance, but in this view plans do not give a precise picture of the final result that merely needs to be implemented.

The situation is quite different in sectoral planning. There, plans are made to achieve goals for specific activities like housing, industry, recreation, agriculture and wildlife. Sectors want to see results; they are, by nature, more concerned with substantive issues. Experts, most of them engineers, are engaged in making these plans.

The Ecological Conditions Strategy aims at being integral, at addressing all activities. Yet, ecology has a special link with some of these environment-use activities. Therefore, we have to look more closely at the role of ecology in sectoral and integral planning.

6 *In his Planning Theory written in the tradition of rational planning theory, Faludi (1973) emphasized procedural theory, a concept that implies, however, the complementary existence of substantive theories, for example land-use theories. In A Decision-centred View (Faludi, 1987), the links between procedural and substantive theory become more clearly visible.*

7 *In section 5.3 we saw that the neoclassic economist's neutral approach is not neutral at all. Therefore we have to be careful to examine the values, underlying so called neutral procedures. The two-tier approach explicitly proposes a specific procedure on the basis of substantive arguments.*

ECOLOGY IN SECTORAL AND INTEGRAL PLANNING

In principle there is no objection against having a role of ecology in integral planning. As mentioned already in section 5.2, ecology is the study of the relationships between living organisms and their environment. In our case the organism is primarily man, not only implying female and male, but also including social differences. People are by nature social beings belonging to different cultural groups that make different demands on their environment. To conceive of environmental planning as a strategy to create good conditions is consistent with the broad definition of ecology. Ecological conditions should be good for general health and for a differentiated human habitat in which different groups can feel at home and in which people can make individual choices. Is ecology the science behind this environmental planning?

ecology in planning practice

Although ecology is widely used to denote such issues as the *ecological question* and the *debate between ecology and economy*, in current planning practice, as a rule, ecologists work for sectoral planning. They are called in to analyze the environmental effects of urban plans on special groups of endangered plants and animals, or they are asked to substantiate the environmental requirements of specific groups of people, for instance those who love nature. Both the general values of biodiversity and the specific images of nature are among the aims of sectoral planning for nature conservation. As a result, sectoral planning is ambiguous. On the one hand It focuses on general aspects, like health, which is relevant for every individual or like biodiversity and is agreed to be a general responsibility of mankind. The degree to which these aspects are considered important is by no means unchallenged, but there is consensus about their general relevance. There is a certain commitment expressed in international agreements and national law. The elaboration of policy-plans for these aspects of *general importance*, however, requires *specialized knowledge* and is left to sectoral ministries or departments.

On the other hand these departments have tasks that are related to issues that are more important for some groups than for others. Sectoral departments tend to defend the interest of these groups. The technical language that develops from the specialized knowledge sometimes makes it difficult to communicate about the underlying values and their meaning for different groups.

Planning practice is not only ambiguous; there is also a process of change. In section 5.2 ecology in the context of this book is described as an orientation within many disciplines, a description that follows a trend observable in the empirical and normative sciences. A similar process of change can be observed in planning practice. Whilst the sectoral organization of government tends to adhere to the biological meaning of ecology there are tendencies in the development of integral policy, like the programme for *ecological* or *sustainable building*, that give ecology a broad meaning. Needless to say this leads to confusion.

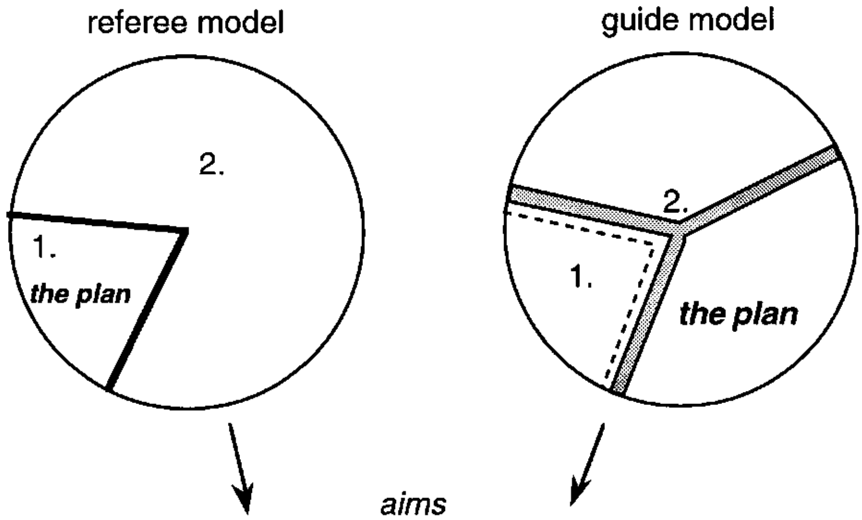
Adding to this confusion is a change in perception of the role of the government and other actors in planning processes. Different views of the *government's role have far-reaching implications for planning in general and particularly for environmental planning. The key issue is the way the government and other actors interact in the process of attuning sectoral and integral planning. Exploring the possible role of an Ecological Conditions Strategy in planning I need to examine the strategic options for the role of actors in the planning process.*

THE REFEREE AND THE GUIDE

Leaving the engineer's model aside for a while, I will first discuss two different ways to look at the interaction between sectoral and integral environmental planning. We may describe them as the referee model and a *guide model* (fig. 7.2).

the referee model

The metaphor used for the role of the government in the first model is the *referee.* The context is the *contest.* The dominating form of planning is *sectoral.* Ecology is seen as part of the conservation and health sectors. The aim of the sectors, of course, is effectiveness of the sector policy; they concentrate on good performance of the sectors' tasks. In accordance with this aim, ecologists are asked to produce scientifically based *values of nature* (see 3.1). *At the integral planning* level the



1. sectoral planning	effectiveness performance	effectiveness synergism, cooperation
2. integral planning	legitimacy fairness	legitimacy, appropriateness *good conditions*

Figure 7.5:
The aims of sectoral and integral planning, two models.

main task is to take decisions on limiting conditions (the rules of the game) in a field of competing or conflicting interests. In order to avoid conflicts, these decisions have to be justified, they have to be fair. They have to rest on Rawls's principle of *justice as fairness.*[8] For this reason, standards and weighing procedures, objectifying the values involved, are preferred instruments. Ecologists are asked to produce these objective *ecological standards* (see 3.3). Sometimes, they are called in to assess the values of wildlife habitats in this context. Sometimes ecologists invite themselves to contribute in this way, as we have seen in the case of the Kromme Rijn Project.

The emphasis is on competition rather than synergism or cooperation. As a result, there are many claims and they are high and unlikely to be compatible. Functional segregation is then the usual outcome: a *compromise* type of consensus. In rural land-use projects, nature conservation areas and farmland tend to be separated this way. This, of course does not prevent flows of water and air from crossing the boundaries of the spatial compartments.

An example of this approach is given by Van Egmont et al. (1992, p.27). For the Dutch situation they argue for a confrontation: the demands of *restrictive functions* such as *nature* (wildlife and scenic qualities) and *environmental quality* (standards for health and environmental protection) versus active *functions* like urbanization and agriculture. An integrated environmental plan will result from this confrontation by means of an explicit weighing procedure.

It is hard to see, however, how consensus on this weighing procedure will be generated after a polarizing process of stimulating sectoral claims. Experts sometimes think politicians should decide on weighting in such cases, but most politicians are reluctant to do so, unless they see the consequences in the context of decision making. This is the *decisionistic model* of interaction, described in section 7.1.

the guide model

In the second model the metaphor for the government is the guide. The context of this metaphor is the *expedition.* There is no winner, a joint benefit results from joint efforts. Sectoral and integral planning interact to achieve the best tuning. For sectoral *planning* this implies that effectiveness in achieving the sector's aim is combined with an understanding of common interest and the opportunities of synergism.

In this model *integral planning* first of all focuses on consensus on an integral plan together with a programme for action. The criterion is not only the legitimacy of this programme, but also its coherence. The integrated plan should be appropriate, it should fit the local landscape and the local social situation. The plan should create structural conditions, both physical and organizational. Formal weighing procedures, if necessary, are left to the operational stages where they can

8 *Rawls' s principle of justice as fairness (mentioned already in section 4.1) refers to the need to justify limits set to the rights of citizens and firms to undertake activities. The law should treat all citizens as equal. This calls for objective standards that are the same for all. For a discussion of the implications of this principle see Achterberg (1991) and Dubbink (1994).*

be applied to competing functions *within the framework* set by the integral plan. In its role as a guide the government's task is to reach consensus with the character of a shared understanding[9] . In this model ecological research of various disciplines focuses on the scientific base of environmentally sound development, being an element of the stem of the tree (figure 4.4), the set of *structural conditions* that constitute the common base.

shortcomings of the metaphors

The referee and guide metaphors may illuminate some aspects, but they are too simple as a picture of the real situation. In most cases there is no one government that acts as the referee or guide. The implementation of environmental policy is in the hands of different Ministries, provincial and local government departments. It is not uncommon to see the environmental department produce traffic noise regulations, whereas the department of economic affairs promotes good infrastructure, thus attracting more vehicles. Rather than one referee, or one guide, there is a *network* of actors. Acknowledging this shortcoming, however, does not prohibit the use of the metaphor as a conceptual model for the combined efforts of actors in the network.

To what extent can the two conceptual models throw light on the prospects of an Ecological Conditions approach?

ECOLOGY, THE GUIDE AND THE REFEREE

In chapter 3 four approaches to ecology and planning are discussed. Three of them fit very well to the more conventional *referee model. Values of nature* aims at increasing nature's price in the competition game with other sectors. *Targets of nature* opts for a design approach to become a winner in this game. *Ecological standards* focuses on the rules of the game, to provide the referee with precise, science-based criteria.

For reasons partly derived from the experiences in the Kromme Rijn Project, the fourth approach, *ecological strategies*, has been selected for elaboration in this book. The approach addresses all activities and focuses on the *making* of plans (see section 3.5). This approach fits in with the *guide model*. In chapter 4 the ecological strategy approach has been further differentiated into a strategy for Ecological Conditions. The basic idea is to create good conditions for ecological modernization. Applying the *guide model* to this strategy does not imply that the guide should direct the engineering of the total system. The group of actors represented here as *the guide* should guide the development of a *common frame* of physical and organizational structures, together forming the good conditions. In this view the *infill issue*, developing plans that fit in the frame, could be organized in various ways. One option is the *referee model*, based on competing environment-use activities.

9 *In his Theory of Communicative Action (1981) Habermas distinguishes two types of consensus: compromise, related to strategic rationality and shared* understanding *(Verständigung), related to communicative action. See section 5.1. and Zonneveld, 1991a, p.73.*

For nature conservation this view implies that basic conditions (clean water and air, quiet) are made part of the common frame of ecological conditions. But, for instance, the future of single woodlands, as far as they do not belong to the spatial frame of ecological conditions, is left to the competing forces of all claims in that area. Of course this does not prohibit the actors in that area from cooperating - the guide may even stimulate this - but there is no command and control policy in this respect.

Opting for the guide model to create conditions is not only a matter of good fundamental reasons. There should be practical prospects for making it a feasible option. How real are these prospects? In the next section I will look at the prospects, discussing various situations.

PROSPECTS FOR THE GUIDE MODEL

learning from projects

Most experiences with a guide model approach are at the project level. Urban renewal has been a fruitful experimental ground and, naturally, in these projects strong *participation of residents* developed, in different forms of *co-management* (Fassbinder & Kalle,1982). But in new urban areas too, project groups with an interest in ecological issues have seized the opportunities.[10] An OECD study (OECD, 1990) analyzed the necessary structural conditions at the urban policy level on the basis of a number of case studies at the project level. Curitiba in Brazil, a city of 1.5 million inhabitants, is well known for its city policy of creating conditions closely linked to infrastructure (Vallicelli, 1994).

This is just a small selection of publications on this subject. Projects in which the government participates as a guide in task forces or project groups are numerous and are taking place all over the world. An essential element in all these projects is working in small groups with face-to-face contact, the basis of the *social learning approach*.

Cooperation is a natural element in these projects, but how may the guide approach work out in non-cooperative situations?

prisoner's dilemma

There is a special category of non-cooperative situations worth discussing here because it *requires* a guide. It is the category described as the *prisoner's dilemma*. In the *theory of games* the dilemma is characterized as a situation of interdependency and uncertainty between hope and fear. A great number of environmental problems are deemed to belong to this category (Van Asperen, 1986).

10 *For urban renewal experiences, see for instance the comparative study of projects in six countries by Fassbinder & Kalle (1982). For a discussion of experiences from projects in new and old urban areas see: for Denmark: Attwell et al., 1991; for France: Duhem & Royoux, 1994; for Germany: Adam & Grohe, 1984; for Great Britain: Nicholson Lord, 1987; for The Netherlands: Koning & Tjallingii, 1991; for Sweden: Malbert (ed.), 1994; for the USA and Canada: Spirn, 1984 and Hough, 1984, to mention but a few.*

A typical illustration is found in urban renewal. Suppose a house owner in a run-down neighbourhood is considering renovating his buildings. If he carries out his plan, but other house owners do not, the neighbourhood will remain run-down and he will not make much profit. If other house owners renovate their properties the neighbourhood will look fresh again and the first house owner will profit even if he has not renovated his own buildings. As a result of the dilemma, nothing will happen.

This example of a prisoner's dilemma demonstrates there is a role for a third party that can provide information, establish confidence or propose agreements and, in doing so, may overcome the impasse or break out of the spiral. This third party is the guide.

administrative control

A third situation I want to discuss is at the national level and is described by In 't Veld (1989) as the *administrative control cycle*. In 't Veld is a former director general of the Dutch Ministry of Education. His experience with subsidies and regulations speaks in this characterization of what he calls *the administrative control cycle*, a cycle,

> "in which control systems unfold themselves in mighty operations, fed by human rationality, with initially high expectations of effectiveness; in which foreseen and intended effects are gradually displaced by unintended effects, because people learn to duck out of the workings of the intended influence; in which policy makers, initially dynamically conservative, react by taking measures to retain the system, with additional means of control, with policy accumulation; after which effectiveness again declines, caused by new learning experiences, just to the point at which the control system collapses under its own weight." (In 't Veld, 1989, p. 22)

This is what In 't Veld calls *first-order learning* (avoidance, sabotage). By contrast, *second-order learning* implies a change of values, an increasing acceptance of the norms. This is called *internalizing*, a term used, for instance, in the context of internalizing environmental values in citizen and company behaviour. Second-order learning explains why there are important exceptions to the *law* of *diminishing effectiveness.*

In 't Veld signals the growing importance of second order learning processes and mentions environmental policy and science policy as examples. He argues for embedding the use of policy indicators and incentives in a structure of dialogue, information and feedback. The government's role then should be to engage in, what he calls *trajectory management*, the use of chains of policy instruments based on communication and following complex social processes. (In 't Veld, p. 26).

I mention this view to demonstrate that, even at this level of government policy, there seem to be prospects for a guide approach. Information and communication are keys to the approach. In some cases, like the introduction of an *eco hallmark*, the objective is to enhance the workings of the market mechanism. In many cases, however, common interests of safety, health and environment are best served by cooperative ventures guided by a good guide.

the guide model in environmental planning

In The Netherlands, the guide model approach is gaining ground in environmental planning in recent years. This development already started in the 1970s with the introduction of a system of *sector planning* and so called *facet planning* . The latter was conceived as coordinating sectors from one point of view. Being a form of facet planning, spatial planning was supposed to assume the role of a coordinator of all sectors with spatial claims.[11] At that time the referee model prevailed. Van der Cammen & De Klerk (1986) claim the new approach led to a growing consensus on the role of spatial planning as a coordinating field. However, it also led to a growing bureaucracy

> "entangled in its own complexity, and in that of the social and spatial outside world, but perhaps most of all in the obscure interrelatedness of the two." (Van der Cammen & De Klerk, 1986, p.312)

The national level with its highly specialized Ministries, was obviously not an easy start for a more coordinated approach. Later, reviewing regional planning and the problem of attuning plans mutually,

Haccoû & Veelenturf, (1991, p. 532) concluded that the national level should not try to integrate all sectors in comprehensive plans. Rather, they claimed, the regional level should be taken as the frame to tune the strategic aims of the national plans to local conditions. Here a new form of planning has developed, in which spatial planning and environmental protection come together in a process of negotiating with local farmers, industry and other stakeholders: a process following the guide approach[12] (Van Tatenhove et al. 1994; Van den Berg et al. 1995).

An extensive account of recent developments in Dutch planning with many examples of the increasing importance of the *guide* model is given by Faludi & Van der Valk, 1994. Here I will only highlight one more aspect that brings us back to the *engineer's model* .

THE ARCHITECT'S MODEL AND COMMUNICATION

In the beginning of this section I quoted Faludi referring to the roots of environmental planning in engineering and architecture. In sectoral planning the prevailing concept is the engineer's model: the plan that can be built like a house. If we use that metaphor the model actually should be called the architect's model. There is a subtle difference: most engineers work for sectoral clients, most architects are integrators. I will not sharpen this difference here, because, as explained in section 5.2, I think all these disciplines should keep an *eye on the plan.*

The point of interest here is the architect's model's power of making things *concrete and visible.* Usually this is the weakness of strategic integral plans. Sectors have less difficulties in making concrete and visible plans indicating their claims or targets. The success of making new nature discussed in chapter 3.2 is related to this

11 See Van der Cammen & De Klerk, p. 311.

12 To practise the new approach, 10 so called ROM areas (Spatial Planning and Environment areas) were designated by both the National Environmental Policy Plan and the Fourth Report on Physical Planning (Ministry of Housing, Physical Planning and Environment, 1989, 1991).

operational planning approach. Drawing concrete and visible utopias may also have a powerful impact in raising public awareness. But in integral planning we cannot yield to concreteness of this type. It may be tempting, but society is not makable, policy plans are not like buildings.

Some of the qualities of the architect's model, however, may be used by the *guide*. This is demonstrated by some recent planning studies and experiences. Some of these focus on policy performance, the subsequent stage of decision making and action by the target groups of a policy plan (Dekker et al., 1992; De Kievit, 1993; De Lange, 1995). In this stage the guide meets the team that has to perform the task.[13]

Among the steering strategies and instruments in the performance stage are: creating structural frameworks, mediation, mutual support and adjustment. In her analysis of policy performance in four rural planning processes in The Netherlands De Lange (1995) also found another effective instrument: persuasive, attractive innovating *design concepts*. (De Lange, 1995 p. 309). This confirms Zonneveld's view of the important communicative role planning concepts play in strategic planning (Zonneveld 1991). Compared with the picture of the final result there is an important difference: the point here is making the structure of the carrying conditions visible; *framing with images* as Faludi (1996) calls it.

THE EMSCHER PARK CASE

To conclude this section a few words about a fine example of a project at the regional scale that contains all the elements discussed: The Emscherpark International Building Exhibition in the German Ruhrgebiet (IBA, 1992, 19..; Schmid, 1995).

The project entails a structural ecological redevelopment of the Emscher river system, which runs across the entire industrial area. Using the river and its tributaries as the carrying structure, more than 80 projects of varying size are being realized, from reshaping an old blast furnace area into a centre of industrial history, to restoring the river valley for wildlife and recreation. The plan intends to provide a new stimulus to the economic viability and development in the area.

The project is structured as a learning process, combining pilot projects with learning about ecological technological and social aspects of development at different scales. The state North Rhine Westphalia initiated the project as a semi-permanent exhibition, and now cooperates with the local governments, private enterprises and citizens. The guide model is at work here.

Taking the catchment area of the river as a starting point, the landscape ecology of the region links rainwater infiltration projects in new and old residential areas with restructuring projects in the river valley downstream. Thus ecological modernization is combined with ecological conditions at the regional level.

13 De Kievit (1993, p.27) describes policy processes in three stages: design, implementation and performance. In a guide model approach, I would suggest the guide meet the team early in the stage of design.

7.3 Summary and conclusions

This chapter's is concerned with the role of actors in the planning process. Section 7.1 is on experts and politicians engaged in planning, the former representing knowledge, the latter the action part of planning. Of the four planning traditions distinguished by Friedmann, *social learning* offers the most clues for combining with the interactive learning processes that emerge from the preceding chapters as basic ingredients for an Ecological Conditions Strategy. Interaction between experts and politicians as indicated in Habermas's *pragmatic model*, implies that both groups of actors participate in learning by doing, exchanging experience about facts and values.

Learning takes place at two levels: the *first level* belongs to day to day decision making and involves learning to improve the quality of the existing situation. Ecological modernization, however, requires change that calls for learning at a second level. This *second level* learning focuses on strategy development, pilot projects and case study assessment. Developing alternatives, for example to reduce motorized traffic, to save energy in buildings, or to reduce pollution in agriculture, requires a programme of pilot projects. This programme may start in situations that seemingly do not allow for change at the level of day-to-day decisions.

Faludi distinguishes *operational decisions* involving definite commitment and *planning decisions*, involving strategies that guide operational decisions. Operational decisions about infrastructure entail large investments that make them irreversible. In an Ecological Conditions Strategy irreversible decisions with environmentally harmful impacts should be postponed to create space for a learning process. The long-term prospects for change should be kept open.

Learning requires experts to cooperate with politicians. The research priorities are linked to the options for action. Therefore surveys should not be carried out without a careful analysis of the decision situation. In hindsight, this is what went wrong in the case of the Kromme Rijn project.

The second section discusses the role of government departments and other actors in the context of sectoral and integral planning. The engineer model perceives planning as, for instance, building a house; the end result is drawn and then the steps towards the goal can be planned. This model is common in sectoral planning. In integral planning it has been abandoned: society cannot be built like a house. Two other models are discussed: The *referee model* considers the government in a passive role, keeping the rules in a situation of competing actors. The *guide model* places the government in an active role, seeking cooperation with other actors to create a common frame.

For an Ecological Conditions Strategy the expectations of the engineer are too high, those of the referee are too low. The latter does not use the potential of cooperation and synergism that is necessary to come to grips with environmental problems. The guide model is best tailored to create the good conditions for environmentally sound economic and social development. Like infra-structure, ecological conditions belong to the common frame. Within that frame individual initiatives and the workings of the market should be encouraged. There is nothing to gain, however, by encouraging competition between urbanization, nature and agriculture. Increasing claims may easily lead to a separation of functions and further unsustainable growth.

Approaching the end of part II, I will look back at the discussions of chapters 4 - 7. Acknowledging the richness and variety of contrasting situations and ideas, we may discern some threads running through these discussions. In the last section I will describe them as two chains of concepts. We may also call them discourses or "languages".

7.4 Concluding Part II: Two "languages"

This section discusses the two chains of concepts that dominate the communication between individual and institutional actors in environmental planning. I call them the "language of control" and the "language of interaction". Discussing them here is a way of building a bridge between the fundamental issues of part II and the strategic planning issues of part III.

THE CONTEXT OF THE TWO LANGUAGES

The first aim of describing the two languages here is to establish a link with discourse analysis, being an important development in linguistics and in political science. Secondly I use the metaphor of the two languages to clarify the position of the discussion on fundamental issues in the context of the Ecological Conditions Strategy.

discourse analysis

The two *languages* discussed in this section are not *causal* chains. Rather, the relationship of the links in the chain is *conditional.* There is an internal rationality that makes it unnecessary to explain why one point of view is combined with another as long as one stays within one language. The different positions may have independent roots, but are linked by a way of reasoning, by a discourse. The sociologist Hajer (1995) applies *discourse analysis* to environmental planning, in particular to the evolution of the ecological modernization discourse. *Discourse* he defines as:

"..a specific ensemble of ideas, concepts, and categorizations that is produced, reproduced and transformed in a particular set of practices and through which meaning is given to physical and social realities." (Hajer, 1995, p. 60)

Drawing on the work of Foucault about discursive routines supporting institutional power and on studies by social psychologists like Billig and Harré, Hajer develops discourse *analysis* into an *argumentative approach* focusing on the role of debate in political processes. He positions the approach between the extreme alternative views of politics as a "game of conflicting interests" and politics as a "confrontation of belief systems". Social structures do not only constrain people to playing fixed and predictable roles, these structural conditions also enable people to develop flexible coalitions. Hajer uses this interpretation of discourse analysis to study processes of change; to investigate:

> "..the boundaries between the clean and the dirty, the moral and the efficient, or how a particular framing of the discussion makes certain elements appear as fixed or appropriate while other elements appear problematic." (Hajer, p. 54).

It goes beyond the scope of this book to elaborate the many implications of discourse analysis for the Ecological Conditions Strategy.[14] That will be an interesting field for future studies. At this stage the reference to discourse analysis may serve to underline the relevance of linking concepts to languages.

metaphors

Figure 7.3 applies the metaphor of the *two languages* to practical planning issues in different settings. Each level, representing a category of decision situations, implies a possibility to opt for the *language of control* or for the *language of interaction*. As will become clear, I argue to give priority to the language of interaction. However, in most cases the decision will combine elements of the two languages. In figure 7.3 this is represented by the way the *two languages* (like the fingers of two hands) come to grips with the *stem of the tree of unity and diversity*. Symbolically thus, figure 7.3 is an enlargement of figure 4.5. The relevance of this metaphoric representation is the understanding of the role of the two *languages* in day-to-day decision making seen from the perspective of creating ecological conditions. Thus, figure 7.3 shows the position of the two languages in the conceptual framework of this book.

DECISION SITUATIONS

For a description of the different levels we will start at the base of figure 7.3 , and "climb the stem of the tree". The following paragraphs highlight ideas discussed in the sections indicated by the figures between brackets.

the ethical base (4.1)

The *language of control* starts with the metaphysical model of the two worlds (Descartes), that places man and naturein opposition to each other. This fits in very well with a basic attitude in which man wants to control nature or to be in control. Human action towards nature is self evident in this thinking. What needs to be justified therefore are the limits imposed on humans for environmental reasons. The deontological ethical theory fits into this picture; it is based on obligations.

The *language of interaction* starts with the metaphysical one-world model (Spinoza) which conceives of man as a part of the unity of nature. This fits in very well with a basic attitude in which man and nature are seen as partners. If living

14 The importance of discourse analysis for understanding the issues of ecology and urban planning is also stressed by Lapintie (1996, p. 59 ff.).

together (also in the sense of man living with nature) is the essence of life, then a *teleological ethics* which includes nature in the concept of good *life* is the most obvious choice.

epistemology and methods of decision making (5.1, 5.4)

In the *language of control,* naturally the need for imposing obligations has to be justified by scientific research on the direct risks to people or on the earth's carrying capacity. Moreover, the limitations should be the same for everyone. Therefore they should be justified in an objective way, preferably *beyond discussion* This requires complex entities to be reduced to simple cause-and-effect and simple goals and means relationships. Reducing complexity produces the required hard figures are produced. There is a preference to leave value statements out. One is looking for instruments that are thought to be neutral, such as cost-benefit analysis.

The language of interaction uses the ethics of partnership as a basis for action. This requires an understanding of complex relationships between humans and their environmental context. The emphasis on context is in keeping with Popper's view of objectifying by an open discussion about statements, taking into account their context: both the context of interpretation and the context of the observed object. In section 5.1 this was called *objectifying in context.*. The approach tends to appreciate indirect conditional relationships between causes and effects and between goals and means. An explicit discussion on values is typical of this approach.. This suits a *two-tier approach* to decisions on values, distinguishing between values belonging to a common frame (for example macro-economic conditions or infra structure), and values belonging to the market operations within the frame.

managing uncertainty and conflicts (6.2, 6.3)

The language of control tends to give preference to reduce uncertainty by, for instance, building higher dikes to control floods.

This is the category of *fail-safe* solutions. Probability theory, modelling and risk assessment studies have priority. Coping with conflicts between actors is seen primarily as a matter of developing neutral, *objective* criteria, followed by weighing and optimizing.

The language of interaction sees learning to live with uncertainties as the answer, for instance by enlarging a floodplain or planning spillways to deal with the risk of floods. This is the category of *"safe-fail"* solutions and self-organizing adaptive systems. In coping with conflicts the first option is to restructure the problem and negotiate stepwise, starting with small projects to open up new prospects. This may include going to a deeper layer of shared basic needs or creating buffer funds as a risk insurance in a process of change.

technology and physical planning (5.2)

The language of control emphasizes the efficiency criterion in technology. The desire to expressed this in hard objective figures leads to reductionistic mono-functional reasoning. As a result, end-of-pipe *cleaning* technology with its more easily measurable effects will prevail . Developing safe standards (to be sure) and the

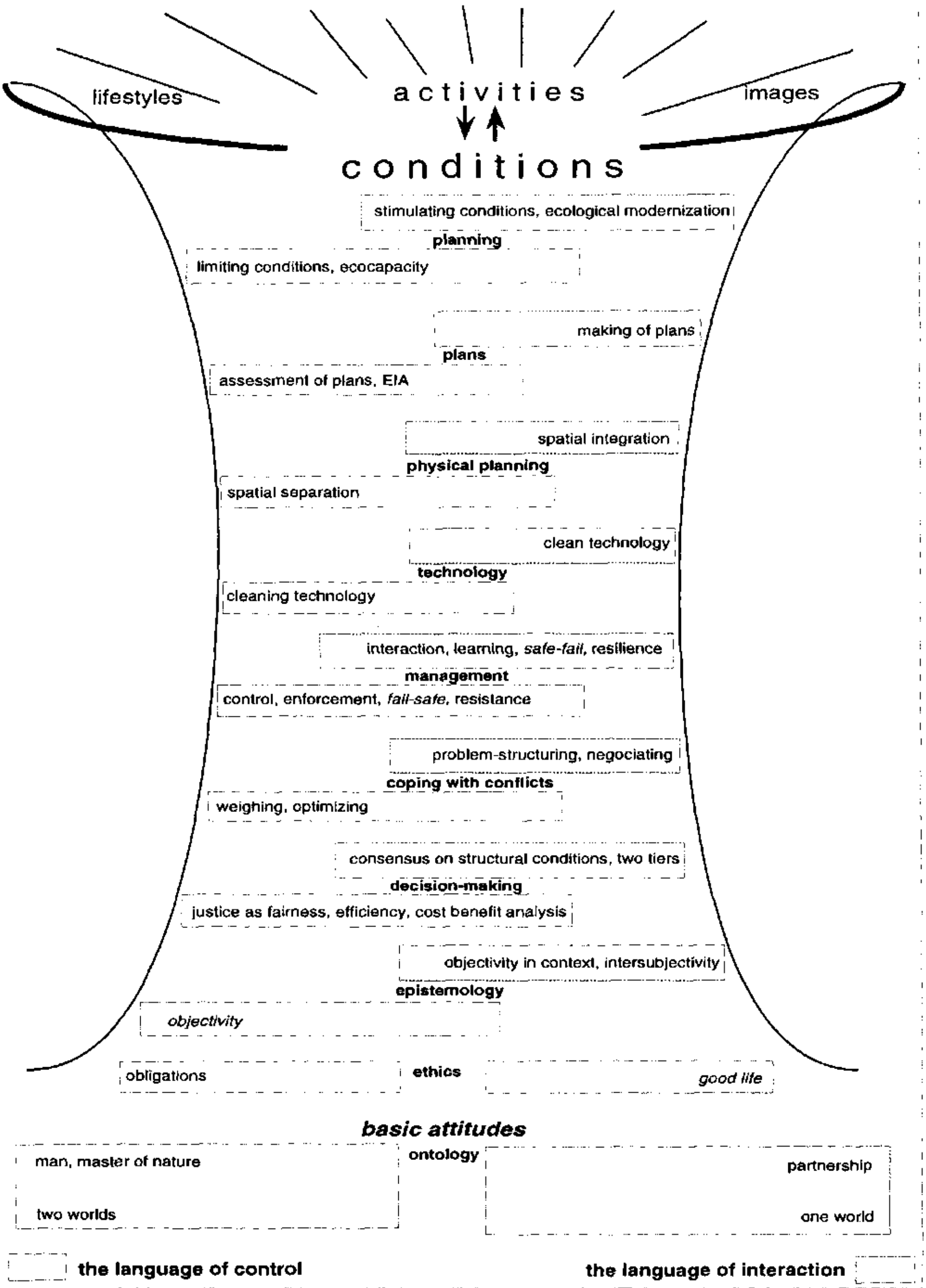


Figure 7.6:
The two "languages"of Ecological Conditions.

use of efficiency criteria per function or per unit product favours a further segregation of land-use functions in physical planning.

The language of interaction typically opts for appropriate technology, starting with a multi-functional assessment before considering effectiveness and efficiency. As a result, there is more scope for prevention, particularly in those cases that require integrated planning and cooperation in the management stage. This fits in with developing pollution prevention and *clean technology* programmes. In *physical planning* an interactive approach is more likely to open up prospects for multi-functional land-use.

plans and planning traditions (7.1, 7.2)

The planning tradition that best suits the *language* of control is *policy analysis*, with its tendency towards the technocratic concept of decision-making. Direct regulation is the preferred policy instrument to achieve goals. The emphasis is on improving criteria and standards for the testing of plans. The role of the government may be either one of strong control (*the engineer's model*) or a role that fits in with the idea of a "withdrawing government", the role of a referee between competing interest groups. In both cases there is a need for objective hard figures.

The planning tradition that best suits the *language of interaction* is *social learning* with its emphasis on communicative interaction and learning by doing. The emphasis is on improving the interactive process of making plans. The role of the government in planning is best described by the *guide* model which emphasizes cooperation of actors in the planning process. This role goes well with interactive instruments like incentives and covenants.

PRIORITY FOR THE LANGUAGE OF INTERACTION

In describing the two languages I have sharpened their contrast for the sake of discussion. However, the discussion is real. The dilemmas of the debate emerge in day-to-day decision making on almost every issue. The language of control tends to dominate. The background to this phenomenon is clear: the rigour of scientific methodology combines with the engineer's preference for figures, the economist's desire for efficiency and the politician's wish to achieve measurable results and to have neutral hard figures in case of conflicts. This is a strong *discourse coalition*, to use Hajer's term. The actors in this coalition each have their own good reasons for participating.

However, the language of control cannot solve important challenges posed by environmental issues. The language of control falls short in coping with basic *uncertainties* accompanying global issues such as global warming, the hole in the ozone layer and acid rain. Neither is the language of control capable of providing guidance to the processes of *social change* required to turn development into sustainable development. And even at the local level, the control approach cannot solve dilemmas like those in the Amelisweerd case or the Drachten case.

Therefore, I argue for a more important role of the language of interaction. The

Cherry Orchard case, the Zaartpark case and the Drachten case show the practical potential of this language. The essence of part II of this book, however, has been to demonstrate the theoretical power of the language of interaction. At the theoretical level this language answers the questions of physical and social uncertainties and the challenge of guiding change towards a socially just, economically viable and ecologically sustainable mode of development. The key concepts of this discourse are *objectifying in context, two-tier decision making, social learning* and a *guide model* for the role of the government. The real challenge is to develop a new discourse coalition of the public awareness of environmental issues and the pragmatic idea of learning by doing. The latter may gain the support of scientists, designers, engineers, economists and politicians who want to have concrete, visible and measurable results.

The Ecological Conditions Strategy to be elaborated in part III is an interactive approach, not by excluding the language of control, but by starting with the interactive options.

III FROM STRATEGY TO PLAN

8. AN ECOLOGICAL CONDITIONS STRATEGY

INTRODUCTION

In part II of this book it was attempted to detach the concept of Ecological Conditions as much as possible from the connotation of limitations, sacrifices and obligations. The point is not to set limits to activities that are basically hostile to the environment, but to create conditions for ecologically sound activities. As mentioned before, *activities* is the term chosen here to indicate things people do that act upon the environment. Land-use comes close to wat I mean, but here I speak about activities that use air and water, plants and animals as well as land. Agriculture and building are activities, but so are applying fertilizer or pruning trees. The *conditions* to be created for these activities include physical and organizational structures such as roads and regulations. Moreover, creating conditions is structuring *a learning process for change*: from a squandering, polluting and disturbing relationship with the environment, to one that is sustainable and inspiring. Making this process of change part of activities may be called *ecological modernization* (Huber, 1981; Van Driel et al., 1993; Hajer, 1995).

This chapter sets out to use the conclusions reached in part II to present and discuss a conceptual framework of the Ecological Conditions Strategy. A first draft of the framework, as it will be presented here, was ready in 1990, and used in environmental planning projects (Tjallingii, 1992, 1995). In the course of that implementation, the framework provoked a number of discussions that have been taken as the basis for chapters 4-7.

The framework is intended to form the bridge between theory and practice. It should be a tool for planners; for example a team commissioned to prepare a regional structure plan, or a design proposal for a new urban area, or a policy plan for integrated water management, or a neighbourhood upgrading programme or any other concrete environmental plan. How could such a team be provided with a guiding strategic framework, reflecting the ideas expressed in part II? This leads to more concrete questions, the first being: How should conditions for ecologically sound activities be created? And the second: What is it that makes a plan sustainable or ecologically sound? The former leads to a structuring of the learning process in section 8.1. The latter requires a conceptual frame for guidelines and criteria that will be discussed in sections 8.2 and 8.3.

8.1 Components of the strategy

We will first look at the basic components of a strategy in the context of integrated environmental planning.

A GENERAL FRAMEWORK

Formulating certain aims and adding guidelines for achieving them is a general way to describe a strategy. However, a strategic aim need not be a point to be reached. Sustainability, whatever definition is chosen, is not a point or a static result to be achieved. Strategies, to follow a recent definition, may also be described as: "types of long term policy...that have the function of drawing up a framework for operational policy efforts" (Mastop & Faludi, 1993). What are the components of such a strategic framework? To be both decision-centred and change oriented, as discussed in section 7.1, the framework should contain statements about:

1. *The users.* If the Ecological-Conditions Strategy is used in the making of a plan, in principle all stakeholders are actors. They will all take part in the decision-making process at some stage. Planners and politicians will be the first users of a strategy for creating conditions. These conditions should enable other actors, such as local residents to take their decisions at a later stage.
2. *The planning object.* What is the central object the strategy should address? Here I opt for conditions *for activities.* In operational and sectoral planning results are the central issue. At the strategic level of integral planning, however, the object is rather to create conditions for change in a desired direction.
3. *The decision context* (or decision-situation). In which physical and social circumstances do the actors decide, using the strategy as a guide? In the Ecological Conditions Strategy framework, there are three decision contexts, indicated as *decision fields*: areas, flows, and actors. They will be discussed in section 8.2.
4. *The desired direction.* What is the desired direction of change? This direction will be the theme of section 8.3.
5. *Means and guidelines.* How will it be possible to move in the agreed direction?
6. *The learning process.* As a strategy is a dynamic concept, it should be made clear how new information and experiences are used when working with the strategy. The means or guidelines of a strategy are not static, they are elements in a learning process.

The planning object was discussed earlier in chapters 4 and 7. Leaving a discussion on the decision context to section 8.2, I will first focus on the learning process, which encompasses the users, the desired direction, means and guidelines.

STRUCTURING THE LEARNING PROCESS

Following practical experiences (Koning & Tjallingii, 1991; Tjallingii, 1995)) and theoretical considerations as described in the preceding chapters, the following structure of the learning process may be proposed:

shared aims, shared concern

In her diagram discussed earlier (figure 6.2), Christensen (1985) points to the need for agreement on goals as a prerequisite for learning about means. Agreement based on a compromise, however, will not be a sufficient basis for learning. Zonneveld (1991a, p. 73), drawing on Habermas' distinction between *strategic action* and *communicative action*, describes two kinds of consensus: *compromise*, resulting from bargaining, and *shared understanding*, resulting from communication and a search for a common ground. The latter, of course, is a good starting point for a process of learning that does not focus exclusively on means.

Consensus may be achieved on rather vague notions, as demonstrated by the concept of *sustainable development*. Many conflicting translations of this concept turn up in operational decision-making. Disagreements on proposals for today, or efforts that failed yesterday, however, do not necessarily imply that the concept of sustainable development has to be abandoned altogether. Concern the environment and for future generations, albeit vaguely expressed, is real. It is this shared concern that may trigger the learning process required to find out precise and practical means. If one road is blocked we have to return and try another, potentially leading in the same direction.[1]

Below, I will propose strategic aims for environmental planning that go a few steps further than sustainable development. At this point it is enough to emphasize the essential role of shared concerns as a basic condition for a group of people to engage in a process of social learning. There is no need to wait for a complete general consensus before starting learning about ecological modernization.

guiding principles

The next step is to formulate more precise guiding principles for concrete themes of decision-making like traffic and water planning, urban structure, green areas, or the division of tasks in waste treatment. These principles hold intermediate positions between the main strategic aims and more concrete planning proposals. They answer the question: what is this activity intended to achieve in the plan?

guiding models

The guiding pinciples are closely linked to guiding models, i.e. *solutions-in-principle for certain categories of plans*, ranging from a model for energy saving in houses to a model for regional urbanization (Tjallingii, 1992,1995). In planning it is useful to learn from experiences of other comparable planning processes and realized projects. The guiding models provide the relevant information about intentionally consistent and empirically researched combinations. They represent hypothetical constructs about the optimal organization of space and processes in well defined categories of situations. As in all scientific work, these hypothetical

1 *Pilot projects, started by small groups with shared aims, may convince more people and hence enlarge the consensus group. However, the pilot project example may also be rejected. If the example is taken as the basic aim, it will raise controversy instead of consensus. The Ecological Conditions approach aims at creating manifold examples expressing a general concern.*

assumptions can be evaluated. Context is an essential part of this evaluative research. Thus, the concept of guiding models reflects the discussion in chapter 5 on objectivizing and context.

At one level of learning, guiding models can be improved and replaced by others. At another level of learning, guiding models are tools for the making of plans, they answer the question *how* activities can be organized in a certain category of cases. Here learning implies making better plans by improving the process of fine-tuning guiding models to local conditions.[2] This process wil be described in chapter 11. The two levels of learning correspond to figure 7. 1.

The concept of *guiding models* comes close to *patterns* in Alexander's Pattern Language (Alexander et al.,1975) and to the *Leitbilder* of Neddens (1986). In the literature on design methods *types* are also mentioned as tools for accumulating design knowledge (Schön, 1988).[3]

Guiding models also have a close kinship with *planning concepts* in physical planning, as discussed by Zonneveld (1991a). He classifies planning concepts as *acting concepts*:

> These are concepts which express a certain gap between a measure or yardstick and an actual or expected situation. Based upon the statutory rights conferred to the government to narrow this gap, they present suggestions concerning the way of doing (Zonneveld, p. 222).

Guiding models are not limited to activities of the government, nor do they focus on a yardstick, but their functions as conceptual tools are the same.

> Drawing on Habermas' s Theory of Communicative Action, Zonneveld describes the main functions of planning concepts as conceptual tools as:
> - empirical (they present the state of knowledge),
> - intentional (they indicate a deliberate choice),
> - institutional (they result in formal responsibilities)
> - communicative (they convey a strategy in narrative or visual form)
> - operational (they structure the course of action and decisions)
> (Zonneveld, pp. 21-25)

These functions are also performed by guiding models, conceived for a wider range of issues, beyond the scope of conventional physical planning, such as technology and organizational issues.

Guiding models are statements about a desired structure in a category of contexts. Thus they represent a way to formalize and communicate the hard core of concepts, originating from an assessment of pilot projects or more descriptive case studies. In earlier studies I developed guiding models for ecologically sound urban

2 *Zonneveld (1991a) proposes to transpose Lakatos's methodology of research programmes to the field of learning about planning concepts. I see no reason not to extend this proposal to guiding models.*
3 *See Faludi, 1996a p. 102.*

development (Tjallingii, 1992, 1995). A number of them were subsequently tested in planning projects. A summary of this learning process will be discussed in later chapters of this book.

There are three types of research to investigate and learn about plans and projects, which are "objects in context": evaluation studies, pilot projects and scenario studies. They are well equipped to provide the essential contextual knowledge in addition to the conventional analytical research.

evaluation studies

The next link in the chain of learning is the development of evaluation methods. It is essential to be able to measure to what extent progress is made in the desired direction. The four criteria discussed in section 5.1 are: *effectiveness, efficiency, legitimacy* and *appropriateness* (or fit). A whole range of standards and indicators have been made to be used in measuring the performance of realized projects or policy measures. In this way the *effectiveness* and *efficiency* criteria in particular are made operational. In order to "objectivize in context", as argued in section 5.1, the *legitimacy* and *appropriateness* criteria should be given more attention.

Plans may be assessed *ex ante*, before it is decided to proceed to the operational stage. In this field the Environmental Impact Assessment practice has developed its own tradition since the late 1970s. Obviously *ex post* evaluations, assessing policy and projects after a longer period are also of great importance. Not only are the formal indicators relevant here; the functioning of social and ecological interactions are even more imp[ortant. Here, too, there is there is already a professional tradition in environmental planning. In The Netherlands, Bressers & Coenen (1989) reviewed environmental policy evaluation studies. Learning from these and other studies, Hoogerwerf (1992) developed general guidelines for *policy design*. It is this learning cycle that has to be strengthened. Guiding models and pilot projects may play a role in this process.

pilot projects

In addition to evaluation studies, pilot projects are essential for learning about future prospects. They represent the laboratory of planning in context. New technologies, new ways of organizing and financing, new concepts in public participation and communication, all kinds of innovative practices can be tested in this pilot project laboratory. The idea of pilot projects clearly fits in very well with the basic principles discussed in the preceding chapters:

- Pilot projects provide the testing ground to explore ways to internalize ecological know-how in *normal practice*. This aim is the essential characteristic of the Ecological Conditions Strategy.
- The programmes for pilot projects create *stimulating conditions* for many private and public actors to engage in innovative practice. This fits in very well with the ethics of good conditions and with the principle of conditions for diversity of lifestyles and images, as discussed in chapter 4.
- Learning from pilot projects may, of course, also imply learning from their

failures. Drawing on her experiences with Danish pilot projects, however, Attwell stresses that small projects can only lead to small failures, from which we can otherwise learn a lot. (Attwell, 1991).

- New proposals that are not yet ready for daily decision-making on *normal* work can be tested in the context of a learning process, as indicated in figure 7.4.

As a research approach, both pilot projects and evaluation studies belong to the family of *case studies.* Malbert (1994b), discusses the case study as a tool to develop context-related knowledge. Case studies are conventionally seen as useful in the exploratory stage of research only. Drawing on his own experience with case studies in Sweden and in Vienna (Malbert (ed.), 1994; Malbert, 1994), he endorses Yin's argument for a pluralistic view: research methods such as surveys, experiments and case studies may all have exploratory, descriptive *and* explanatory power.[4]

From a research point of view the relevant question is how to go from in-depth analysis of cases to statistical generalization. A perspective to find answers to this question may be found in the social research method developed by a group of researchers from the Department of Geography of University College London (Burgess, Limb & Harrison, 1988; Burgess, Harrison & Filius, 1994, 1995). They combine survey methods and working with small groups over a longer period, thus linking approaches of the sociological and anthropological traditions. Their method seems very well suitable for building a bridge between the context-related knowledge of case study research and the generalizations to larger groups.

scenario studies

Not everything can be tested by means of pilot projects. The interrelatedness of decisions with a wider scope and for the long term is the particular domain of scenario studies. If we seek to develop a strategy that will enable us to survive, we need to be informed about the probable and possible circumstances. These circumstances may be described in the form of *context scenarios.* They represent the context for *strategic learning* (Becker, 1994). Drawing the lines and turning the pages of the desirable futures produces *strategic scenarios.* These may be used for further research, but they also

> "have an important role to play because of their ability to help people participate more effectively in the political process of negotiating and planning for the community." (Bryant, 1995, p. 599)

This brings us back to the shared aims, more particularly to the question of how to develop consensus on more specific goals and means.

the forum

Who will take the lead in the learning from guiding models process, being one

4 *The discussion on the case study method, in which he refers to Yin's Case Study Research. Design and Methods (1989) and to a Danish publication by Flyvberg (1992) is found in Malbert 1994, pp. 37-50.*

of the two levels of learning outlined above?[5] Who will assess the pilot projects and other case studies and initiate new ones? The answer to these questions is: the *forum*. There are several reasons for proposing the forum as a separate public body: *At the political level*, decision-making can only proceed slowly. In a municipal council, for instance, it is difficult to get consensus on something new that nobody has actually ever seen. Also, conflicting interests may lead to a static struggle that make people suspicious of experiments. *At the operational level*, there is a rich urban renewal experience in social processes, sometimes described as *co-management* (Fassbinder & Kalle, 1982; Janssen et al. 1995). This may be an excellent environment in which pilot projects can take shape. But for evaluation there may be too much involvement with one solution. *At the level of the scientific community*, there are some interesting initiatives, but here too it is difficult to position the forum function: on the one hand there is the monodisciplinary organization and on the other hand there is a weak link with local authority. These platforms do not fulfil the need for an intermediate forum for the evaluation of the learning process, a forum that may evaluate the pilot projects and other experiments and may decide on new learning initiatives.

The need to install such a forum has surfaced in different places. The Berlin Stadtforum is a well known example. Experiences with *Round table committees* in Canada are described by Runnals (1991) and Bryant (1995). The *Vienna model* (Malbert, 1994), is a well documented case. Recently, a forum-like initiative has been started in Amsterdam (Roobeek, 1995). Initiatives of this kind have in common a shared commitment to innovation, unhampered by short-term responsibilities. The participants are public and private organizations, citizens, politicians and researchers.

8.2 Decision fields

Having sketched the learning process, we now turn to the substantive decision context. Ultimately, learning, as we discuss it here, is about taking decisions. The interrelatedness of decisions about environmental planning is more structured than is suggested by the phrase "everything has to do with everything" .

AREAS, FLOWS AND ACTORS AS DECISION FIELDS

In the Ecopolis study (Tjallingii, 1995) three fields of decisions on activities are discerned: areas, flows and actors. Why these three?

In day-to-day decision-making questions emerge like:

- "what items should be included in an environmental policy plan?"

5 *Learning from guiding models is the outer circle in figure 7.1. The inner circle represents the learning taking place in the making of an individual plan. The latter, more commonly indicated as public participation, is not the task of the forum. Developing methods for participation, however, or generating and improving procedural guiding models, should be on the forum's agenda.*

- "what exactly makes a plan ecologically sound?"
- "how can we distinguish between group interests and basic conditions?" (the question illustrated by figure 7.2)

To answer these questions a general frame of orientation is required.

interactions and decisions

A first, common sense approach is to look at *interactions*. Ecology is about interactions. Environment-use activities interact if they have to share the same *area*, if they are "fishing in the same *flow*" or if they are actors in the same organization. It therefore seems attractive to discern the *interaction fields* of areas, flows and actors.

The second reasoning follows from developments in Dutch national environmental policy. As environmental policy shifted its priorities from an effect-oriented to a source-oriented approach, three operational fields emerged: *area-directed policy, integral chain management* (flow-directed) and target *group policy* (actor-directed). It is in these fields that *decisions* on ecological modernization are made.

Thus, decisions on interactions are made in certain categories of decision situations or *decision fields*. Areas, flows and actors are such fields. Of course the three fields are not separated, but for analytical and practical reasons it seems sensible to discern them.

This view is supported by some other experiences and considerations.

motives and options

In our survey on urban projects that were called *ecological* by their initiators (Koning & Tjallingii, 1991), we discovered there were three *categories of motive* that existed more or less independently:

- healthy buildings, wildlife habitats and landscape (area-linked qualities),
- energy saving, recycling and other flow-related motives, and
- a way of life, or ways of cooperation (actor-linked, or social motives).

The initiators of these projects had developed ecological strategies for areas, flows and actors. In these fields they were motivated to do normal things in a different way, to take different decisions.

In action and in decision-making *motives* are linked to *options*. In the concrete situation you cannot know what you want, unless you know what you can. Not surprisingly motives and options are core concepts in the *action in context* part of W. de Groot's Environmental Science Theory (De Groot, 1992).

With discussions on options, of course, planning comes in.

The role of *actors* in planning is undisputed. Areas are also widely recognized as the traditional domain of physical planning, but it is not common practice to consider *flows* as a third category.

In their analysis of the planning process in a regional project, Van Tatenhove et al. (1994) describe a *planning task*, organizing the linkage of knowledge and action in performing two tasks, a *spatial arranging task* and a *steering task*. The latter is concerned with the interaction of public and private actors. Instead of areas *and* flows, they only focus on spatial arrangement. In doing so, they risk underestimating flow processes. Yet it is in production flows, in input-output processes, that the economic driving forces act. In missing this, an important category of planning options is lost from sight.

Faludi (1987) takes the *land decision unit* as a central concept: "an area of land forming the object of decision-making." These units are defined by the rights of the primary decision-maker, the land title, and by the sum total of legal barriers around a site, the land regime. These concepts testify to an institutional view of the environment (Faludi, 1987, pp. 146-153). This view can be considered complementary to the areas, flows and actors approach. The institutional aspect is essential in the operational stage of planning, just like technology, but it is not a strategic aim.

○ decision fields in strategic planning

The reasons for opting for *areas, flows* and *actors* are not specifically ecological. We may therefore take them as general decision fields. They create a framework of decisions about all activities. We need this framework, to develop ecological strategies for all activities. But before elaborating these strategies the decision field diagram is presented as a general frame. In figure 8.1 the position of the three decision fields is illustrated in a strategic planning context. Areas, flows and actors are not separated entities, they are part of one plan. They may be discerned by looking from different corners. Therefore the *role of disciplines* and *points of view* representations from figures 5.1 and 5.2 are combined as the corners of a triangle around the circle that represents the plan. The triangle stands on one angle, to indicate that this representation twists conventional demarcations of

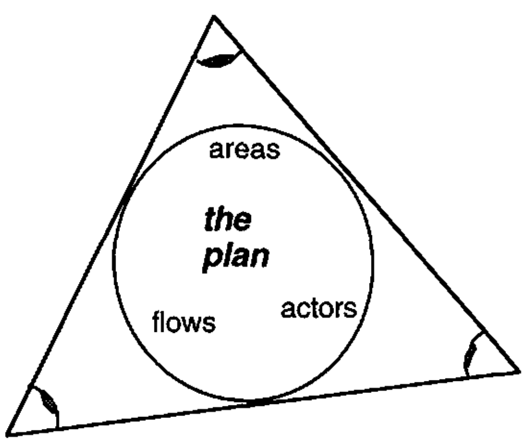


Figure 8.1:
Decision fields, looking at the plan from three points of view.

policy. I also want to avoid associations with a Holy Trinity. There is nothing like that. There are good reasons to opt for the three decision fields, but there is no objection *in principle* to adding more points of view if that should be appropriate.

What the triangle says is this: A good plan pays attention to the three fields. It shoul be the planner's concern to look at decisions interrelated by their effects in the same area, on the same flows and on the same interacting network of actors. This implies the making of plans for the area concerned, for the relevant flows and for the actors affected by the plan. Moreover, the three plans have to be carefully tuned to each other. The three are like entrances to the plan. You may enter through one door, but once inside, you encounter the other decision fields. Decisions in one field affect other fields. The challenge for planners, therefore, is to generate planning proposals that take advantage of potential synergism between the areas, flows and actors fields.

the ecology of flows and areas

There is a more fundamental ecological reason for discerning areas and flows, illustrated by the ecodevice, an ecosystem model, representing interactions between flows and an area. The model has been developed by Van Wirdum (1982) and Van Leeuwen (Van Leeuwen 1973, 1982).

The model shows the input (supply from a source, push) and output (discharge to a sink, pull) which characterizes all open systems, such as ecosystems. An ecosystem cannot function without the input of solar energy, water and minerals. The discharge of heat and certain substances is also essential. In addtion to *in* and *out*, the system also has the capacity to resist (the concave side, symbolizing not in) and to retain (the convex side, symbolizing *not out*). Protection against flooding by dikes is a form of resistance (not in). Insulation of buildings is a way to keep the heat inside (retention). The same insulating layer also keeps the cold outside (resistance). Storage of food, water or energy, and recycling of materials are examples of retention that reduces the need for supply.

In Van Leeuwen's conceptual language, *ecodevices* are interacting selection-regulation devices, organisms and ecosystems that are used as tools on each other. Sometimes they are placed in chains, sometimes they encompass one another (Van Leeuwen, 1973 p. 12 ff.). The *ecodevice* concept has been developed in analytical

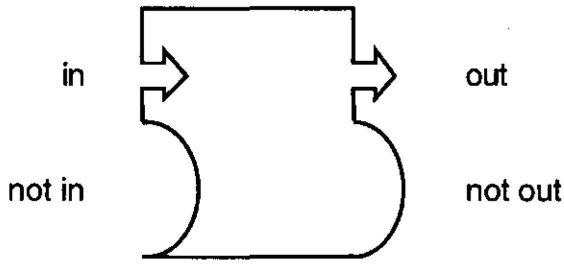


Figure 8.2:
The ecodevice model.

research, aiming at understanding interactions of flows and areas and the selection-regulation mechanisms responsible. Subsequently the model has also been applied to work on management and design problems. It has been shown to have heuristic value in the making of plans to improve or to create good ecological conditions.

Input, output, resistance and retention are the four basic regulating mechanisms that operate in both natural and artificial ecosystems. In most, but not all, natural ecosystems resistance and retention are more important. But an artificial system like the city can only survive as a result of large artificially charged supply and discharge flows (Douglas, 1983).

Both in nature reserves and in most urban habitats, the quality of the area, is the goal and flows are means. The regulation of flows creates the good conditions for the habitat. In agricultural and industrial production systems it is the other way round. Here, input and output flows are the goal and the qualities of the area are means. The management of the area creates good conditions for production flows.

Though developed in the study of natural ecosystems, the ecodevice model may well be used as a conceptual tool to perform both analytical and planning tasks in man-dominated urban and rural areas. Regulation in these systems is not only technical by nature, but also legal and economic. Human activities do not replace nature; physical processes related to climate, soil, groundwater, plant and animal growth still operate, even in the heart of the city. The analysis may reveal how human activities interact with these processes and how the interaction may be susceptible to being steered via planning.

This becomes clear if we use the *ecodevice* model to describe environmental problems, as demonstrated in figure 8.3. This way to work with the model originated within the Urban Design and Environment study group at the Delft University of Technology (Duijvestein, 1990; Tjallingii & Reh, 1989).

Many problems occur particularly as a result of the large extra supply and discharge flows. Typically the internal problems in urban and rural systems are *solved* by increasing supply and discharge. This merely aggravates external problems.

Water management in Dutch cities is a good example. If it is too dry, water is pumped in. If conditions are too wet, drainage is improved or the water is pumped out. If the surface water is too polluted, the water system is flushed with river water. An ecological strategy seeks to improve retention of clean rainwater. This is not only a technological approach. Retention requires space and therefore also the cooperation of the users of that space. The strategy has to cope with decisions in the three fields: areas, flows and actors.

If we are striving for *good conditions for good activities* then we shall have to develop a strategy for avoiding source and sink problems. *We shall then have to pay more attention to the selection and regulation principles of the concave and convex sides of the model in each plan. This is a general guiding principle* for ecologically sound development. The implications may be illustrated with two examples:

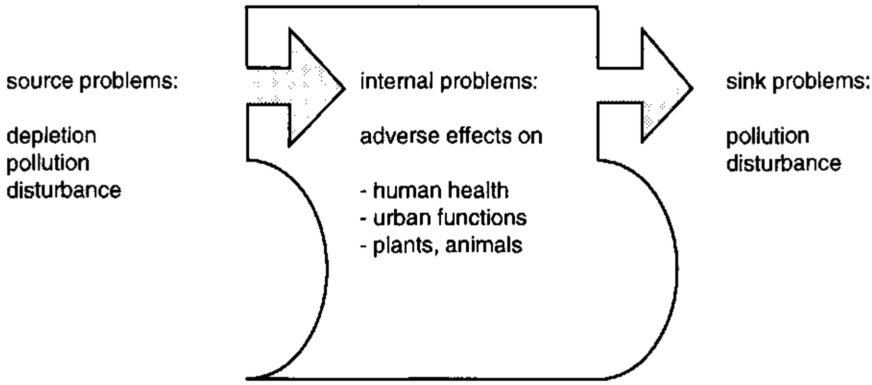


Figure 8.3:
The ecodevice model applied to environmental problems.

In the case of a design for a building the guiding principle leads to practical means for insulation and the use of solar energy. In the case of an urban environmental policy plan, the principle leads to planning for prevention and recycling of waste materials.

8.3 Strategic aims

The ecodevice model demonstrates the relationship between flows and areas. They can be goals and means for each other. Actors too may play the two roles in their interactions with both areas and flows. What does this mean for the strategic aims in an Ecological Conditions strategy? In this section the desired direction (point 4 in the general frame) is elaborated, taking areas, flows and actors as points of departure. In this way the general concept of sustainable development is substantiated for the three decision fields.

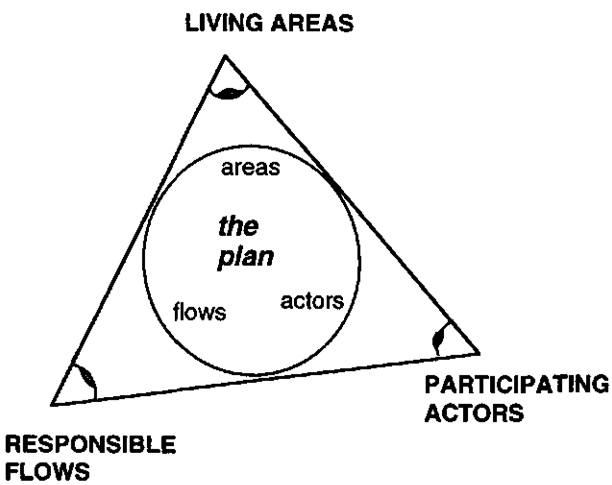


Figure 8.4:
The Ecological Conditions Strategy framework.

THE ECOLOGICAL CONDITIONS STRATEGY FRAMEWORK

The Ecopolis Strategy (Tjallingii. 1995) gave three catchwords to areas, flows and actors: The Living City, The Responsible City and The Participating City. The Ecological Conditions Strategy is not limited to urban areas, but is otherwise closely related to its predecessor. In figure 8.4 the catchwords have been adapted to the more general Ecological Conditions Strategy framework, that results from the decision fields triangle.

The strategy aims to manage and design areas as living areas, to turn flows to responsible flows and to stimulate actors to participate in ecological interaction.

What is behind these catchwords? Looking from the three corners a description of the strategic issues will be given, followed by general guiding principles.[6]

LIVING AREAS

strategic aim

For decisions about areas, the aim is to treat areas as living ecosystems, irrespective of their type of use. *Living* means taking into account growth and differentiation processes in creating conditions for a habitable environment for human residents and users, and for plants and animals.[7]

principal problem

The strategy addresses the threat many activities pose to habitat diversity for humans, plants and animals. Differentiation is threatened by processes like urban sprawl, road construction, spatial separation of functions in coarse patterns, intensified use of fertilizers and pesticides, industrial pollution, noise and disturbance, but also by disruption of connecting infrastructure for plants, animals, pedestrians and cyclists. Not only is existing diversity threatened; potentialities for increasing diversity are often overlooked or are at odds with standard practices. Conventional policies in physical and environmental planning directed at tightening standards and sharpening claims aggravate the problem. The problem of areas is not a scarcity of space as such; the difficult task is to create conditions for a diversity of activities.

direction of the search

To gear the diversity of needs for use and amenity to the diverse potential of the local landscape, that is the direction of the search. The focus is not on rejecting technology or on fighting claims but on using opportunities. These are not only offered by capital, labour and technology, but also by the local climate, relief, soils and waters, by plant and animal life, and by the heritage of the history of urban and rural landscape. These area-bound qualities, built and green, culture and nature, can

6 *These sequences of guiding principles result partly from teaching practice at the Faculty of Architecture of Delft University of Technology (Duijvestein, 1990; Tjallingii & Reh, 1989) Later they were adjusted and supplemented with the help of our experience from research and planning projects at the DLO Institute for Forestry and Nature Research.*

7 *The implications of the strategy for the design and maintenance of such living areas as plazas and other paved surfaces were discussed in the paragraph on design images in context in section 4.3.*

be both a practical basis and a source of inspiration. In planning they are to be taken as a *structural language in which many stories about form can be told,* as discussed in section 4.3.[8]

Biodiversity is an item on the environmental agenda, such as Agenda 21 (UNCED, 1992), that does not seem to be identical with areas. Yet, areas are the key to the issue. Concern about biodiversity is essentially concern about a diversity of habitats and not concern about a zoo.

challenge to planners

The challenge is indicated by the metaphor of *writing a new page in the book of the place.* The page may mark the beginning of a new chapter but is still a page in the same book.

general guiding principles

In the making of a concrete new residential area, for example, the following *guiding principles* will translate the strategic aim of *living areas* into more operational terms:

1. *Use of local natural and cultural potential.* Surveying the ecological potentialities of soils, vegetation, natural landscape and cultural heritage, should be carried out in close relationship with the making of the plan, taking advantage, of course, of available data. Priority should be given to the use of ecological potentialities for the future habitat, not to nostalgia for the pristine countryside. A special role is to be given to the water system as this is a structural link between the existing landscape and the future plan. See, for example, the Cherry Orchard case discussed in intermezzo 1.
2. *Spatial structure for flow management.* The requirements of *chain management* (see *responsible flows*) should be integrated in the design of urban areas. Rainwater retention, for example, should not be considered a *limiting factor* or a *constraint,* to be solved in a purely technical way, but rather an opportunity for creating an attractive urban environment.
3. *Health and a differentiated human habitat.* Safety, tranquility and shelter are aspects that are to be integrated in the regular programme for the new area,. Differentiation of public open space is to be tuned to different lifestyles and activities.
4. *Habitats, corridors and stepping stones for plants and animals.*Corridors and stepping stones are important for migrating animals, but prior to the design of connections, good habitats for plant and animal species should be created. Existing and new gradients create the basic conditions for diversity: transitions betweennutrient rich and poor, wet and dry, sunny and shaded etc.

RESPONSIBLE FLOWS

strategic aim

The aim for decisions on handling flows, is to generate activities that have

8 *The approach I advocate here is in the tradition of - among others- Ian McHarg (1971), Michael Hough (1984) and Anne Spirn (1984).*

internalized the responsbility for flows. These activities do not shrug off their environmental problems to the neighbours or to future generations. The aim is to manage flows as a chain of links, *from cradle to grave.* The links do have a shared responsibility for the chain. In this way conditions are created for sustained use of flows.[9]

principal problem

The *shrug-off* phenomenon illustrated by figure 8.3 is the main problem. The development of modern industrial society has increased flows of people and information, but also of energy, materials and waste, traffic and water. Their purpose is the production and consumption of goods and services, but *external effects* lead to environmental problems like acidification, eutrophication, dispersion of hazardous waste, falling water tables and disturbance. Sometimes the direct neighbours are affected, as in the case of noise. Sometimes people on the other side of the globe may suffer, as in the case of the destruction of tropical rainforests. Future generations are exposed to risks, plant and animal species become extinct.

In conventional policy, increased efficiency standards tend to favour end-of-pipe techniques. As in health policy, everyone knows *an ounce of prevention is worth a pound of cure,* but cure and purification are more easy to measure and to get funded. Prevention by clean technology, modes of production or building is lagging behind.

direction of the search

The direction of the search is: to develop source directed environmental plans within companies, agencies and households. Sometimes this will lead to *high-tech* solutions like photovoltaic cells, sometimes *to low-tech* solutions, like separating domestic waste in the kitchen. Priority is given to prevention at a decentral level, as close to the source as possible.[10] If, for good reasons, that option is not chosen, environmental problems should be dealt with jointly with other links of the chain. Cleaning technology can not be missed, but the first option is prevention.

challenge to planners

The challenge is to develop modern ways of integrated chain management that are not only efficient in one aspect but also fit in a multifunctional economy.

general guiding principles

In constructing a new building, for example, the following *guiding principles* will translate the strategic aim of *responsible flows* into more operational terms:

The guiding principles begin with what can be arranged inside the plan itself. The order in which the points have been listed has been chosen deliberately. It should be read as a sequence of priority options for each plan.

9 The strategy for flows, in a similar form, has been described by Duijvestein (1989) and Tjallingii (1981, 1991b).

10 The debate on the optimal scale will be elaborated in chapter 9. The Sandwich Strategy, which deals with this issue, will be discussed there.

1. *Reducing use.* This option may imply encouraging changes in behaviour, such as cycling instead of driving a car. But in this context we can also consider technically more efficient systems, such as the well insulated house. More generally, this option concerns preventive measures.
2. Re-use. This is the second step because the first , less use, also means fewer waste products to be re-used. But in so far as they do occur, the re-use of buildings and objects, and if that is not possible, the recovery and recycling of raw materials must be considered. A prerequisite is separation and purification at the source. These require decentralized facilities, for example in the home.
3. *Renewable or infinite resources.* The remaining need should preferably be met by fuels and raw materials which do not become exhausted, such as solar energy, rainwater or wood.
4. *Accountability for the quantity and quality* of *flows* of supply and discharge. Tropical hardwood, for example, is a durable and renewable material. But the way it is currently collected is leading to the destruction of the rainforests. This accountability is shared by those who use this wood for building. Accountability for discharge flows also means that if it is necessary to use fossil fuels, then clean fuels such as natural gas must be given preference.

PARTICIPATING ACTORS

strategic aim

For decisions on the role of actors in the organization of activities, the strategic aim is to create conditions for a shared involvement in ecological processes. Such shared involvement would reproduce and reinforce rules and resources in the structure of the social system which support environmentally[11] friendly behaviour. Participation thus indicates, in this context, the role of actors in the interaction of society and environment. The strategy combines the shared involvement with an acknowledgement of the diversity of preferred images and lifestyles: in other words, the participation will take shape in many different ways. *The tree of unity and diversity* (figure 4.5), symbolizes this strategic aim.

principal problems

With the introduction of Environmental Impact Assessment (EIA), the problem of the *unknown consequences* of decisions is partly solved. Partly, because EIA is not perfect and the procedure is not required for many decisions that affect the environment.

The citizen or firm aware of the environmental implications of decisions, faces *dilemmas* between the intention of environmentally friendly behaviour and the practical possibilities and difficulties involved in converting this wish into

11 Ter Heide (1996), in the context of advocating sociological studies in aid of sustainability, points out that Giddens's Structuration Theory can be used to analyse possibilities for interrelated changes in social structure and individual behaviour. Giddens regards the physical environment as one of the resources making up the social structure. The existence of such possibilities for change would imply that ecological participation could be considered a guiding principle for the social system.

deeds; this also involves choosing between different accountabilities.[12]

The problem for planners is how to cope with these dilemmas. The issue is to develope structural (physical and organizational) *conditions that act as incentives* for environmentally sound decisions by citizens and firms. Many incentives that currently come from the market or from the state are not conducive to this end.[13] A number of these structural problems were discussed in section 5.2, in the section on the role of actors. Conventional policies focus on direct regulation. An increasing number of rules, however, makes enforcement increasingly difficult (see section 3.3). Moreover, the approach does not stimulate commitment nor prevention.

direction of the search

The direction of the search is to engage in a process of *learning by doing*, focusing both on small structural steps to change the *magnetic field* that influences all choices of actors, and on small local pilot projects that try to explore new roads. This approach is outlined in section 8.1.

Neither commercial competition, nor the state norms and regulations are enough to stimulate a network of participating actors. In addition to these two organizing mechanisms a third way has to be further explored: the (self)organizing power of synergism and cooperation.[14] The goverment, though, may play a role as a *guide*, as discussed in section 7.2.

challenge to planners

The challenge is to mobilize the social energy of the actors in the field, to organize synergism and cooperation without an intolerable impairment of personal freedom.

general guiding principles

In the making of a concrete environmental policy plan, for example, the following *guiding principles* will translate the strategic aim of participating actors into more operational terms:

1. *Creating conditions for cooperation.* Self-help works by means of social incentives. In many practical projects people in neighbourhood organizations, schools and enterprises benefit socially from working together to improve their environment. This active participation is probably more important than participation during the making of the plan. Many neighbourhood activities

12 See Ter Heide & Berends, 1994, p.122.

13 In his: Het Rijk van de Schaarste ('The realm of scarcity') (1988), Achterhuis analyses the deeply rooted philosophical backgrounds to scarcity. In his view scarcity, and hence expanding growth, is induced both by market mechanisms and by norms imposed by the state. Both mechanisms stimulate mimetic desire, the desire to have more than your neighbour. In these mechanisms he sees the socio-psychological process that triggers the flight ahead.

14 This direction of the search direction may produce more concrete guiding models like:
- *A modernized version of the commons, discussed in Ecopolis (Tjallingii, 1995, p. 112).*
- *The basic income proposal, discussed briefly in section 3.2 and 5.3, after Van Parijs (1994).*

may only have a short life, but this should not be a reason for not supporting them.

2. *Creating conditions for the operation of the market.* Economic self-help or self-organizing initiatives should be encouraged. The local government could act in a *guide model* type of organization as discussed in section 7.2. Initiatives could include new developments but also management and maintenance, job-creating projects etc.
3. *Visible ecological relationships.* What can be seen and done in and around the home can be very important for gaining the involvement of citizens with environmental problems at higher levels. The saying *think globally, act locally* reflects this only partially. Some environmental problems require measures to be taken at regional, or even continental or global level. But the political basis for this is developed from experience gained in everyday life.
4. *Enforcement.* As a last step, legal regulations and control are indispensable, even in a prevention-oriented approach like the Ecological Conditions Strategy. Rather than being organized separately, control can also be integrated in covenants and public private projects.

The three strategic aims have now been discussed separately, but the diagram in figure 8.4 places them in one frame. In the plan they cannot be separated. Their combination is essential if the plan is to be good.

RELATIONS BETWEEN AREAS, FLOWS AND ACTORS

For practical *and* theoretical reasons the strategies for areas, flows and actors need each other. The relationship between areas and flows follows from the *ecodevice* theory: Increased levels of input and output flows tend to reduce spatial diversity. A strategy of reducing levels of flow dynamics, therefore, creates conditions for spatial diversity. This may become clear from two arguments:

1. First, less input and output causes fewer source and sink problems, less nuisance to neighbours. Reduced levels of noise, pollution or traffic, will therefore cause fewer problems with adjacent functions and more possibilities for using subtle selection devices like fences, hedges, ditches, screens and walls in order to create and maintain spatial diversity.
2. Secondly, more attention for the concave and convex sides offigure 8. 3 requires more use of local potentialities for resistance and retention at a decentral level. This implies looking at the local landscape but also at the local *human resources.* Though the ecodevice diagram only implicitly refers to them, the role of actors crucial in the decision to manage the system as a *responsible flow.* If priority is given to retention and resistance options, the responsibility to deal with the environmental problem is taken by the direct users of the system.

Some practical examples may illustrate the interrelatedness of decisions on areas, flows and actors:

A strategy to retain rainwater in urban areas, a typical example of the responsible flows strategy, requires space, uses existing floodplains for example, and in this way supports the living areas strategy to use ecological potentialities of the local landscape. In this example the workings of the rainwater system are also made visible to the local residents, an element of the *participating actors* strategy. Thus, the three strategic points of view work together to make one good plan.

A strategy to create a car-free city centre can be taken as another example. The purpose of the plan is to remove cars from the inner city in order to create a quiet area for pedestrians to the benefit of shops but also beneficial to monuments and street life. Thus, a flow strategy creates conditions for spatial differentiation. But to get this plan implemented we will need to convince the actors of the benefits of the plan. Shopkeepers tend to be espacially sceptical in such cases. De Kievit (1993, p. 132 ff.) describes a similar case from the city of Nijmegen. In that case the shopkeepers were simply overruled by a decision from the municipal council. In such a case it is conceivable, however, that the local government will act in a *guide model* approach.Together with private parties it may create a fund to cover the risks for the shopkeepers involved. Experiences from the Nijmegen case and from others, show an economic revival after such plans are realized (Van Iersel, 1994). Thus other parties like banks can be expected to take part in the joint venture.

A combination of the three strategic aims for areas, flows and actors ensures the strength of the strategy.

THREE CRITERIA FOR SUSTAINABLE DEVELOPMENT

The Ecological Conditions Strategy throws a different light on the sustainability discussion. Since the Brundtland Committee's report (WCED, 1987), sustainable development has been widely recognized as a concept that points at the need to reconcile economic development and the carrying capacity of the planet. How can this rather vague concept be linked to operational decisions?

ecocapacity and Ecological Conditions

The attempt to translate sustainable into operational terms by calculating the *ecocapacity* of the earth (Weterings & Opschoor, 1992), was discussed in section 6.1, together with the confusing debate that followed. Obviously, the alarming figures on the global situation do not by themselves generate operational plans. The figures point at results to be achieved but do not indicate how to move in this direction.

The Ecological Conditions Strategy looks at sustainability from another angle. It provides guiding principles for activities, starting from the present situation. Sustainability is made concrete in a different way. The framework points at three dimensions of sustainability:

- durable diversity of areas,
- sustained use of resources,
- sustained involvement of actors.

As a rule the sustainable development discussion centres on the second issue. This issue, however cannot be isolated from the other two. The Ecological Conditions Strategy, as elaborated in this chapter, aims at linking together these three dimensions in operational plans for the first steps rather than for the ultimate results.

Of course the ecocapacity and Ecological Conditions strategies may be seen as complementary. However, given a basic consensus on the urgent need to move ahead in a sustainable direction, the first priority is to create conditions and to work rather than to calculate and weigh.

appropriateness

Sustainable development, in its three dimensions, can be assessed in every plan by using the *appropriateness* criterion proposed in the text that goes with figure 5.1. As a criterion *appropriateness* or *fit*, belongs to the *objectifying in context* approach, as discussed in chapter 5.1. Ecology is a scientific approach to questions of context. Ecologically sound and sustainable are expressions that are placing development in the context of the three dimensions of the Ecological Conditions Strategy. The interrelatedness within and between the dimensions cannot adequately be measured by effectiveness and efficiency criteria, therefore a qualitative appropriateness criterion is required that may be operationalized along the areas, flows and actor dimensions outlined in this chapter and further along with the guiding models to be discussed in the next chapter.

ECOPOLIS

Having outlined the Ecological Conditions Strategy in the previous sections, I may now visualize its predecessor, the Ecopolis strategy (Tjallingii, 1995), in a new jacket, as shown in figure 8.5. Many concepts, developed in the context of Ecopolis, are not exclusively tied to the city. They have emerged now in a more general form as the building blocks of Ecological Conditions. In turn, Ecopolis has become a member of a larger family.

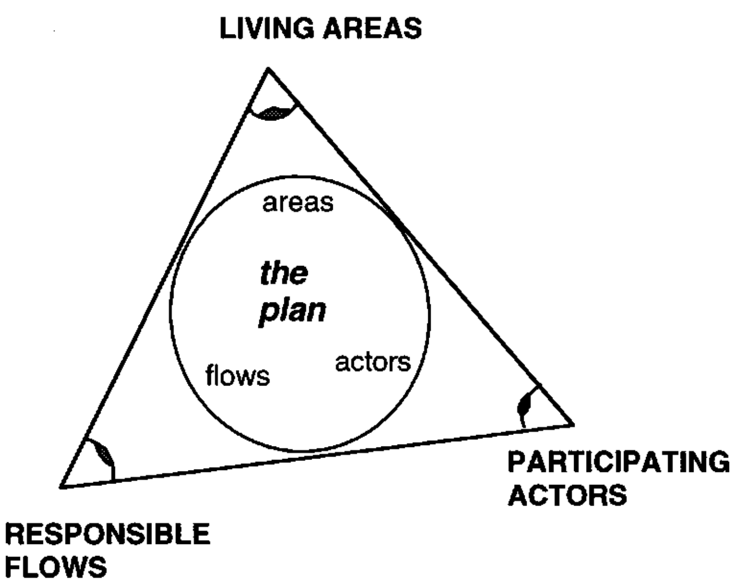


Figure 8.5:
The Ecopolis framework.

8.4 Summary and conclusions

In this chapter the Ecological Conditions Strategy is described as a framework, containing statements about the following aspects:

1. *The users.* In the case of the making of a plan, all participating actors are involved. In the case of a research programme to evaluate and improve *guiding models* the planners and researchers will be the users.
2. *The strategy's objective.* The objective is to create conditions for activities that use the environment.
3. *Decision fields.* The strategy addresses decisions on activities in three fields: *areas, flows* and *actors.* Ecological Conditions are conditions of interrelatedness and decisions are interrelated because they affect the same area, the same flow or the same network of actors. Areas, flows and actors are three fields that are discerned but cannot be separated. The three fields are present in each plan. However we may take anyone of them as an entrance to the plan.
4. *Strategic aims* are linked to the decision fields. They bear the following mottos: *living areas, responsible flows* and *participating actors.* Planning for areas should be tuned to processes of living (growth, differentiation). Flows should be managed in a responsible way regarding inflow and outflow. Actors should be involved in ecological interaction, which is an aspect of the social system. The three strategic aims are interpreted as *three criteria for sustainability.*
5. *Guiding models,* answers in principle to planning questions, are the strategic propositions that are the basis of the learning process.
6. *The learning process* is made of the following elements: developing shared aims, guiding principles(what?), guiding models (how?), evaluation studies, pilot projects, scenario studies and a *forum,* to assess and feed the learning process.

In this framework the basic conceptual insights of the preceding chapters have been used to forge strategic tools. *Guiding models* are the most important of these from a substantive point of view. Examples of guiding models choosing flows or areas as a point of entry, will be discussed in chapters 9 and 10.

9. GUIDING MODELS: STARTING WITH FLOWS

INTRODUCTION

Chapter 8 provided a general conceptual framework for the Ecological Conditions Strategy. Going up the road from strategy to plan, we move from the general framework's basis to the particularities of the individual plan. Before we can start the actual design cycle, tailoring general ideas to local conditions, the general ideas have to be rendered more precise. They have to be developed into *guiding models*, diagrams of solutions-in-principle representing the cornerstones of the learning process. This chapter and chapter 10 will illustrate the nature and use of guiding models, using the *flow approach* and the *area approach*, respectively.[1] It is beyond my professional scope to elaborate more detailed guiding models for the *actor approach*. At a general level, however, the concept of the learning process as described in section 8.1 is a guiding model for actors.

In this chapter we will start the discussion on *flows* by looking at the general flow-problem of *scale* (9.1). Decisions about flow management involve choices about scale of our interventions. Should energy production and solid waste treatment, for example, be organized at the national level or even higher, as some technocrats would have us believe us, or should we strive for the *autonomous house*, as some environmentalists argue? A possible answer to these discussions is offered by the *Sandwich Strategy*, a strategic guiding model that starts with flow management. (9.2). Then the various water flows are taken as an example to demonstrate more detailed guiding models for different scales. One of them, the *circulation model* for water systems at the district level, will be the starting point of the design case study in chapter 11.

The "Starting with flows" in the title of this chapter was used deliberately to avoid confusion. One cannot design a plan for water flows in a new urban district without, at the same time, taking decisions about areas and about actors. The need to anticipate this interconnectedness between flows, areas and actors is threatened by sectoral and disciplinary organization. Therefore "starting with flows" is better than "for flows".[2] In the context of this book, the purpose of this chapter is not in the first place to discuss new proposals for specific flows. The central issue is the role of guiding models in the learning process of the Ecological Conditions Strategy. Do guiding models perform a useful role in linking strategic aims to real world decision-making?

1 *The discussion on guiding models in chapters 9 and 10 is based on the Ecopolis study (Tjallingii, 1995), which will be referred to as Ecopolis.*

2 *The titles "Guiding models for flows" etc. in Ecopolis (Tjallingii, 1995) gave rise to confusion. In accordance with the "from wedges of the cake to points of view" discussion in section 5.2, the expression "starting with flows" is preferred.*

9.1 The central - decentral debate

The Sandwich Strategy developed from an analysis of specific categories of flows: water, energy, waste materials and traffic. In all these flows the central-decentral debate emerges. Therefore I will start with a brief discussion of this debate.

FLOWS AND SCALES

Schumacher's "Small is beautiful" (Schumacher, 1973) has drawn the attention of a wider public to an old and persistent key issue in the environmental debate: the choice between central and decentral options in the organization of economic life. Choices about the flows of energy, water, traffic and waste materials are public choices more than options about production of goods flows. Looking at the issue with the help of the *ecodevice model*, discussed in section 8.2, the strategic question is: is it preferable to solve flow problems at building level, or should we turn first to supply and discharge at the regional or higher levels? Figure 9.1 illustrates the interrelatedness of the choice. The question can also be stated in a more general way: should we organize supply and discharge at the lowest possible level or should we promote an economy of scale at the highest level? Has the Ecological Conditions Strategy anything to say on this issue?

On closer inspection, of course, the question is shaped in different ways for different flows. Some discussions are highlighted in public debate. The *energy discussion* focuses on the building of bigger power plants versus the implementation of solar or other decentral energy programmes at building level. The waste *treatment discussion* focuses on the building of bigger incinerators versus the local recycling programmes. The *discussion on rainwater flows* focuses primarily on building bigger sewers versus decentral rainwater retention schemes. The *traffic and transport discussion* focuses on globalizing versus regionalizing the economy.

The debate may first be described from the two positions:

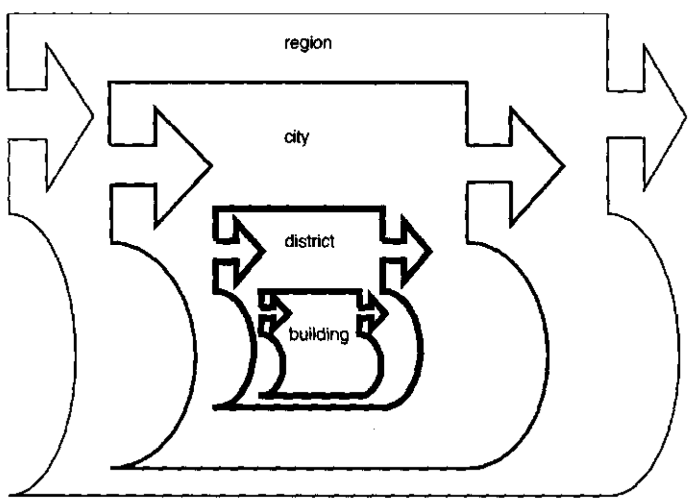


Figure 9.1:
Flow management at different scales.

TOWARDS CENTRAL SOLUTIONS

In this approach, the emphasis is upon big facilities serving large areas. Supply and discharge are organized at higher scales. The problems are either regarded as a *shortage of*, or *demand for* water, energy, materials or roads or as an *excess* of polluted water, residual heat, waste or traffic congestion. Solutions are particularly sought in the provision of facilities for improving the supply and removing the excess. The accent lies on policy directed at effect, and the *economy of scale* leads to large central facilities : power stations, pumping stations, sewage purification plants, waste incinerators and the motorway network.[3] Planning and management of these facilities is in the hands of strongly organized sectoral services, such as electricity companies, sewage treatment boards, waste disposal and *public works* departments in the municipal organization.

In view of the responsibility borne by these services, it is understandable that there is an inclination to play *safe* with the planning (or fail-safe, as it was called in section 6.2). One does not want to run the risk of there being not enough energy or incineration capacity. It is difficult and risky to incorporate prevention in this planning. The effects are uncertain and a policy for prevention policy often belongs to the task of other departments, or, even more difficult, is shared by all departments.[4]

The city dwellers profit from the central facilities, but these are hardly visible in the city. Waste water, for example, flows away via sink, toilet or gully-drain in the street and what happens to it further is not seen. The public pays for the services and relies upon them. The critics feel that the atmosphere surrounding this approach is one of the powerful machine which wants to control things. But this, of course, is exactly the responsibility entrusted to the technical services by politicians, representing the public.

TOWARDS DECENTRAL SOLUTIONS

This approach focuses on the lower scales. Environmental problems are mainly connected with the individual behaviour of citizens and businesses. Prevention and separation at the source are the primary objectives. The arguments for this approach are: new motorways do not really solve congestion problems, the sewage treatment plant leaves us with the sludge and the waste incinerator leaves us with the slag. The central approach tries to remove the effects but shifts them to other areas rather than solving them. To most citizens, however, the problems disappear and are *out of sight, out of mind.* Those who advocate the decentral solutions perceive this

3 *The director of the Provincial Waste Treatment Company in Zuid-Holland has a clear message. Speaking about the system of waste incinerators he states: "..the concept of regional self-reliance has long been superseded." He opts for an off-shore megalocation (De Jong, 1993, p.9). His arguments are: economy of scale, control and the avoidance of the NIMBY (not in my backyard) objections that are an increasing problem in decision-making about large-scale facilities.*

4 *I encountered an illustration of this phenomenon as a member of the committee of independent experts for the Environmental Impact Assessment (EIA) procedure on the planning of facilities for waste from building and demolishing activities in the Province of South Holland. In the EIA report (Provincie Zuid-Holland, 1991, summary p. V) the effect of prevention on the expected quantities of waste was assumed to be 0,* to be certain.

as a problem: The system does not encourage active involvement, and this is a prerequisite for prevention.[5]

Most recent policy documents on the environment officially give priority to a source-directed decentralized approach but do have great difficulties in implementing this policy.[6] Over the last two decades the decentral approach has been practised by highly motivated pioneers in the environmental movement, A number of these people moved to the countryside where they built their *autonomous homes* or *ecovillages*. The critics of the decentralized approach are afraid that adopting this policy will lead to primitive, anti-urban ways of living and working with sometimes ingenious, but not generally applicable *self-sufficient* systems. Some trends within the environmentalist movement do indeed give cause for this fear. Growing your own food, composting your own organic waste and building your own house, requires a high level of community cooperation, but also much time to spend and much available space. This seems contrary to urban lifestyles as such.[7]

DILEMMAS

The *central approach* removes the *problems* from the city, the *decentral approach* seems to move *people* out of the city.

Recent urban ecological projects, however, clearly demonstrate a wide range of decentralized measures that fit into typical urban environments very well. The analysis of the four flows in *Ecopolis* demonstrates for the lower scales, a variety of possibilities that comply with different lifestyles and types of business very well. However, there is a great need for visible examples in this field.

By highlighting the contrast between centralized and decentralized with the accompanying stereotypes, the development of a really integral chain management becomes delayed and frustrated. But even if we assume a policy in which elements of both approaches play a part, there is still a dilemma: how must we choose between the certainty of centralized solutions, which we see as having more and more disadvantages, and the uncertainty of a decentralized solution, whose advantages for prevention are obvious? If we really give such a policy precedence, do we not run the risk of being caught later with energy shortages or unmanageable surpluses of waste?

This brings us back to the discussion on environmental risks and social risks in chapter 6. The basic perspective offered by the learning approach, as discussed in section 6.3, should now be elaborated in a practical way to fit the central - decentral debate.

5 *Schumacher (1973) is but one of the critics of the* economy and technology of scale *effects. According to Tellegen (1983, p. 41) the search for small scale solutions is a general principle of environmentalists in many countries.*
6 *In The Netherlands, this was one of the policy principles from 1970 onward, but it was given a much higher priority by the National Environmental Policy Plan (Ministry of Housing, Physical Planning and the Environment, 1989, p. 74)*
7 *For a discussion on the pioneer lifestyle, see section 4.2.*

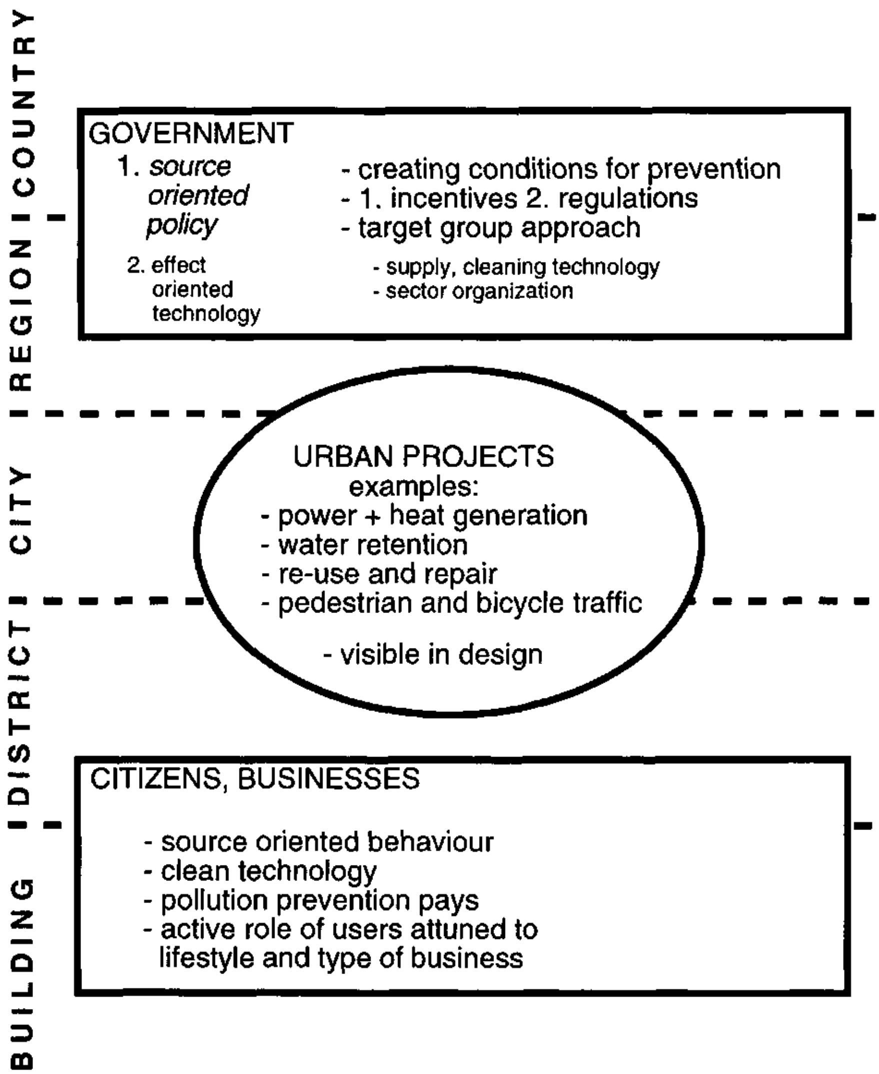


Figure 9.2:
The Sandwich Strategy.
source: Ecopolis.

9.2 The Sandwich Strategy

THE STRATEGY

A possible escape from the central - decentral dilemma is the "Sandwich Strategy". This strategic guiding model is illustrated in figure 9.2. It was conceived to guide the making of environmental policy plans at different levels. The strategy emerged from an analysis of problems and opportunities for the water, energy, waste and traffic flows in Ecópolis (pp. 53-84).

the top layer

The primary task of the *top layer*, representing the municipal and higher authorities is to create technical, economic and organizational conditions for prevention and other source-directed measures. In an active target group policy, incentives and regulations and physical conditions must be created which fit the different lifestyles and types of business. Supply and discharge facilities only follow as a second task, to be organized in a way that enhances the performance of the first task.[8]

Under the influence of this policy, *the basic layer* of individual citizens and companies develops behaviour and suitable measures for saving water, energy and resources, for the separation of waste and for environmentally sound mobility.

Sometimes old and tested techniques, such as the bicycle, should be given a fresh chance, sometimes new techniques such as photo-voltaic cells and telematics are appropriate.

the intermediate layer

The *intermediate layer* is the area for initiatives at the neighbourhood, city and regional levels of the scale. Many projects can be realized here, for example in the fields of wind-energy production, district heating with combined power and heat production, rainwater retention, return and secondhand shops, and attractive and safe cycle routes. This is where ecologically sound urban development is given its spatial and visible shape. In section 10.3, a number of spatial aspects concerning these projects in the urban *midfield* will be described in the context of a guiding model for the city.

PLANNING WITH UNCERTAINTY

To a certain extent central technical facilities (organized by the top layer), will be indispensable. But if preventive policy is to be given a chance, then *flexible planning* and *diversity* are imperative. Planning smaller units is more flexible and may more easily be combined with performing practical experiments. Thus, step by

8 *This is not only a matter of* roads and rules *to be created by the central government. In a discussion of the Sandwich Strategy, Ter Heide & Berends (1994, p. 122) emphasize the need to create conditions for solving dilemmas resulting from conflicting responsibilities. They use the example of school children being brought to school by car* for safety reasons. *By creating safe routes to school, the local authority may also create conditions for reducing car-use and, in so doing, enhance safety even more. The example illustrates the interrelatedness of flows, areas and actors.*

step the feasibility and the effects of a source-directed policy can be tested and more reliable basic information can be obtained for the forecasts necessary when planning larger central facilities. In this way the learning process may guide the government's decisions on investments, thus solving the central-decentral dilemma.

However, playing safe may easily lead to irreversible investments or even to an overcapacity of large facilities.[9] This development is a real threat to an ecological approach. It means it is becoming the government's interest *not* to conduct a preventive policy.

CENTRAL - DECENTRAL, THE APPROPRIATENESS CRITERION

The Sandwich Strategy primarily addresses the decision field of flow management. On closer inspection, however, the strategy offers criteria based on the appropriateness of the interaction between flows, areas and actors. Thus the extreme central solutions are rejected, not because they are not efficient seen from a flow perspective, but because they are not considered appropriate.

The main arguments are:

1. The inflexibility counteracts prevention (the argument just mentioned),
2. The NIMBY(not in my backyard) effects, the protests of people whot do not like the nuisance of big public facilities *in their backyard*. In the case of big central facilities, the new neighbours rightly feel they have to carry the burden of a whole region. Smaller projects may be more easy to integrate with local life.
3. A more decentral way of flow management creates conditions to make the flow processes more visible. If properly designed, and linked to local education and information, this may contribute to sustained prevention or recycling activities.

On the other hand the strategy does not focus on the extreme decentral solutions either. Though the *autonomous home* might be the ideal solution for a devoted few, this way of life cannot be imposed on all citizens. Generally speaking, this solution is not appropriate for the minimal division of labour that is essential for city life. The Sandwich Strategy creates conditions for a diversity of lifestyles.

Opting for an intermediate position in the central - decentral debate, creates space for a visible role of urban projects that stimulate cooperation and commitment and may be part of a process of learning about ecologically sound alternatives. The Sandwich Strategy shows the strategic direction. In the making of the local plan, thus, the idea of responsible links can be tuned to the local situation.

After this discussion on strategic options for flows in general, we turn to one specific family: water flows. They may illustrate a more concrete level of working with guiding models.

9 *The irreversibility of operational decisions on large infrastructure works was discussed earlier in section 7.1. There the need was stressed to create space and time for a process of learning to generate ecologically sound alternatives.*

9.3 Guiding models for water flows

The Sandwich Strategy is of a more general strategic nature. To demonstrate what guiding models may look like at a more detailed level, I will elaborate guiding models for water flows at different scales. As stated in section 8.1, guiding models should provide answers to two questions: "how to solve problems" and "how to use opportunities". What are the problems and opportunities associated with the water flows?

PROBLEMS AND OPPORTUNITIES

Problems with the *rainwater-groundwater-surface water flow* are caused by too much (flooding), too little (drought) or too polluted (algal growth, dead fish). These problems have been solved in the past by increasing supply and discharge and by flushing out. As a result the problems in the supply and discharge areas increase. The problems are passed on. To use the expressions of the *ecodevice model* in figure 8.3, *internal problems* are turned to *external problems.*

This also applies to the *drinking water-sewage water flow.* Drinking water collection causes falling water tables in and near the supply areas. Overflows of combined sewers cause pollution.[10] The effluent from wastewater treatment plants also contributes to the eutrophication and pollution of receiving surface waters. The purification sludge is too polluted to be re-used. It is either dumped, mixed or burned, whereby part of the problem is passed on.[11] Clearly, not only the direct nuisance is problematic, but so are the conventional ways of solving it.

Looking at new ways to solve these problems is not only the troublesome task to find a way out. A preventive approach focuses on opportunities for integrated and source-directed solutions. The Ecological Conditions Strategy seeks to develop good conditions. This asks for good tools, for guiding models to guide the making of good plans. Following the sequence described in section 8.1, the first step in this direction is to formulate guiding principles.

GUIDING PRINCIPLES

The emergence of a different approach to water management, concentrating on the opportunities for prevention and not shifting problems to other areas, is visible in many countries.[12] The strategic guiding principles attached to the new approach are:

- to be economical with drinking water,

10 *Sewers in a combined system carry both wastewater and rainwater. In the case of heavy rainfall, the sewers are charged beyond their capacity and overflows start operating. They discharge diluted sewage into surface waters. In many cities this is considered the most important cause of water pollution (Hengeveld & De Vocht eds.,1982; Hooghart ed., 1988).*

11 *These problems are worldwide, though they manifest themselves in many different ways. For urban water problems this is clearly demonstrated by the proceedings from the UNESCO -International Hydrological Programme conferences, (Hooghart, ed. 1988; Van Engen, Kampe & Tjallingii, ed. 1995). The* roll off *problem, passing negative effects to neighbours, is analyzed and visualized in* Ecopolis, *p.57.*

12 *At the 1993 UNESCO-IHP conference similar trends were reported from Australia, Canada, Germany, Sweden, The Netherlands and the USA (Van Engen, Kampe & Tjallingii, eds. 1995)*

- to retain clean water (wells, rainwater), and
- to prevent and abate pollution at the source.

Thus, step by step, the general *guiding principles* mentioned in the section on responsible flows in chapter 8.3 are made more specific. One step further is the *Ecopolis* scheme with guiding principles for households, industry, agriculture and public sectors (p. 58).

The guiding principles do not only point at problems to be solved, but also indicate how to prevent them.They invite to use the local opportunities to make a better plan. The next step is to generate solutions-in-principle: guiding models.

GUIDING MODELS

Figure 9.3 shows a number of guiding models for different levels. Together they form a *guiding model for the water chain*, that shows ways to operationalize a *responsible flows* strategy (see section 8.3).

building level

In the diagram, the use of drinking water per person per year has been reduced from the current average of 136 to 78 litres without causing any loss of comfort. To achieve this, the following measures, largely based on Mönninghoff (1988) and Reijenga (1990), have been introduced into the model household:

Water savings in cooking and in the bathroom, largely as a result of special taps and showerheads, which ensure no more water than necessary flows out, even with increasing water pressure.

The use of water for cleaning is halved by the presence of the rainwater tank, which supplies the water for washing the car and watering the garden.

The greatest saving can be made with toilet flushing.

Here, a number of alternative options can be considered:

1. The composttoilet, without water flushing, is most effective in this respect, but this system is thought to be more suitable for committed people in rural areas or in the urban fringe, where there is more space, and where the compost can also be used immediately in the garden.
2. The amount of water for flushing the WC can also be drastically reduced by technical measures or by influencing behaviour.[13] These systems can be applied anywhere, they do not really generate alternatives for designers. More interesting from a planning point of view, is the question of which water is used for flushing. One option is to re-use *grey water*, from the bathroom and the washing machine. This system will probably become operational within the next few years. It is the system shown in the diagram.
3. In a less far-reaching version of the household system, the toilets are flushed using rainwater instead of *grey water*. This option is already being applied.The same volume of drinking water is saved as in option 2, but, as both grey water and *black water* from the toilets are discharged to the sewers, system 3 produces more wastewater than system 2.

For a discussion on the options in an urban environment it is worth looking at a famous pilot project performed in *Block 6 in Berlin-Kreutzberg* (Hahn, Thomas & Zeisel, 1988). In this

13 One technical improvement is the Gustavsberg system which ensures that the water for flushing is used more effectively. a more effective operation of the waterquantity applied. Behaviour may be influenced by making users choose between two amounts (Mönninghof, 1988, Reijenga, 1990).

project the *grey water* from dwellings is conducted to the courtyard of the big building block, where it is purified by a marshland system (reeds and bull rushes). After treatment the water is pumped back to the flats to be used for flushing toilets.

The effects on flow management are the same as in alternative 2: no drinking water is used to flush toilets, grey water is used twice. The Block 6 collective system, however, has some disadvantages: First, it takes up rather a lot of space in this case the big lot of the courtyard. Secondly, difficulties can arise from wrong connections. It will be difficult to make clear to professional and do-it-yourself plumbers the distinction between the pipes for drinking water, grey water and purified grey water that criss-cross in all parts of the building. Thus, if we take area and *actor* aspects into account, the Block 6 option is not attractive. Coupling grey water directly to toilet flushing within one dwelling, as shown in fig. 9.3, seems a more appropriate proposition.

From the area point of view, option 3 misses the chance to have rainwater play a role in courtyards and parks. Clean rainwater is much more attractive for that purpose than the grey water used in Block 6. For these reasons, option 2 is prefered and selected tobecome part of the guiding model. The option 2 system still has some flaws, however.[14] Yet, it has been indicated here as long term guiding model because the technical problems will very probably be solved. Not many inventors have applied themselves to this problem yet. The importance of its position in the chain makes it necessary to pay more attention to this weak link.

This short elaboration on toilet flushing clearly illustrates how, even at this detailed practical level, questions of *flow* are connected to *area* and *actor* aspects. The guiding model results from a discussion on the interrelations of the three aspects at interrelated levels. A simple technical optimization study is not sufficient. Yet, assessing costs and effects of the proposed measures is, of course, also part of the planning process.

The possible effects of the above measures at the district level have been investigated by Gommans and Hendrikse (1992) in the Cremer District, a late19th century district in Amsterdam. They compared costs and effects of water saving measures for this urban renewal area for three planning options: *major maintenance, renovation and demolition/new building.* The options follow the regular maintenance and renovation practice of the housing corporation in this area. The effects are not just marginal, as is demonstrated by the findings of this study:

In a typical building block, covering 0.8 hectares and containing 208 dwellings, the existing consumption of drinking water is 142 litres p.p.p.d. Incorporating water saving measures in the *major maintenance, renovation* and *demolition/new building-options*, for low additional expenditure, the water consumption can be reduced to respectively 116, 87 and 62 litres. The discharge of waste water into sewers is reduced by respectively 8, 35 and 56%.

district level

Rainwater and drainage are special issues at district level. The combined sewer overflow problems, for example, may be solved by increasing the capacity of sewers. However, instead of running into the sewers, rainwater from roofs and streets can also infiltrate into green areas or flow to surface waters. The *combined sewer system*, with sewers combining wastewater and rainwater transport, is thereby

14 If such a system is taken into account when the house is being designed, then it is already realizable and not too expensive, but in the practical experiments with this system (Mönninghoff, 1988) one problem was not solved satisfactorily: the odour emanating from the grey water in the reservoir.

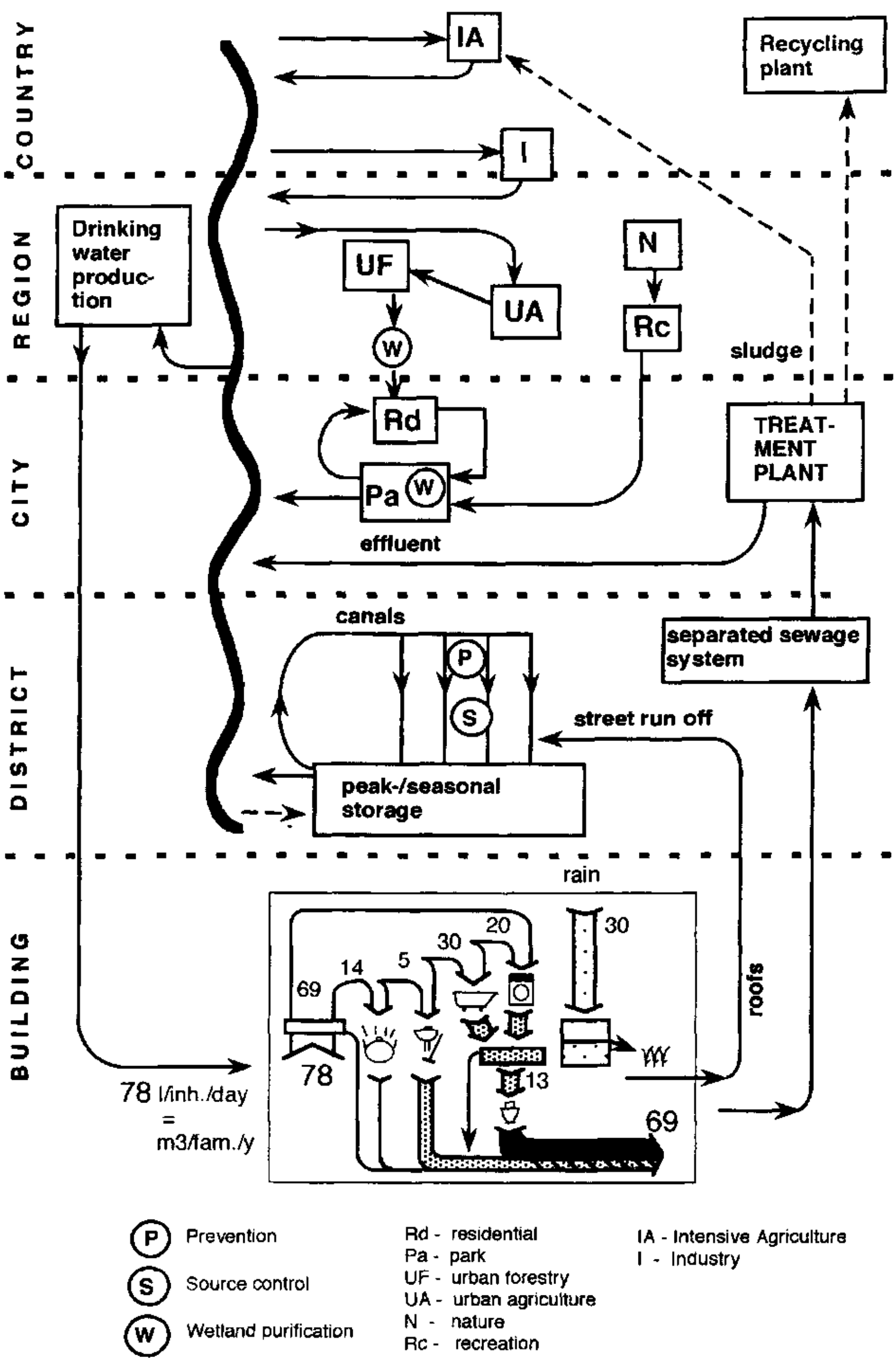


Figure 9.3:
Guiding models for the water chain (lowland situation).
source: Ecopolis.

reshaped into a *separated sewer system*: The sewers still carry wastewater, but rainwater is dealt with separately. This *disconnection* of rainwater from the sewers can be realized step by step. A simulation study by Bruun and Kristiansen (1991) shows a substantial reduction of overflow volumes as a result of *disconnection*.[15] This is directly beneficial to the quality of the surface waters. Compared to the increased sewer capacity option, the *disconnection* alternative has several advantages:

1. Adding more surface waters to the neighbourhood may contribute to an agreeable environment with more opportunities for sports and recreation. I assume that the usual safety measures are being taken into account.
2. Making rainwater *storage* visible contributes to public awareness of water as a vital element in urban areas.
3. Clean rain water may enhance growth conditions for trees and for plant and animal life in green areas.
4. *Disconnection* may be more easily combined with other works taking place, such as renovation of buildings or restructuring of open space. This may reduce costs.

Again: a comparison of technical solutions, also implies *actor* and *area* considerations.

The *disconnection* option is part of a district level guiding model that is called the *circulation model*. It will be the starting point of the design process to be described in chapter 11. Therefore, it is worth examining more closely.

The first matter to be discussed is the meaning of (P) and (S) in the diagram. These represent two prerequisites for the functioning of the circulation system: (P) stands for *prevention*, for instance by using building materials that do not cause runoff water pollution. (S) stands for *source control* measures, for instance separating oil from parking lots before it runs into surface water.

The circulation model in figure 9.3 was developed for lowland (polder) conditions. What is specific about these conditions? To mark the differences between lowland and upland, figure 9.4 shows two guiding models for these contrasting situations. The figure may illustrate the way different guiding models are required to guide in different categories of situations.

In the *upland situation* groundwater is relatively low. Rainwater can infiltrate easily and primarily stored in the ground. In the built-up area special infiltration ditches collect runoff water. A brook with a clean water source is kept separate but ultimately the brook and the ditches run into a peak storage lake. This lake buffers storm-water peaks from the paved surfaces of the urban area. As a result, the river and the valley downstream can be left undisturbed.[16]

15 In a Danish - Dutch cooperation project, Bruun & Kristiansen (1991) investigated three urban districts with combined sewer systems in The Netherlands. A disconnection from the sewers of rainwater run-off from 45% of the paved surface was found to reduce the volume of the polluting combined sewer overflows by 65-82%.

16 The relatively new principles are described, for example by Sieker (1995) for the German situation and by Hedgcock & Mouritz (1995) for the West Australian conditions. For operational decisionmaking the details are communicated to practitioners by the water boards like the German Emschergenossenschaft (1993) or by municipalities like Enschede, The Netherlands (Bruins, 1993).

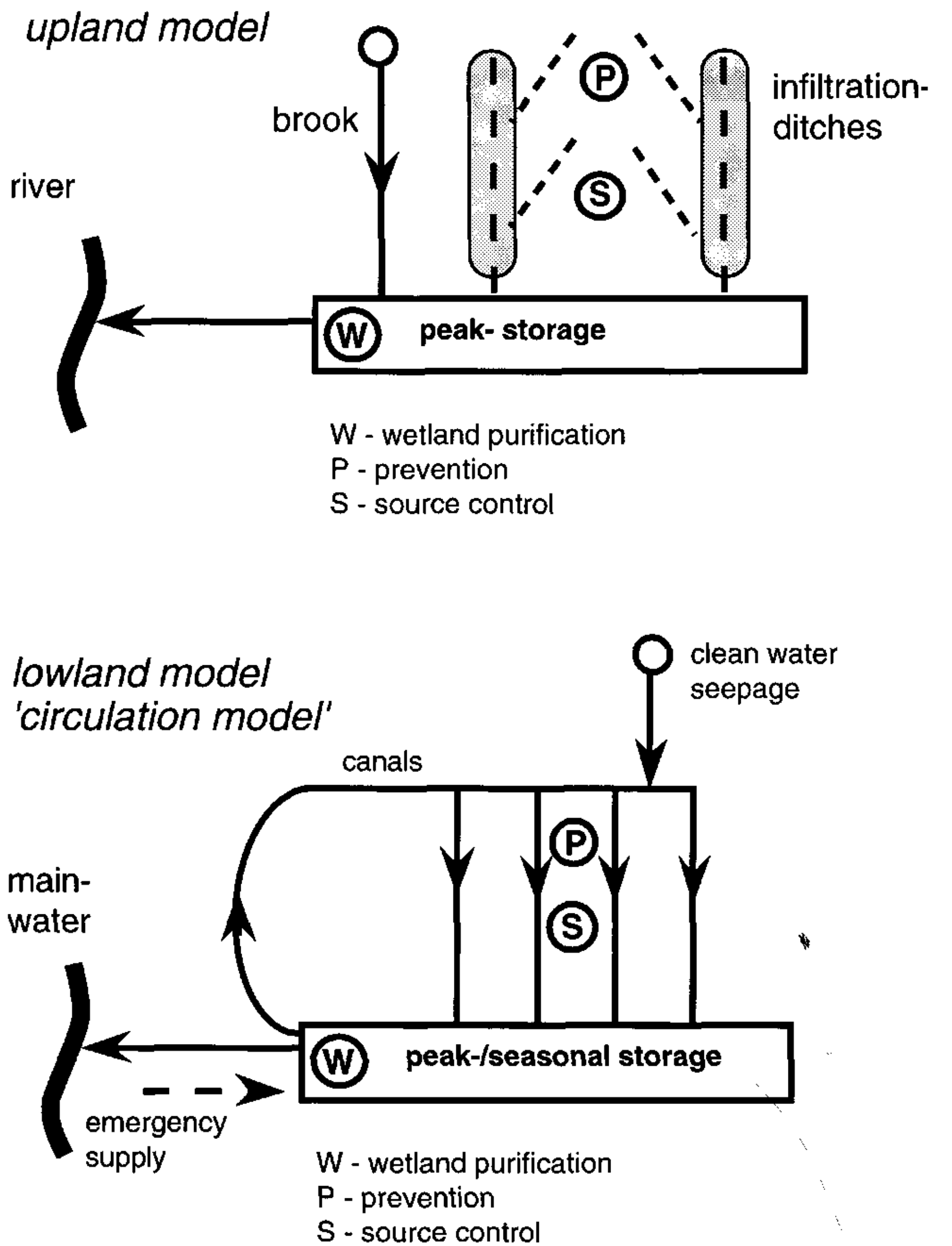


Figure 9.4:
Guiding models for upland and lowland conditions.

By contrast, the *lowland or polder situation*, is characterized by high watertables that do not easily allow infiltration. Retention in surface water is therefore the appropriate way to store water. In the guiding model the retention pond is labelled *peak and seasonal storage*. The need to store stormwater peaks is not different from that in upland conditions, but the seasonal storage is. In a lowland situation the water is pumped off in periods of a precipitation surplus. In summer, when there is a shortage, water is let in to maintain water levels in the polder. The inlet water, however, is from rivers that are more polluted. The solution of the problem of quantity gives rise to a problem of quality. Therefore, the guiding model has a seasonal storage that should have enough capacity to make up for the summer shortage. Thus the system is made independent of the surrounding polluted systems. As a result, internal sources of pollution will be noticed earlier, because the pollution is not diluted with other water. The system creates conditions to enable the source of pollution to be traced. This is an *actor-related argument*. The local water authority will have to take steps and approach the polluters.

The *area argument* is the need to look for storage in naturally low-lying places. This creates a need for using the ecological potential of the local landscape which thus becomes part of the plan.

The Vrijenban case in section 11.2 will demonstrate further details of the circulation model. The use of this model in a new residential area. will be shown in 11.3.

Urban level

As a result of the above measures, the sewage water treatment plant has less waste water to deal with and no longer any runoff rainwater. Thus the purification plant will work better and the effluent-receiving waters will benefit.[17]

At the urban level, the circulation systems of various districts can be linked to storage lakes which form part of green belts and parks. This is visible in the diagram where the peak/seasonal storage of a residential area (Rd) , is part of the park (Pa) where it is combined with a purification wetland (W). Spatial aspects of this guiding model are demonstrated in the area guiding model for the city.

Regional level

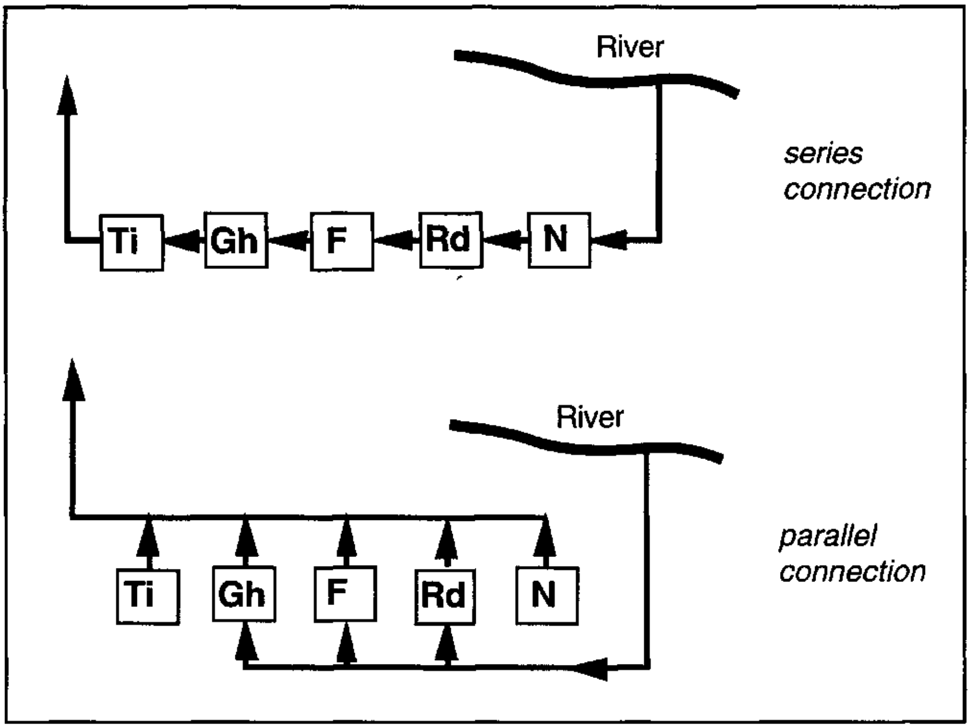
To prevent water tables from falling, groundwater can be replaced by surface water as a source for the production of drinking-water. Reservoirs taking up river water have been constructed for the drinking-water supply of many cities. In Chapter 10 a plan for applying this principle to the Randstad Holland will be presented. Hereby the reservoirs are combined with wildlife habitat creation and some non-polluting forms of recreation.

In the guiding model shown in figure 9.3, the role of water is indicated as

17 See Bruun & Kristiansen, 1991.

linking areas with different types of land-use. Connections can be planned in series or parallel. Linked in series, the underlying ecological principle in the guiding model diagram is that *water should flow from clean to polluted.* This is the only way for clean water areas to stay clean. Thus a nature reserve (N) is situated upstream from a recreation area (Rc) and this may discharge into the park and residential circulation system (Pa and Rd). Another flow links allotment gardens, part-time farming and other forms of "urban agriculture" (UA) to urban forestry (UF). The latter may use the nutrients discharged by the former.

The parallel-connection, on the other hand, creates more flexibility, as the land-use types are less interdependent. Figure 9.5 illustrates the difference in the context of a regional zoning study.



N nature reserve
Rd residential
F fruit farming
Gh glasshouse horticulture
Ti traffic and industrial

Figure 9.5:
Series and parallel connections in water flows.

the chain guiding model

Looking at the whole diagram in figure 9.3, we may interpret it as a guiding model for the planning and management of the water *chain*, the system that links the systems at various levels. The guiding models at each level are developed to guide these systems in a process of what was called earlier *ecological modernization*. The water chain demonstrates how this modernization involves the internalizing of responsibility for flow. This is a process that requires to *keep an eye on the chain*, to develop watersystems that fit in with the chain. Thus the strategy of *responsible flows* (section 8. 3) is taking shape.

THE WAALSPRONG CASE

The role of the *chain guiding model* in a concrete planning process is illustrated by the Waalsprong case. The actual planning process in this case was accompanied by a process of guidance on the basis of the Ecopolis strategy. Here, only the structuring role of water is highlighted.

The city of Nijmegen, in the east of The Netherlands, is preparing for a new urban expansion of approximately 12,500 dwellings to be built over more than 20 years. For the first time in the city's history it will expand its boundaries north of the river Waal, the river Rhine's main channel. This is why the new residential area , occupying an area of approximately 5x5 kilometer, is called Waalsprong ("Jump over the Waal").

The structure plan has to take into account the slow process of change and the need to have good conditions at any stage of development. This implies the functioning of residential areas (including existing villages), fruit farming and glasshouse horticulture, areas for wildlife, new industrial and commercial areas and motorway infrastructure. The map in figure 9.6 shows the water-structure plan that was made in the preparatory stage of planning.[18] The uncertainties that accompany the long planning period and the slow process of change, led to the choice of a guiding model based on the principle of parallel connection, as indicated in figure 9.3.

The river Waal does not play an important role, apart from the groundwater relations through upward seepage. The river Linge feeds a cleanwater supply canal, the *southern bend*. The discharge canal, the *northern bend*, again discharges into the Linge, after a passage through a wetland purification area. The two *bends*, which follow existing watercourses, create good water conditions for a number of functional areas that are drawn according to their existing or planned positions. The functional areas are presented as ecodevices (see figure 8.2). They may be linked to the system, provided they follow the rules of the game. These rules are indicated here as peak and seasonal storage for quantitative reasons (enough and not too much), and prevention and purification for qualitative reasons.

18 The map shown in figure 9.6 resulted from Haccoû, Tjallingii & Zonneveld (1994) and was based on an earlier study of the potential green and blue structures (green areas and water structure) by Claringbould & Tjallingii (1993).

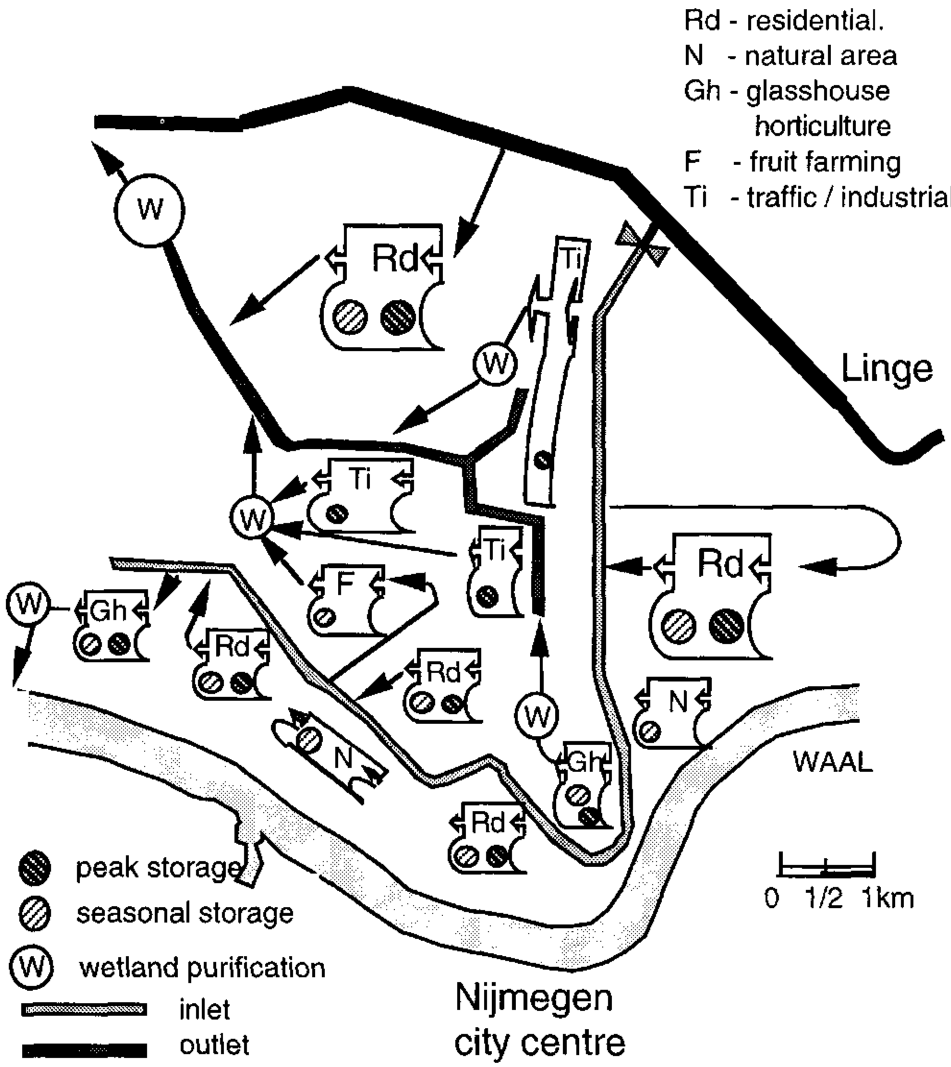


Figure 9.6:
Water structure plan for the Waalsprong area.
source: Haccoû, Zonneveld & Tjallingii, 1994.

9.4 Summary and conclusions

The scale issue, or the discussion on upscaling and downscaling options, is related to flowmanagement in this chapter. Rejecting the extreme central and decentral positions of the economy of scale and the autonomous home, the Sandwich Strategy opts for a policy of *creating conditions* for environmentally sound behaviour of households and enterprises. An important role is assigned to *visible projects* at the intermediate (neighbourhood to city) level. A learning process based on these conditions and projects may open up new prospects and provides a strategic answer to large irreversible investments that reinforce squandering and polluting habits. Thus, it seems, the difficult road to sustainability has to be explored.

Guiding models, as demonstrated by the detailed examples for water flows, bring together the relevant knowledge as a basis for action. This knowledge is *in context*. The *interrelatedness of flow-managment at different scales* is central to the contextual discussion in this chapter. But, from toilet flushing to the planning of urban water courses, we started with flows and ended in discussions about the *interrelatedness of flows, areas and actors.* Thus the role of guiding models is becoming visible, as statements of contextual know-how, in a scientific and practical learning process, illustrating the theoretical arguments discussed in chapter 5 and 7.

Guiding models are made to assist in the making of plans. The guiding models for water flows assisted in the making of the Waalsprong development plan. The case demonstrates how guiding models provide the conceptual tools to gear strategic options to local conditions. Chapter 11 elaborates this making of the local plan aspect, taking the *circulation model* from figure 9.4 as a guide.

Considering the making of plans as one level of learning, the making of guiding models is a second level. At the second level the guiding models explore new passable ways in the direction indicated by the Ecological Conditions Strategy. Thus, the present chapter may be seen as a demonstration of *learning at two levels*, as discussed in section 7.1.

10. GUIDING MODELS: STARTING WITH AREAS

INTRODUCTION

Having approached the planning process from the flow side in the preceding chapter, we now will turn to the area approach. Area management is the starting point of the planning issues of the Strategy of the Two Networks : a guiding model that uses durable water and traffic networks to define space for otherwise flexible land-use planning. The *Strategy of the Two Networks* has been concieved for planners working in this field. As an introduction I will first discuss the problems of suburbanization in the Randstad Holland as a typical example of the decision field in which decisions may be guided by the Strategy of the Two Networks. A possible answer to these problems, the *compact city option*, will be my starting point in section 10.1. The formal presentation then follows in section 10.2. Subsequently, in 10.3, the strategy is elaborated to a guiding model for the city, in which we will meet an old planning concept in a fresh form: the *lobe model*.

As with the flow approach, looking from one angle does not exclude the others. Choosing an area as the *entrance* to planning issues does not exclude the role of flows and actors. The opposite is true. Looking from this angle it becomes clear how flows and actors both contribute to the quality of the area. Areas, flows and actors are planned in interaction. This is true for the making of guiding models and for the making of a concrete plan. The former is shown in the description of the lobe model.The latter is demonstrated in section 10.4 by a plan for the future of the Randstad Holland based on the Strategy of the Two Networks.

In the context of this book, the purpose of this chapter is not in the first place to discuss new proposals for specific areas. The central issue is the role of guiding models in the learning process of the Ecological Conditions Strategy: Do guiding models perform a useful role in linking strategic aims to real world decision-making?

10.1 The Compact City debate

In this section the problems of suburbanization are discussed with the Randstad Holland as an example and, in the background, dreams and nightmares from the USA. The Compact City option for approaching these problems is then considered together with the difficulties accompanying its implementation. By analysing the interaction of area, flow and actor-related aspects of the problems and the solutions I attempt to throw light on this complicated matter.

THE COMPACT CITY

According to Zonneveld (1991b, p. 50), the Compact City as a spatial planning concept, was first introduced in The Netherlands in 1978. In reaction to urban sprawl and to the planned expansion of cities at the expense of the surrounding countryside, the idea of the compact city is an effort to concentrate building activities in and around central cities. The advantages of this concept are that it:

- sustains the carrying capacity for urban services,
- keeps the coherence of urban functions intact,
- halts the disruption of environment and scenery of the agrarian landscape,
- counteracts an increase of mobility,
- stops the spatial segregation of income groups.

The concept had a great influence on Dutch environmental policy in the 1980s. It had, and still has, broad political support. But the voices of its critics are becoming louder. What are the issues in this debate?

DREAMS AND NIGHTMARES

Migration away from central cities to the countryside is an old and widespread phenomenon in Europe and in North America. Dutch policy based on the Compact City concept was moderately successful in the 1980s. However, in recent years pressure to give free rein to suburban developments has been gaining momentum. Some planners think suburbanization cannot be steered and that therefore the Compact City concept should be abandoned.[1] Others have *American dreams* of life in suburbia.[2]

There are, in fact, several of these dreams. Rusk (1993), speaking about urban development after 1950, describes how American society made an offer to middle-class families they could not refuse:

> "the American dream. Sustained economic growth, cheap home mortgages, affordable private cars, and federally subsidized highways...made that dream house with its own yard, quiet neighborhood, local school, and nearby shopping possible for millions of families." (Rusk, 1993, p. 7)

Another, more recent dream is related to the Edge Cities. Joel Garreau's euphoria about New Jersey's *Tomorrowland* speaks for itself:

> " Cities are always created around whatever the state-of-the-art transportation device is at the time...The combination of the present is the automibile, the jet plane and the computer. The result is Edge City. ..if this is America's urban future, the future is bright. .Yet, all this variety, beauty, economic prowess, density, and urbanity has been achieved without New Jersey's having within its boundaries what most people would consider even one major city."
>
> Garreau describes how the Edge Cities "rise as their own commonwealths", are named after the Interstates, like "the 287 and 80 world", and offer a place for many headquarters that, of course again attract more traffic. "In fact, the rise nationwide of satellite airports with

1 *The jury report of the international competition on the Green future of the Green Heart, the central green area inside the Randstad Holland, mentions at least 7 entries that hold this view. (Eo Wijersstichting, 1995, p. 11)*

2 *"I wanted to visit L.A., to see the future of the Randstad with my own eyes." writes A. Reyndorp in a report on a study trip to L.A. by 18 Dutch designers (Baljon et al. 1995).*

surprisingly high levels of full-blown commercial service is a direct result of Edge Cities." (Garreau, 1992, pp. 22-32).

Others, like David Rusk, a former mayor of Albuquerque, N. Mex., highlight what they see as the other side of the medal. Rusk carried out an extensive analysis of demographic and income developments in America's 522 central cities between 1950 and 1990. The image that emerges is quite different:

"America's real urban problem is the racial and economic segregation that has created an underclass in many of America's major urban areas. Segregating poor urban Blacks and Hispanics has spawned physically decaying, revenue-strapped, poverty impacted, crime-ridden 'inner cities'. These inner cities are isolated from their 'outer cities' - wealthier, growing, largely White suburbs." (Rusk, 1993, p. 1)

American dreams and nightmares may, from the background, throw their light and shadow on the discussion in European countries; in the foreground there are the facts about the driving forces of suburbanization that will be discussed here with the Randstad Holland and its Green Heart as an example.[3]

DRIVING FORCES

Recent studies on the Randstad Holland give some new information on these driving forces: Hooimeijer & Nijstad (1996) review recent research on migration from the Randstad to suburban environments. They find tendencies comparable to the London, Paris and Brussels conurbations. Not only do attractive rural environments for living pull well-off urban citizens to the countryside; also work becomes an important factor. In periods of economic growth, more higher-income earners leave the city. In recessions they tend to stay. This is explained by assuming that fewer people change jobs and therefore postpone buying more expensive houses.

" The decline in departures from the Randstad in the early 1980s (a period of recession, ST) is erroneously seen as a revaluation of urban living. In this respect, the compact city policy is built on quicksand." (Hooimeyer & Nijstad, 1996, p. 8)

Lambooy & Manshanden (1992) demonstrate the importance of suburban and airport and highway related activities to economic development and employment.

"Urban oriented policy, as practiced in the 1980s cannot stop economic development of suburbia. But this urban policy may have prevented a further decay of the central cities." (Lambooy & Manshanden, 1992, p. 1049)

A compact city policy obviously has to cope with strong driving forces that work in the opposite direction. It seems as if no one can control these processes. There are, of course, many more aspects of the matter than I can discuss here. My

3 *The Green Heart is the area dominated by pasture land and wetlands and surrounded by towns and cities, including Amsterdam, The Hague, Rotterdam and Utrecht. Together the cities form the Randstad, or rim city. Since the1950s Dutch planners have seen the Green Heart as the essential complement of the Randstad. This* localized planning concept *of the Green Heart (Zonneveld, 1991b) kept going for 40 years. Since 1988 the concept has been increasingly under attack, as will further be discussed in section 10.4.*

focal point is the existence of persistent problems that provide good reasons for not yielding too easily to the driving forces.

PROBLEMS RELATED TO AREAS, FLOWS AND ACTORS

The first category of problems is related to areas : the category described as the principal problem in the section on the *living areas* strategy in section 8.3. The loss of the contrast and habitat diversity is a problem for humans, plants and animals. It is the diversity that has developed over the centuries in a cultural history of differentiation on a natural basis (Lambert, 1971). Of course this is not only a spatial problem; the quality of quiet and clean areas is at stake. However, if it replaces intensive agricultural use, suburbanization may also turn out to be beneficial for plant and animal life.

As a result of continuing centrifugal tendencies in living, working and recreation, the role of automobile *traffic flow* has increased dramatically. In the Netherlands, car density per km2 is 128, the highest in the world. Yet, it has been predicted that this will increase by 70% between 1986 and 2010. (Ministry of Traffic and Public Works, 1989). Restrictive policy aims at reducing this increase to 35%. In *Ecopolis* I summarized the literature on the environmental effects of traffic: pollution of soils, water and air; noise; fragmentation of nature and landscape; death and injury in traffic accidents; space taken up by parking, reduction of space for walking and recreation. These problems are persistent.

Problems of suburbanization that directly affect actors are partly related to traffic (congestion, parking problems). but a loss of visual contrast is experienced as a problem. Times and again the desire for open space surfaces in public debate.

How can we cope with the strong driving forces in view of these persistent problems? To a certain extent, decision making on the basis of the "compact city" concept may be improved at the performance level, the day-to-day practice of local authorities that have to find their way between regulations and negotiations with enterprises and citizens.

THE PARADOX OF THE COMPACT CITY

Recently, a working group made up of representatives from the Ministry of Environment and local government reported on the *paradox* of the Compact City. (Stad en Milieu, 1995). Basically they support the Compact City idea. However, their work with the concept at the local level has revealed a number of practical problems. Advantages at macro-level (space for wildlife, traffic reduction) are accompanied by disadvantages at micro-level, in the neighbourhood where residents are faced with the building of offices in *their* green area and more noise and pollution from cars. This paradox is also visible in the Drachten case, discussed in the second intermezzo. There, the rather strict environmental regulations stood in the way of good solutions. The working group also noticed this in their case studies:

"The (physical) planning culture works with general concepts that leave the municipalities great freedom, Environmental regulation is much more tight."[4]

This observation leads to the proposal of including environmental qualities in the general (physical)planning concepts like the Compact City. In doing so we turn these concepts into guiding models.

REDEFINING THE COMPACT CITY STRATEGY

As a first step I will reformulate the compact city strategy in terms of guiding principles for areas, flows and actors. The next step will be the general guiding model: the strategy of the two networks.

areas

The contradiction here seems to be real: either the city expands its boundaries at the cost of the countryside, or green areas within the city will disappear. But is it really a contradiction; are these the only options? Or is it a paradox, apparently contradictory but not unsolvable?

The challenge to planners is to investigate other options: The first option is to take a better use of existing buildings; for instance to build appartments above shops in existing buildings. The second is to look for other opportunities in the existing city, like old industrial or harbour sites. Another option is to design clever buildings such as urban villas with roof gardens, or *baffleboard houses*, noise barriers combined with houses, as in the Drachten case. Such buildings create space, compared with the standard terraced house. A last option is to build close to the existent city, along a good railway track and in a way that improves the scenery, plant and animal life on the site.

The protagonists of the Compact City want to save the green countryside, or, as they say in The Netherlands, to save *nature*. However, the contrast between the city and the *open space* in the rural area is not identical to the culture - nature dichotomy. This false image was discussed in section 4.3.. For plant and animal life the city is not black and agricultural areas are certainly not white. The question is whether a residential function is a bad choice everywhere, for instance if land is released as a result of overproduction in agriculture. A guiding model that aims at a *contrast-rich city* will be presented in chapter 10.3. Here visual contrasts and differentiated habitats for humans as well as for plant and animal life are more favourable than in intensive agricultural areas.

The Don and Waterfront Scheme in Toronto is an outstanding example of the *contrast-rich* approach, applied to the restructuring of a whole catchment area (Crombie

4 *Stad en Milieu, 1995, appendix 2, p. 2. The recommendations of the working group follow a priority scheme: 1. integration of environmental issues in planning at an early stage (this is, in fact, the pivot of the* good conditions *approach). 2. exploring all avenues to find a solution within the existing rules. 3. accepting environmental loss against compensation. In practice the working group focused almost entirely on the third option.*

et al. 1992, Hough, 1995). The major role played by the water and traffic systems as carriers of contrast in urban planning is an interesting aspect in this scheme.

flows

For the *energy flow* the advantage of the compact city is not self evident. The positive effect of *stacking* may also be realized by good insulation (Owens, 1986). The *waste* flow may benefit from shorter distances to recycling shops, but the essential condition is organization and not the spatial structure. For *water*, more compact building may lead to an increased paved surface that creates high stormwater peaks. In that case the advantage is for the residents and the bill is paid by the countryside; the paradox reversed! Rainwater retention, as proposed in the guiding models discussed in the previous chapter, requires space. In a good design, however, there are opportunities to combine green areas with rainwater retention, thus using limited space efficiently.

Clearly, compact building may create good conditions for the *traffic* flow, because, for example, frequent and cheap public transport is dependent on high population densities. Walking and cycling may also benefit. These positive effects will, of course, only operate if private car traffic and parking places are restricted. Building densely is not enough in itself. This is clearly the crux of the problem. The challenge here is to develop an actor-directed policy.[5]

actors

Assuming that most people want to live in the suburbs in a house with a garden, the question is whether we can afford to offer this great good to the greatest numbers. In The Netherlands, in my opinion, the answer to this question is no. The preceding sections point at one conclusion: if at least a minimum of contrast between city and countryside is to be preserved, and if the traffic problems (including congestion) are to be reduced, this dream is not on offer. If we close our eyes to both problems we may continue to offer the suburban dream, but this, of course, is very shortsighted policy. How can this policy be curbed?

The answer is a strategy that consists of two parts:

1. The *strategy of the two networks* creates a basis for contrasts: a long edge of the city with both green areas and urban services within reach by walking, cycling or public transport. Thus, more people are given a chance to live on the green edge and yet the contrast between city and countryside remains sharp.
2. In addition, an actor-oriented approach may further concentrate on pilot projects, demonstrating more compact ways of living and developing ways of mobility control. Thus the process of learning that generates alternative

5 *In* Control of automobility, fact or fiction? *Priemus & Nijkamp (1994) edited a number of contributions on experiments in The Netherlands and other countries. Their conclusions:*
1. A precondition for success is good tuning of physical planning, environmental policy and transport planning. (In terms of section 7.2: the guide model.)
2. The importance is clear, there is a long and difficult way to go, but there are rays of hope in several experiments. (In terms of chapter 8.1: the learning process.)

solutions may continue.[6]

These sections on area, flow and actor aspects may be read as a collection of interrelated guiding principles. The next step is to conceive a general guiding model that unites them in a solution-in-principle.

10.2 The Strategy of the Two Networks

Choosing flows as an entrance led to the Sandwich Strategy. Now let us opt for the area entrance. This implies that the guiding model should be a map, a strategic spatial diagram that provides a general answer to the question: how could urbanization be geared to ecologically sound regional development? Research on this question in Ecopolis , produced more specific guiding models for an inner city area, an urban fringe area, and the city as a whole. The latter will be discussed in the next chapter.

THE CASCO CONCEPT AND ECOLOGICAL CONDITIONS

From the above mentioned more specific models the idea of a more general spatial strategy developed: the Strategy of the Two Networks, emphasizing the strategic role of water and traffic networks. The roots of this strategy lay in the so called *casco concept* or *framework concept*, developed for landscape planning in rural areas (Sijmons, 1990, 1991; Kerkstra & Vrijland, 1990).[7]

The main steps in the *casco concept's* process of thought, as explained by Sijmons, are the following. I summarize them in my own wording:

The starting point is that a general approach should be found to a number of fundamental uncertainties in regional planning:

1. The time factor for ecological developments and for economic and social developments. Predictions about agriculture, industry and trade, but also trends in living and processes such as individualization, can only be made at relatively short notice.
2. The possibilities to control these processes are limited. Cooperation between public and private sectors is needed, as is a definition of tasks. In large parts of an urbanized region, the government can only set limiting conditions and create terms.[8]

With an eye to these fundamental problems, in the *casco concept* a distinction is made between *high dynamic* and *low dynamic* land-use types.The former display large spatial changes and great ecological fluctuations (for example, agriculture). However, *low dynamic* land-use types such as nature conservation require spatial and ecological continuity.

6 *One pilot project is worth mentioning here. In the city of Tilburg, the area of an old military compound was to be developed. Developers, real estate agents and municipal officials were convinced that only a conventional layout with rows of terraced houses was possible. A group of architects, however, persuaded the authorities to engage in an experiment. One urban villa appartment building was constructed. The response of buyers was overwhelming. That triggered the plan to build more of these. As a result, there is now a public park next to these compact buildings. (Bronzen Bever, 1995).*

7 *The word* casco *refers to a protective helmet, but also to a carrying framework or body.*

8 *In terms of my Ecological Conditions approach I would prefer to put more positive* carrying conditions *first, but here, I follow the formulations in Sijmons (1991, 13 ff.)*

In the case of the *high dynamic* land-use types, management is in the hands of private owners and development is dependent on many uncertain market factors.

In the case of the *low dynamic* land-use types, the role of the government is much larger and the uncertain market plays only a small part. The casco concept is directed towards spatially grouping these two categories into a *framework* (safeguarding continuity for the low dynamic functions) and a *utilization* space, left free for the high dynamic production functions.[9]

Basically the *casco concept* is an ecological strategy in the sense of section 3.4. It also contains elements of the target *images of nature* approach (section 3.2) as becomes clear from the plan for the central river area in The Netherlands (De Bruin et al. 1987). This plan may be considered a practical illustration of the casco concept. It also demonstrates the role that can be played by the water system carrying the *framework's* spatial structure. The combination of an ecological strategy that creates conditions and yet also uses visible images is interesting. It suits the combination of the *guide model* and the architect model as discussed in section 7.2 : the role of a government that actively seeks the cooperation of all actors to create good conditions and, for that purpose, takes advantage of the communicative value of planning concepts.

However, there are also differences between the casco concept and the Ecological Conditions approach. Thinking in terms of *framework* and utilization space implies starting with *limiting conditions* as dicussed in section 4.1. The use is self evident; limitations have to be justified, for instance by refferring to vulnerable wildlife areas that have to be protected. The word *casco* also reflects this protective approach. Though the *casco approach* also has imaginative design elements, it never entirely relinquishes this conservation-oriented basis. In the Ecological Conditions approach *carrying conditions* come first. This implies we have to start with *carrying structures*[10] instead of a protecting *framework*.

One important *carrying structure, the water structure,* already plays an important role in the plans that are based on the *casco concept.* This illustrates the proximity of the two approaches. In the context of the Ecological Conditions approach, however, we have to elaborate the central role of carrying structures. If we move from the rural areas, where the casco concept originated, to urban regions, this leads to the *traffic structure* as a second carrier for the Strategy of the Two Networks. To conceive of the traffic system as the backbone of spatial plans has a long tradition in urban planning. Using the water system in the same way is new.

9 *This short summary is based on Sijmons (1991) p. 21 ff. In a further discussion (p. 49-51) he positions the* casque concept *as related to Etzioni's Mixed Scanning (Etzioni, 1973), it combines normative long term searching with functional short term planning. This comes very close to the learning at two levels approach of fig 7.4.*

10 *The concept of* carriers *was first used in a similar way by the architect Habraken in his 1962 publication:* The carriers and the people, *a plea for interaction between people and their homes, made possible by a simple carrying structure that creates conditions for individual and changing built-in components. It was this simple but powerful idea that was a source of inspiration for the Strategy of the Two Networks as the* carriers *of urban and regional development.*

TWO NETWORKS IN TOWN AND COUNTRY

In the tradition of urban planning, the design of infrastructure means, above all else, creating optimal accessibility for motorized traffic to enhance a climate conducive for setting up businesses. But, of course, also the social functioning of urbanized areas depends on infrastructure. It is widely recognized that creating conditions for traffic means to steer economic and social activities in spatial planning. However, there is no reason to exclude rural areas, as they also depend on road infrastructure. The Dutch tradition of re-allotment schemes in rural areas is based on a *plan of roads and waterways* as a basic planning document. On closer inspection, the road infrastructure is a carrying structure for both urban and rural areas. Opting for the water structure for urban areas, on the other hand, is less self evident. Some examples like the Cherry Orchard Case (Intermezzo 1) and the Zaartpark Case (section 5.4) suggest water can play a role. But it is the elaboration of the *guiding models for water chains* in section 9.3 that clearly demonstrates the important role of the water network in organizing the links between flows and areas. In this respect this network is equivalent to the traffic network.

the special position of residential districts

Residential areas represent another aspect that comes to the fore if we consider urban environments. Living cannot be labelled *high dynamic* or *low dynamic*, to use the *casco concept's* terms. In fact, residential areas occupy an interesting intermediate position between *high dynamic* and *low dynamic*.[11] Most people's preference for living seems to be to *have both sides of one's bread buttered*: both easy access to the urban facilities and to wildlife and recreation facilities at the edge of the city. Living in suburbia, then, presupposes the extensive use of private cars. Living at the edge of the city may create other options to meet the *both sides* desire.

traffic and water networks

Both the water and traffic network have an important steering potential in physical planning; they are useful tools in the process of spatial organization.

The *traffic network can* be seen as a carrier of manufacturing industry , trade and commerce, but mass recreation and most types of modern agriculture are also highly dependent on traffic facilities. In this context the polarity between urban and rural is irrelevant. The traffic network feeds economic development on both sides.

Traffic is not always linked to production and to noise and disturbance. It also includes public transport and cycle track networks, providing conditions to reduce the role of motorized vehicles in areas that need tranquillity. However, in all these cases the traffic network, as a planning instrument, can be very effective in *channelling human activities*, either by stimulating them or by preventing them.

11 *On closer inspection* dynamic *is a confusing term meaning 1. the dynamism of crowded and quiet, hot and cold, wet and dry within 24 hours, and 2. the dynamism of changing land use (discontinuity). A highway, for instance, is high dynamic in the first meaning but low dynamic according to the second definition. Rather than specifying in an abstract way the dynamics of different classes of land use or environment use, I turn to the question which activities can be carried by traffic and water networks.*

The *water network* can be seen as a carrier of functions like quiet recreation and wildlife. By providing space for rainwater infiltration and retention it may create conditions for durable quality of green areas but also for sustainable production of drinking water and for other ways of using groundwater and surface water resources.[12] As a planning instrument, the water network, including brooks and rivers, but also protected areas for infiltration, can be very effective in *steering the optimal use of ecological potentialities* of the local, more or less urbanized landscape. It is this combination of steering activities and using the carrying capacity of landscape and resources that makes the water and traffic networks useful as vehicles of the role of spatial planning in sustainable development.

THE STRATEGY

In figure 10.1 the Strategy of the Two Networks is presented. The two networks are the carrying structures of a *zoning principle* that goes from a quiet and clean green area to the left, to a more polluted and noisy business area to the right. Intensive agriculture is to be situated to the right of the area in the diagram, a vulnerable nature reserve is to be to the left.

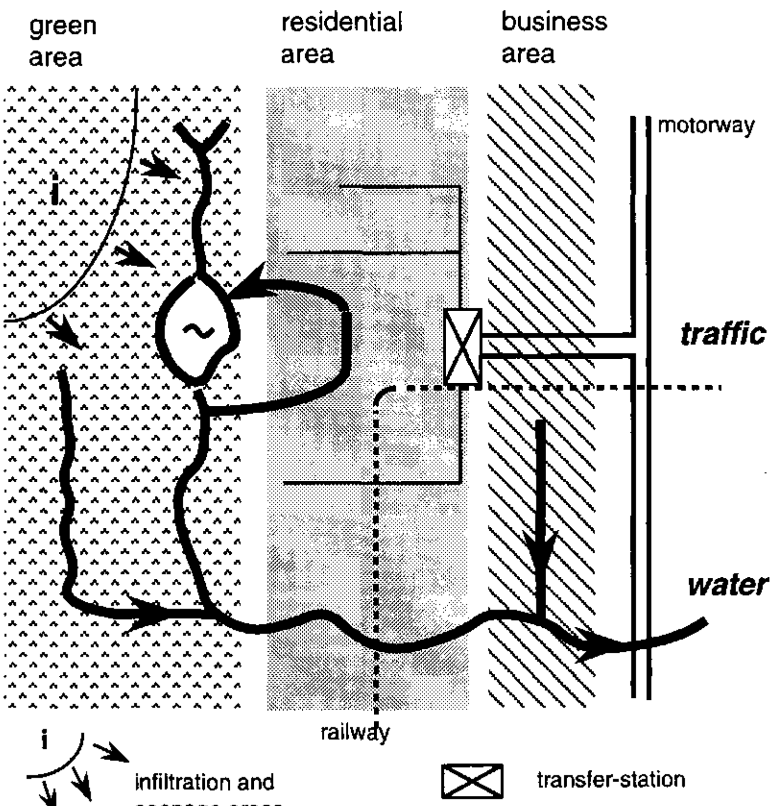


Figure 10.1:
The Strategy of the Two Networks.
source: Ecopolis.

12 Waterways for shipping take an intermediate position, belonging both to the water network and to the traffic network.

The *water network* starts with the infiltration zone (i), an upland dry area that should not carry polluting functions like intensive agriculture. Upward seepage at the foot of the hill feeds the water courses that run through the different zones. The diagram uses the guiding models for the water chain at the district, city and regional levels (figure 9. 3).

Both series and parallel connections are applied, following the guiding principle that water should flow from clean to polluted. This, of course, does not mean the business area can discharge run off water without restrictions. On the contrary, the business area may have a purification system geared to the nature of the pollutants and the situation in that area.

The *traffic network* follows the guiding principles and guiding models as presented in *Ecopolis*. The essential features are: The motorway leads to a city highway that enters the city through the business area and ends in a transfer station for goods and people next to the railway station. Traffic is more quiet in residential areas, ending up in cycle tracks and footpaths leading into the green area.

The two networks create a durable spatial structure that guides the uncertain future land-use development which is otherwise left free under some environmental conditions. Thus a tool for spatial planning is provided that enables us to meet the requirements of *different groups of actors*. Sustainable development in this context means creating conditions for durable diversity. *First tier decisions* (in the sense of section 5.4) on land use proposals, building permits etc. should be made on the basis of an appropriateness criterion. The issue is whether the proposal fits the structure (pattern and process).

In describing the Strategy of the Two Networks in this section it becomes clear that this guiding model is not only concerned with *living areas* but also with the interrelated flow and actor decisions.

FROM RED AND GREEN TO BLUE AND GREY

The Strategy of the Two Networks , as a guiding model, offers an alternative to the traditional *red and green* models used to indicate the built-up and green areas in spatial urban planning: the classical *concentric, finger, lobe* and *polynuclear* models.[13] The two networks represent a *blue and grey* approach in which carrying structures replace the picture that covers the whole area.

The water and traffic networks are excellent links between *flow* and *area* planning, thus providing relevant planning tools for ecologically sound development. In this way the strategy creates conditions for a *contrast-rich* approach to design, that does not freeze an urban rural polarity which has become obsolete in many aspects.

From the discussion on strategic options for areas in general, we now turn to one specific area: the city.

13 See, for instance, Neddens, 1986, pp.152-154.

10.3 A guiding model for the city

This section combines a description of the *Ecopolis* guiding model for the city with a plan for the future development of the Randstad Holland. The plan combines a specific proposal for the Randstad as a whole with guiding model suggestions for parts. Thus, this section illustrates how to work with the Strategy of the Two Networks.

THE LOBE MODEL RECONSIDERED

This section, largely based on Ecopolis, presents a guiding model for the city. Like all guiding models it does not represent a plan. It is important to stress this point because the city model looks like a plan. It is conceived, however, as a model that shows solutions-in-principle for spatial organization. A real plan has to tune these principles to the local conditions. Maybe the city is aready there and does not fit the model at all. In that particular case too the guiding model may guide decisions about where to build or not to build, about the organization of the two networks, etc.

the lobe model

Figure 10.2 is a diagram of the spatial structure of the guiding model for the city. In this model a radial lobe structure towards the edge of the city has been chosen. According to Zonneveld's (1991b) survey of physical planning concepts, this *lobe city concept* has a long history.

In The Netherlands the concept has been a subject of discussion since the 1920s. It played a part in the development of Amsterdam and in the plans for Rotterdam's southern extensions. Neddens (1986) describes it as the *star city*, the guiding model for cities like Hamburg, Copenhagen and many others. The main advantages of the model are described by Zonneveld as:

1. A jointing (articulating) of urban areas.
2. A good transition to and accessibility of the rural area, due to short distances and a large 'tangent plane' between the built-up and green areas.
3. A radial orientation towards the city with its facilities.
4. The potential for a large variety in residential environments.

The second point fits very well with the contrast-rich approach recommended in the last section .

The *lobe city* characteristically has *green wedges* or *green fingers* between the built-up lobes - also an old idea. In recent years, the idea has become increasingly popular again, partly because it creates good conditions for connecting the city to the countryside via a greenway network for wildlife and with recreational routes. In Dutch literature the wildlife network is referred to as the *ecological infrastructure*.

ADDITIONS TO THE LOBE MODEL

In its classic form *the lobe city concept* is a typical red and green model. To

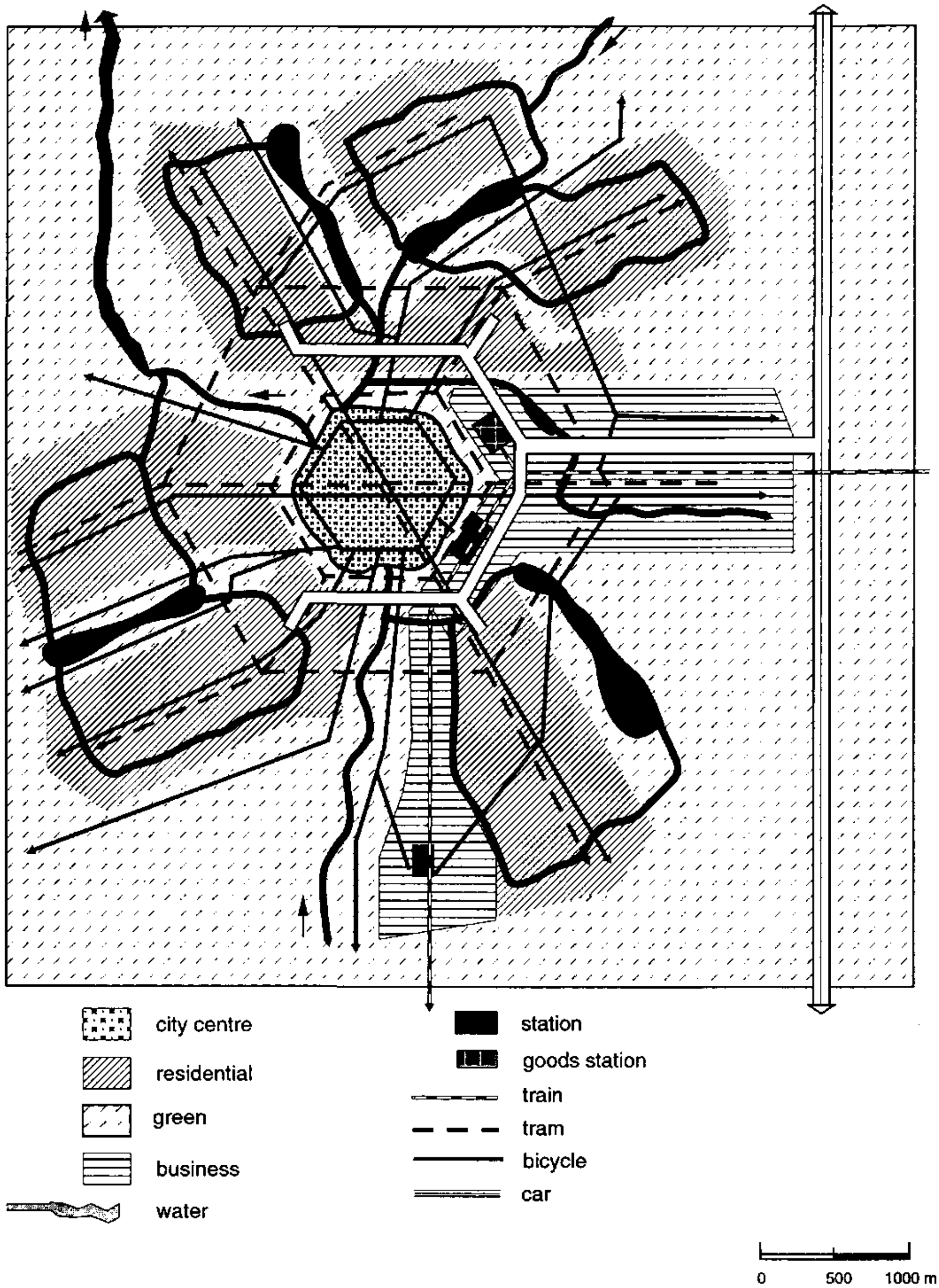


Figure 10.2:
A guiding model for the city.
source: Ecopolis.

make it fit the strategy of the two networks, a number of issues have been added:

1. The study done by Bolt (1982) on the advantages and disadvantages of various *networks*, revealed that it is not the chessboard but the closed hexagon that is the most favourable, in terms of costs of investing in infra-structure, and maintenance and management costs. In addition, the feasible frequency of public transport links is relatively high in this network. It also implies short distances for cyclists.Thus, the traffic flow according to the two networks principles, will benefit from this model.
2. In addition, the model has a system of *attractive cycle routes* which follow the green zones. The city centre, the station and the industrial estate can all be reached by bicycle in a maximum of a quarter of an hour via these routes. From the city centre, all districts can be reached safely, even in the evenings, via routes which run through the built-up areas, where there is more social control.
3. Together, the cycle route network and the public transport system create the possibility for *limiting car traffic* in the city centre and in residential districts. This can be realized in a stepwise process. Ultimately, there is no parking in the streets. All dwellings, however are accessible for essential traffic, invalids and elderly people, as well as for ambulances, refuse collection, removal lorries and the fire brigade.
4. There is *no ring-road* round the outside of the lobes or far from the centre, because this would cause too many activities to be removed from the centre, and also because a ring road like this forms a large barrier for the different functions of the green areas and for the water structure. The Drachten case, discussed in intermezzo 2, highlights this point. In cities that already have a more or less closed motorway ringroad, an alternative guiding model could opt for ahorseshoe model, a model for the ringroad that is not fully closed but leaves at least one important *green wedge* free. In the case of an already fully closed ringroad a less far-reaching guiding model could be elaborated that concentrates on the position of the main junctions and on measures to alleviate the barrier effects in sensitive areas by building tunnels and bridges.
5. Goods delivered by train or truck are transferred to electric vans at the *goods station*, for further transportation in the city.
6. The *water system* has been based on the *circulation model* according to the guiding model of figure 9.4, with a larger pond for seasonal storage and some extra wetland purification. Thanks this system, there is no need to admit polluted water from outside, to compensate for the evaporation losses in summer. The retention ponds are part of the green fingers. This means there is space for this facility next to each district. No extra space has to be reserved in the designated built-up area. In hilly situations, where a circulation system is not feasible, the ponds could be part of a cascade-like water system in which they perform a permanent or temporary peak-storage function.
7. In order to improve the possibilities for orientation towards the sun in the neighbourhoods, the lobes should preferably be positioned in such a way that the rows of houses can easily face south-southeast, either in the transverse direction or along the length of a lobe. This orientation creates good conditions for the use of solar energy and for the gardens to receive more sun.

THE OPTIMAL SIZE OF THE CITY

According to this guiding model, the size of the city is restricted by the cycling distance to the centre or to the railway or underground stations leading to the centre. If a quarter of an hour is regarded as reasonable travelling time, then the lengths of the lobes can be approximately 2500m. If we set the width of the lobes at a maximum of 600m, so that the green fingers are within walking distance, then the upper limit for the size of the district is somewhere around 150 hectares. This means, with an average housing density of 50 per hectare, that there are approximately 7500 dwellings per district. This implies that, according to this guiding model, maximum size of the city is between the 60,000 and 100,000 inhabitants. These figures concerning size are, of course, only a rough indication. Further expansion of the city will be able to take place alongside public transport axes. In that case, additional suburban stations, or fast tram or underground systems will have to be built.

CITY FORM AND LANDSCAPE ECOLOGY POTENTIAL

Being a central issue of the *living areas* approach, it is worth noting that the improved lobe model creates conditions for the use of the ecological potential of the existing landscape: hills and valleys, water flows, woodlands and parks can all be integrated easily in the concrete design. Connecting routes for plants and animals and for recreational pedestrian and cycle traffic can create optimal contact between city and countryside, geared to the local possibilities. Concentric or chessboard models are not so easily compatible with the use of local ecological potential.

A *polynucear model* for the city, as in the Dutch new town Almere, near Amsterdam, has a number of advantages in common with the *lobe model*. But the multicentred structure is less concentrated along public transport axes, and the cycling distances are longer. This encourages the use of the car.

POSSIBLE CONFLICTS

Neddens (1986), who also opts for, as he calls it, a *decentrally integrated* model, bearing strong similarity to the lobe model, points at possible conflicts. The planning of green zones which penetrate deep into the heart of the city, he states, has always conflicted with the economic pressure to build on the *open spaces*. Nowadays this pressure is usually connected with good traffic access points. Conflicts of this type about urban open space are not limited to the lobe model. In the guiding model for the city, however, some elements may improve the resistance of green areas. By making them not only part of the green structure, but also essential links in the traffic system and in the water system, more municipal services, together with the local residents will have vital interests to protect.

A guiding model for the city sounds pretentious, but the difference between a guiding model and a blueprint should be kept in mind. To illustrate the way guiding models may guide the planning process in a concrete case, I turn to the case of the Randstad Holland. In fact, the Randstad is not a city of the size of the guiding model in this section. Rather it can be described as a conurbation of the size of London, Paris or the Ruhrgebiet. Unlike these large urban areas, the Randstad has a green heart, the Green Heart.

10.4 The Chaining Waters case

Chaining Waters is the title of our entry to the international competition on "designing the inner fringes of Green Heart Metropolis". [14] *I will discuss this plan as an illustration of the guiding model for the city and, more in general, of the Strategy of the Two Networks.*

BACKGROUND

The Green Heart discussion as a public debate is marked by two opposite positions that may be illustrated by two quotations:

> "The Green Heart may perform the function of an 'inner garden' to the Randstad, but in that case it is indeed necessary to stop further urbanization of the Green Heart, preferably today." (Mrs. L.E. Stolker-Nanninga, member of the Executive of the Province of South Holland, in: Stuurgroep Groene Hart, 1990, p.3)

> "The pastoral fairytale of the Green Heart has been frustrating the development of the urban housing market for some time." (V.an Rossem, 1995)

The last quotation reflects the increasing difficulties faced by regional and national authorities in continuing the official restrictive policy. The increasing pressure on the *courtyard of the Randstad* results from the strong driving forces related to suburbanization and traffic growth in general, as mentioned in section 10.1. Thus, the *Green Heart debate* is a specific case of the general discussion on suburbanization.

Against the background of the public debate on the future of Randstad Holland and the Green Heart, the Eo Wijers foundation[15] organized an open competition for planners and designers who "were challenged to dispute the development of Randstad Holland as a Green Metropolis and to illustrate the role of the urban fringes around the Green Heart." (Eo Wijersstichting, 1995)

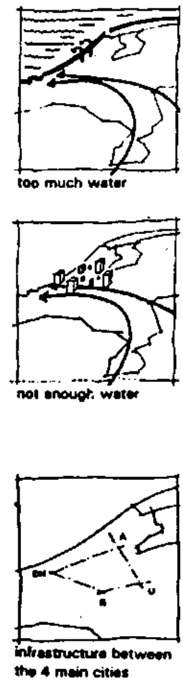
THE CHAINING WATERS CONCEPT

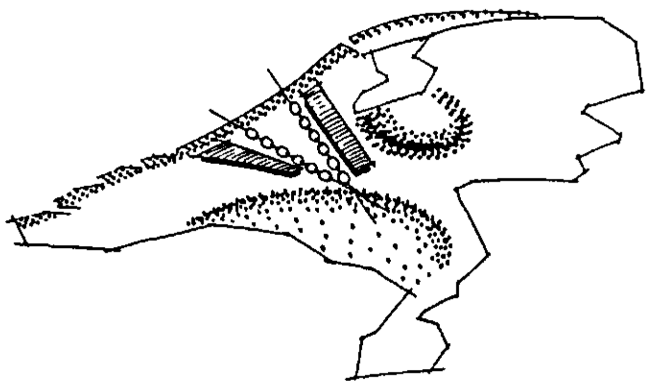
The leading idea of Chaining Waters is to use water as the starting point of a combined approach to urbanization and landscape planning. Traditionally agriculture is the economic carrier of the Green Heart. Modern agriculture, however, requires less space. With the importance of agriculture diminishing, defending the Green Heart against urbanization and traffic pressure seems to be a lost cause. By introducing a system of lakes that aims to make the Green Heart produce the drinking water for the Randstad, *a new economic function* is introduced that carries

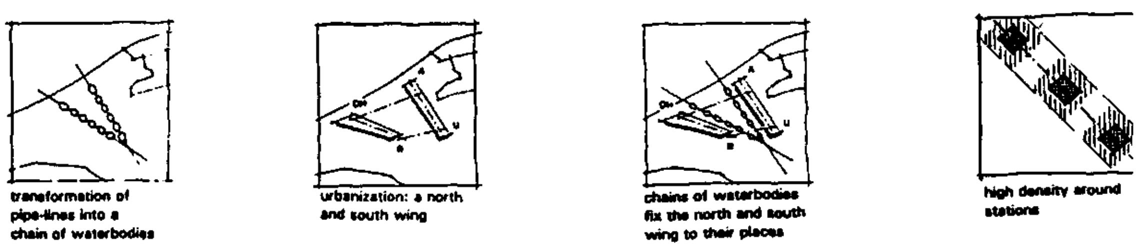
14 The plan was made by a team of planners and designers from Zandvoort Ordening & Advies (consultants) and the DLO Institute for Forestry and Nature Research: Jeroen Hoefsloot, Peter Klomp, Ton van Laar, Hans Snijders and Reinier Stuffers, in cooperation with Jos Jonkhof, Sjef Langeveld and Sybrand Tjallingii. (The entry was awarded a second prize and is referred to as: Zandvoort - IBN-DLO, 1995.)

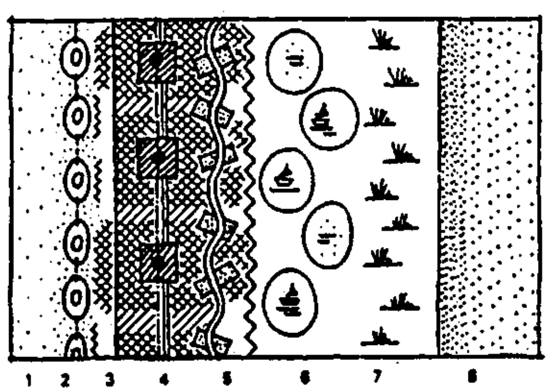
15 The late Eo Wijers was a Dutch planner who inspired many by his ideas on morphological quality in regional planning. The foundation named after him organizes competitions to promote spatial design and planning at the subregional and regional scales.

CHAINING WATERS









1. space reservoir
2. pipeline + water retention units
3. low density housing
4. urban concentration zone around railway
5. vecht zone, park estates and low density hou
6. lake zone: water supply and recreation
7. marshes
8. woods: infiltration zone

Figure 10.3:
Some important features of Chaining Waters.
source: Zandvoort - IBN-DLO, 1995.

the other qualities of the Green Heart. The quality of the Randstad is in the *rand*, the Dutch word for edge or rim. The future of the Randstad is not in building suburban *edge cities* in the sense of Garreau (section 10.1), but in developing a *city with more edges*. By placing the drinking water lakes close to the urban fringe, more *contrast-rich* edges can be developed. The waterbodies themselves spatially mark the boundary of urban extension. In this way a durable diversity is created. Figure 10.3 highlights the main features of the Chaining Waters plan.

the water network

At present, *drinking water* for the Randstad is produced in different ways. The plan proposes to replace two important existing modes of production:

1. Pumping up groundwater from the hills east of the Randstad.
2. Conducting river water to the coastal dunes where the water is first infiltrated and then further purified to drinking water.

At present, two main pipelines conduct river water to the dunes. Chaining Waters proposes to form two chains of lakes in the Green Heart linked by the existing pipelines. In this way the lakes can gradually take over the role of river water and groundwater.

How to feed the new lakes?

To answer this question the plan *links the drinking water and rainwater chains* that are presently separated in the area. Paradoxically, polluted water is taken from the rivers in order to provide drinking water and simultaneously huge quantities of clean rainwater are pumped to the sea. Retention of rainwater in the chain of lakes will make the Randstad independent of river water and groundwater.

At the local level the *circulation model* (figure 9.4) guides the planning process. Retention lakes may be combined with the design of the fringe, similar to the *guiding model for the city's suggestion* for the green fingers (see figure 10.2.)

the traffic network

At the Randstad level, the railway system is further developed to a Randstad metro circle following existing proposals, the so-called ARGUS plan (Frieling, 1994). As the width of the Randstad belt is kept limited, railway stations can easily be reached by bicycle. Motorways are kept close to business areas and city centres. They cross residential districts by tunnels and are kept away from the new urban fringe with the lakes.

the urban landscape

The overall structure is a necklace with urban concentrations around railway stations. Some beads in the chain are business areas. The density can be lower between the central cores and the fringe. In the fringe there will be a diversity of housing types.

Moving the drinking water production from the outer fringe to the inner fringe creates conditions for solving the outer fringe's environmental problems. As a result, falling watertables along the Utrechtse Heuvelrug (the reastern hills) and pollution in the coastal dunes, will no longer constrain the development of interesting areas for recreation and nature development, taking advantage of the high ecological potential of these areas.

In the inner fringe, the drinking water lakes should be designed in a way that creates conditions for the combination with attractive residential areas on the Randstad side. The visual contrast between urban and rural will be sharpened by the lakes.

transformation stepwise

The plan allows for a step by step approach and a learning process in several ways. Firstly, the pipelines linking the lakes, whilst still connected to the rivers, warrant a continuity in drinking water production whereas the system is transformed simultaneously. Secondly, the improvement of public transport and cycle traffic is stimulated by more compact building in the Randstad belt. So the car traffic that cannot be reduced, can at least be concentrated. In this way it seems more likely that the funds will be found to invest in tunnels.

The plan offers a framework for practical experiments such as reducing car use, water management, more compact ways of building, ecological farming, habitat creation etc. The challenge for these experiments is to make these activities fit the structural conditions better. In return the activities may benefit from the clean air, the clean water, the tranquillity, the contrast-rich landscape and other *good conditions* that are created by the basic structure.

10.5 Summary and conclusions

The guiding models that have been discussed in this chapter take *areas* as their point of departure. In this case we take urban *areas* as an example. These areas are struggling with persistent problems, such as the rapid growth of suburbia thet threatens to spoil the contrast between town and countryside. The growth of motorized traffic that threatens to clog the existing roads, not to mention the increasing environmental impairment, is related to urban sprawl. One possible answer is the Compact City option for concentrating the built-up area. The hurdles to be overcome by the Compact City strategy are reformulated in terms of areas, flows and actors. Even if areas are the starting point, the interrelations with flows and actors are vital to understand both driving forces and steering options. The Ecological Conditions Strategy provides useful tools to this end.

The Strategy of the Two Networks originated from a search for a guiding model that should be able to cope with the persistent problems just mentioned. Moreover, the guiding model is expected to offer a framework for both economic and ecological development tuned to local conditions. The approach adopted by the Strategy of the Two Networks is to focus planning efforts on the carrying structures of *water and traffic systems*. The strategy conceives of the water network (including groundwater flows) as a carrier for activities like quiet recreation and wildlife. The traffic network is planned as a carrier of activities like agriculture and manufacturing industry. The two networks combine their capacity of carrying a zoning plan and their capacity of managing flows. The networks themselves form a sustainable backbone that creates space for flexible decisions.

One way to elaborate the basic concept of the Strategy of the Two Networks is the rejuvenated *lobe model*, a guiding model for the city with green wedges penetrating into the heart of the city. The new elements added to this old planning concept are based on the spatial organization of water and traffic flow management strategies.

Guiding models are made to assist in the making of plans. Demonstrating the heuristic value of the Strategy of the Two Networks in the making of plans, the Chaining Waters plan throws new light on the future of the Randstad Holland. Considering the making of plans as one level of learning, the making of guiding models is a second level. At the second level the guiding models explore new passable ways in the direction indicated by the Ecological Conditions Strategy. Moreover the guiding models provide the tools to discuss the environmental issues in their context.

11.THE MAKING OF PLANS

INTRODUCTION

In this chapter the steps from guiding model to individual plan are the central issue. Designers sometimes think they have to start from scratch in the making of each individual plan. However, the wheel does not need to be reinvented in every plan. There is no such thing as the local wheel, but there *is* local nature and local culture and all the elements that play a role in the making of the right plan at the right place. Cars can be mass produced, buildings and parks cannot. They have individuality. That is why architects and planners are needed; they have to make plans that *fit*. Guiding models are a little bit like wheels, they do not have to be invented every time, but they represent the things that can be learned from other projects. The making of the plan starts off from the knowledge embodied in the guiding model. What happens next? In the last chapter I jumped from guiding models to planning proposals in the Waalsprong and Chaining Waters cases. The making of plans, however is not an easy jump, not a *creative leap*.

In this chapter I will look more closely at the role of ecological research as a part of the process of plan-making, taking the design of a new residential area as an example. In section 7.1 the Geddesian maxime "survey before plan" was criticized. Now I will discuss a possible alternative. Ecology is about context. What has an ecological approach to say about the tuning of general guiding models to specific local conditions? In 11.1 a stepwise approach that is derived from ecological theory is discussed: PROSA. How to work with this approach is then demonstrated in the case study discussed in 11.2. The last section describes a completed project in which this approach was used.

11.1 Ecology and design

The usual role of ecologists in planning is to prepare basic maps or to evaluate plans. This is clearly demonstrated by the proceedings of international meetings of landscape ecologists (Tjallingii & De Veer, 1981; Schreiber, 1988). Recently, there has been some change in this (Vos & Opdam, 1993), but still only a few ecologists actually participate in the making of plans and, if they do, their main concern is usually to design for nature (that is, for wildlife). Ecological research and integrated design are unlikely bedfellows.

In this section I will first look at difficulties and perspectives of the combination, with a special eye for methodology. What lessons can be useful in answering the question about design steps between guiding model and plan? In the subsequent section I will discuss the basic scheme for these steps that link research to the process of design.

RESEARCH AND DESIGN

In this sectiondesign is used to denote the making of a plan. The selection and combination of options for the physical structure of an area is taken as an example, bearing in mind that one cannot change the physical structure of an area without interfering with economic and social processes. Or, to put it in the terms of the Ecological Conditions Strategy: one cannot separate the making of a plan for an area, from designing for flows and actors.

A search for ecological theories on the making of integral spatial plans reveals there are very few. Ecology, whether taken in a broad or narrow sense, is a research discipline. Researchers tend to focus either on surveying or on the evaluation of planning proposals, but how these proposals are made seems to be beyond their horizon. W. De Groot (1992, pp.161-62) also signals the neglect of design by researchers. "How the policies to be evaluated actually come into being is left in the dark." There are good reasons for paying more attention to the making of plans. As stated in section 3.4: the best evaluation methods do not produce a better result, if the plans considered are no good. As to the surveys, chapter 3 has demonstrated their inability to produce plans by themselves.

There is a special difficulty in the making of plans that may explain the gap between research and design. Researchers facing complexity tend to retreat into simplicity. "The retreat into reductionism is easy; all scientists are trained to explain wholes in terms of parts." (Jørgensen et al., 1992, p. 3). Design requires putting parts together to make wholes.[1]

ecology and spatial planning

Recently, however, ecological researchers and designers have been collaborating in spatial planning. This cooperation is producing fruitful results in different approaches.

Harms et al. (1995) distinguish three ecological approaches to spatial planning:

1. The species-oriented approach. The common form of these studies is to determine the habitat requirements of the species selected and subsequently to draw up a spatial programme to realize these habitats.
2. The ecosystem-oriented approach. Here, as a rule the target ecotope or *target nature type* is the objective. The planned result is somewhat more flexible, but the Dutch classification of target types contains detailed descriptions of the desired plant and animal world.[2]
3. The landscape-oriented approach, which focuses on the ecological structure of multifunctional areas.

1 *See section 5.2 for a more elaborate discussion on the differences between designers and researchers.*

2 Target nature type *is defined in Duch nature policy as: "The aimed for combination of abiotic and biotic characteristics at a certain scale." A comprehensive summary of 132* target nature types *has recently been published by the Ministry of Agricuture, Nature and Fisheries (Ministerie LNV, 1995).*

The first and second approaches fit in with the *target images of nature* approach, discussed in section 3.2. Much research is being done on this, in which the role of ecological modelling is becoming more important. Olff et al. (1995) recently reviewed the models used in predicting vegetation succession. Simulation models of various types may be particularly helpful when making plans for nature development. Further elaboration of these models will be of great importance when making layout and management plans for areas designated as nature reserves.

Valuable as these approaches may be in sector planning, for multifunctional plans, the focus of this chapter, we have to look to the third category: the landscape oriented approach.

ecological infrastructure and "greenways"

At first sight the research and policy efforts under the heading of ecological infrastructure belong to the *landscape* oriented aproach. However, the origin of this approach lies in the classicspecies oriented population studies by McArthur & Wilson (1967) that gave rise to their Theory of Island Biogeography.

The theory draws attention to the immigration and extinction of species and describes relationships with the *size* of the habitat and the *distance* plant and animals have to bridge before settling down on an island. Later, the concept was applied to islands of nature in a hostile agricultural or urban environment. The emphasis on size and distance made it popular among designers, but researchers were highly critical about the use of size and distance abstracted from habitat quality (Gilbert, 1980). Indeed, to neglect abiotic and management conditions is neither logical nor practical. Opdam (1987) included habitat quality in his analysis of the effects of habitat fragmentation in cultural landscapes. His concept of the *metapopulation*, includes the subunits of the population that inhabit patches. "The survival chance of the metapopulation is assumed to be a function of the number and size of habitat patches, habitat quality, interpatch distance and density of connecting corridors." (Opdam, 1987, p. 304). In this approach, landscape ecology is like looking at the landscape through the eyes of plants and animals.

The idea of designing a green infrastructure for wildlife has become very popular among biologists and in sectoral planning for nature conservation and habitat development. A major field of research in Europe and North America is focusing on these issues.

This is, of course, an important development in sectoral planning. However, the green network concept opens up new prospects for integral planning as well.

Research on the importance of core habitats , corridors and stepping stones for plants and animals, creates the possibility of including these scientific insights when planning greenways designed for recreation. This idea contributed to a real greenways movement (Sijmons, 1990; Hersperger, 1994; Machado et al. 1995). In this new tradition, greenways are defined as: "linear systems of land that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, or other purposes compatible with the concept of sustainable land use." (Machado et al., p. 118)

We have now crossed the border between sectoral and integral planning and have arrived at what can be called a guiding model for planning at the subregional or regional level. It is easy to combine the greenway model with the 'strategy of the two networks' and this is, in fact, what the "guiding model for the city" does. The decription of these models in sections 9.3 and 9.4. however, show in their fundamentals they are closer to basic structure for processes that support all functions: water and traffic. In search for theory on the steps from guiding models to plan we have to cross another border: the one between researchers and designers.

a process-oriented approach to design

The use of ecological research findings in a landscape oriented approach has a tradition that does not rest on the work of researchers but goes back to landscape architects. Almost 50 years ago Bijhouwer (1948) used the soil map as an important element in urban design. Mc Harg (1969), and Hough (1984,1995) introduced the systematic use of information on *ecological processes as a basis for urban and regional planning.*[3]

Not surprisingly, in these design approaches, water plays an important role, not only the river system, but the whole water cycle, including such links in the chain as aquifer recharge (infiltration) and sewage systems. As a consequence research on hydrology, drainage patterns and water quality is essential throughout the design process.

Working on design projects in urban areas, and greatly inspired by the "process oriented approach" I felt the need to foster the link between research and design. Developing guiding models (design principles that can be improved) is indispensable in this context, but this still leaves in the dark what actually happens in the making of an individual plan. So I started to structure the design process, making the research issues explicit step by step, so as to gain insight into values and knowledge at all stages. The reasons for adopting this approach were partly related to teaching, as explained in chapter 1. But another strong motive was the wish to consolidate the learning process in design, where it has no established tradition. The result of this search is PROSA.

PROSA

The acronym PROSA stems from the names given to steps in the design process. In this section the procedure of the PROSA procedure will be described and explained. The text is based on Tjallingii, 1988.

the optimum

For the roots of the design procedure we go back to the ecodevice model, discussed in chapter 8 in the section on the ecology of flows and areas. The actors

3 *The German projects in the Emscherpark region (Schmid, 1995; Latz, 1992; see also section 7.2) are very much in keeping with the work of Mc Harg and Hough. In The Netherlands, the Stork Plan (De Bruin et al., 1987), restructuring the central river area is an interesting case, which also significantly contributed to the theory of the* casco concept *(Sijmons, 1990, 1991), discussed in section 9.3. Farjon (1993) made an interesting contribution to the theory of spatial design in river basins.*

themselves remain on the background for a while, the issue here is how they handle flows and areas.

Life is an *optimum phenomenon*. This is the starting point for the description of the *ecodevice concept* by Van Leeuwen (1973). Environmental factors like temperature, light and moisture all have their optimal range for a certain organism or system. Optimal means the range between the *minimum required* and the *maximum tolerated.*[4]

The *ecodevice* was conceived to describe steady states in ecosystems. If we wish to create or to keep the optimum for a desired ecosystem, we may opt for *direct operations* like feeding or for *indirect operations* like organizing food supply. Planning and design work through indirect operations or through creating conditions. The *ecodevice* can be seen as the instrument that by selection and regulation creates the conditions for flows to operate in an optimal way.

In the corner of figure 11.1 the ecodevice is presented in a slightly different way, corresponding to Van Leeuwen's views: the *in* and *out* arrows, indicating *supply* and *discharge* are responsible for the *prescriptive regulation* of the *minimum required.* The convex and concave sides, indicating *resistance* and *retention* are responsible for *veto-regulation* that safeguards the *maximum tolerated.*

selection and regulation

Further theoretical research on the *ecodevice* model (Van Wirdum, 1982, 1995; Van Leeuwen, 1985) led to an elaboration of the selection and regulation mechanisms. The *ecodevice* shows only four possibilities: *in* and *not in*, *out* and *not out*.. This is, of course, an extreme simplification. In the real world more often some may go in, others may not (selection). Or, *sometimes* they may go in and sometimes they may not (regulation). In most cases it will be difficult to distinguish between selection and regulation. Van Leeuwen speaks of *selecto-regulators* to indicate the combined function of mechanisms that allow some substances or some people to go in or out sometimes.

How do these indirect control mechanisms operate? According to Van Leeuwen, there are four basic categories, called *basic operations*:

- *sequential* operations, in which time or rhythm is the decisive factor,
- *expositional* operations that work through exposition or orientation,
- *positional* operations, where spatial situation is the mechanism, and,
- *conditional* operations, control through the use of energy to switch on or switch off. The appropriate technology of appliances is decisive here.

design decisions

If we consider the design process as a sequence of decisions about the choice of *selecto-regulators*, the different options may be illustrated as shown in figure

4 *The term optimization is sometimes used in planning, meaning: seeking the maximum attainable under the present circumstances. To the living organism too high is as bad as too low.*

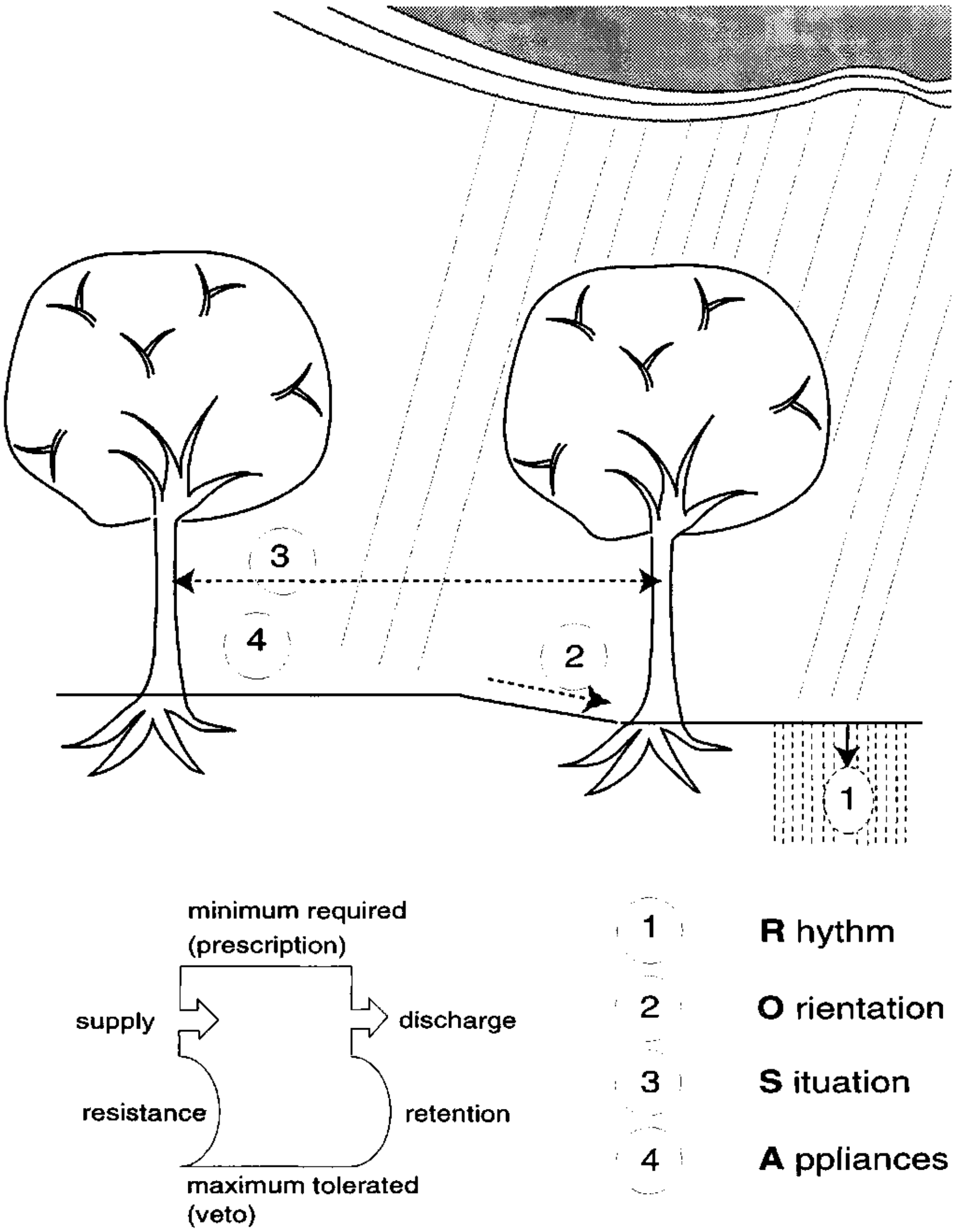


Figure 11.1:
Basic operations of selecto-regulators.

11.1.[5] If a tree is planted in the street, the design decisions that create good conditions for the growth of the tree belong to the following categories:

1. The tree is planted in soil with a high moisture capacity. This *regulator* is based on the effects of *rhythm*. When it rains the soil can absorb the water and later, in a dry period, the roots can take up water from this storage. The storage capacity has to be related to the rhythm of dry and wet periods.
2. The tree is planted in a hollow. Thus the water will run off to the stem. In this case the slope *orientation* creates conditions for flow direction. If too much water is the problem, the tree can be planted higher that the surroundings: the direction of the flow is then reversed.
3. The trees are planted at a certain spacing. This creates a situation for good growth. Competition for moisture (and nutrients, and light) is limited.
4. Special pipes can be installed to carry air to the roots to enhance their capacity to take up water. The appropriate technology, or the right *appliances* are chosen to create the optimal conditions.

design steps

If we link the categories of options to steps in the design process, an interesting approach to *design with nature* emerges. Paying attention to the basic operations in this sequence, an optimal use is made of the workings of time, orientation and spatial elements. The technology of special appliances comes last, to enhance and accomplish the spatial design decisions rather that to replace or to dominate them. In this way a real *partnership with nature* may be developed. So there are reasons for starting with "ROS" before turning to step "A". *Rhythm* seems to be a logical start, because it concerns the dynamic aspect of water related to climate, groundwater and soils. Rhythm sets the frame for the other aspects. *Orientation* is linked to the drainage system, a basic landscape structure and therefore it is placed before *Situation*. The ROS sequence reflects the process oriented approach. Ecology is primarily linked to basic *processes*. In doing so, conditions are created for a variety of *patterns* related to images and lifestyles. Thus, the idea expressed by the tree of unity and diversity in section 4.4, becomes part of the making of plans.

However, one step is missing: the *programme* that is the starting point of any planning process. In the illustration of figure 11.1 the programme is to plant trees, in the case study of section 11.2, the programme is to build a new residential area. Programme may be described in more gereral terms such as *goals* or *problems*, but these general terms should be substantiated into a programme of specific planning objectives that fit in with the decision situation, when making a plan that is directly linked to operational decisions (see section 7.2). The programme should be formulated before dealing with the four basic operations. Thus the Programme precedes ROSA and the result is PROSA.

step by step

PROSA design steps consist of three parts (figure 11.2). First the guiding

5 See section 8.2 for the relation of selecto-regulators to the ecology of areas, flows and actors.

principles are formulated. Bearing these principles in mind, in each step first the existing conditions are surveyed and then ideas, sketches and calculations for the design of future conditions are developed. Designing and planning are cyclic processes; therefore the sequence is not a one-way road. Reiteration is the rule rather than the exception. However, the sequence provides a heuristic path for investigation by design. Moreover it is a way of recording the arguments incuding the values accompanying the relevant information that makes these aspects accessible for discussion in decision making.

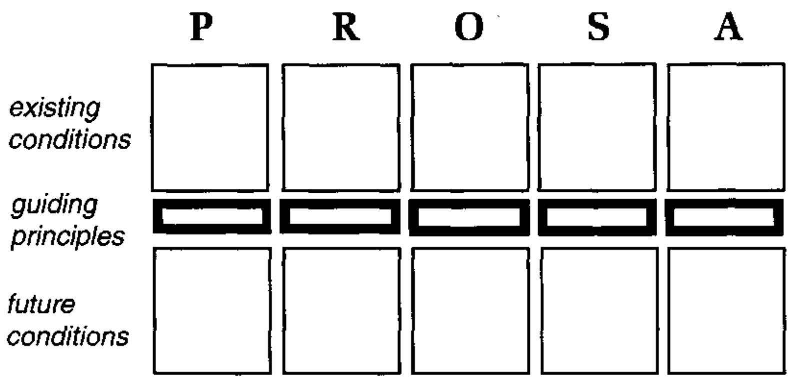


Figure 11.2:
PROSA design steps.

PROSA for water flows in a new residential area

The PROSA procedure can be elaborated for different flows. Duijvestein (1990) presents an example for the energy flow in the design process for a building. So far, however, we have primarily concentrated on water flows in an urban or regional setting. As an illustration, the key words for a PROSA approach to the design of the water system in a new residential area are given here:

Programme	guiding principle: the self reliant, self responsible system existing system: spatial structure, water balance future system: design concept (adapted guiding model)
Rhythm	guiding principle: peak and seasonal storage existing rhythm: seasonal, irregular future rhythm: storage calculation
Orientation	guiding principle: from clean to polluted existing orientation: flow directions future orientation: flow and zoning
Situation	guiding principle: use of local ecological potential existing situation: abiotic, biotic, cultural future situation: first design sketch
Appliances	guiding principle: adjusting to design, management existing appliances: type, operation future appliances: normal operation, emergency

11.2 Designing a water system

In this section an illustration of PROSA will be given in a real design procedure. The making of a water structure plan for a new residential area will be followed step by step. At the end the relevance of the water structure plan for other aspects such as traffic, housing and green areas will be discussed. The text is based on Tjallingii, 1991a.[6]

INTRODUCTION

In this investigation by design the following questions are explored:

1. Is it possible to design a *self-reliant, self-responsible* water system at the scale of a residential scheme for 400 dwellings? More specifically the question is about the usefulness of the *circulation* model (fig. 9.4). Is this guiding model a good tool for operationalizing the Ecopolis strategy of the *responsible city* (fig. 8.5) in the making of this plan?
2. Is the PROSA approach, linking landscape ecology research to design practice, a fruitful one? Does it produce structural planning proposals, i.e. feasible spatial ideas that not only refer to specific elements but may structure the whole plan?
3. Are these proposals useful to steer the concepts that are introduced by other disciplines and result from considerations of practicability and image?

The text is structured according to the PROSA steps. At each step a figure summarizes the most important items.

STEP 1 PROGRAMME (figure 11.3)

In this first step of the design process a general outline of the main objectives and conditions is described. In this case the design of a water system and a small park are part of the plans for a new residential area for approximately 400 dwellings sited in the northern urban fringe of the city of Delft.

guiding principles

The general principle is to design a *self-reliant, self-responsible water*[7] system. The implications of this guiding principle are made clear in section 9.3 where the guiding models at the district level are discussed. A first glance at the existing conditions reveals that the lowland guiding model, the *circulation model* is appropriate for further investigation. The important issues are:

1. The use of rainwater within the system (separated from the sewage system) and,
2. Making the new system independent of inflow from surrounding waters that

6 *The case study started as a students' project. I elaborated a first draft in 1987. The text was first published in Dutch in 1991. This version is based on the English text published in 1993 in: Vos, C.C. & P. Opdam (eds.)1993, pp . 281-99.*

7 *Self-reliant is used here to indicate a system that is independent of the input from other water systems. Self-responsible means: the system is organized to prevent internal pollution and to trace and abate remaining sources of pollution.*

are polluted to some degree, by planning a *seasonal storage*.

A few questions related to these issues have to be answered before proceeding:

What is the quality of rainwater? Is it not too polluted to be used?
An analysis of rainwater composition in The Netherlands (Van den Eshof et al. 1985) shows that the precipitation is considerably contaminated as a result of air pollution. Its sulphate content is generally even higher than in surface waters. However, rainwater contains significantly lower percentages of eutrophying substances, heavy metals, and organic pollutants. This is even more pronounced when rainwater is compared with surface waters that are strongly influenced by the river Rhine, as is the case in the study area. Acidification by sulphate rich rainwater is less important because the soils in this area are alkaline. It therefore seems justified to consider rainwater as being a relatively clean source. The challenge is to create conditions for not polluting it during runoff to surface water. One advantage of keeping rainwater separated from the wastewater sewage system is clear: the water quality problems caused by combined sewer overflows are avoided.

Will runoff water in the planning area be less polluted than inflowing water from the surrounding polder? The answer to this question largely depends on to what extent prevention and 'source control' measures can be included or prescribed in the plan (the P and S in the guiding model). However, as stated in section 9.3, the point that matters is not the water quality in the surrounding polder. The *actor* related argument is that making the system self-responsible implies creating conditions to detect and abate pollution at the source. For this reason inflow from surrounding waters should be avoided. *Alien*[8] water should not dilute pollution within the area, and the new system should not shift its problems to the neighbours. The conditions for an inflow-independent system are created by *seasonal storage*: storing enough water in the wet season to survive a dry summer without having to admit alien water from outside.

existing conditions

The planning site, "Vrijenban", is a 8 ha pasture area on the urban fringe of the city of Delft. The surface waters of Vrijenban are part of the "Hoge Broek polder" between Delft and the Hague. This low laying polder, one to two meters below sea level, is surrounded by dikes. From this polder the surplus water is pumped into the "Delftse Vliet", the polder outlet that carries the water to the sea. In dry periods an inlet sluice in the northern part of the polder is used for supply. The water enters the study area through a culvert under the motorway separating Vrijenban from the rest of the polder. This point is a source for our system, whereas the pumping engine is a sink.

Other sources and sinks may best be identified by drawing up the water

8 *Alien water, being inlet water from another area, may be polluted. If it is clean, it may be still be of a different quality, for instance with a different calcium or chloride content. Following the* living areas *strategy (see section 8.3) the ecologiocal potentialities for differentiation should be used. This implies different water qualities should not be mixed.*

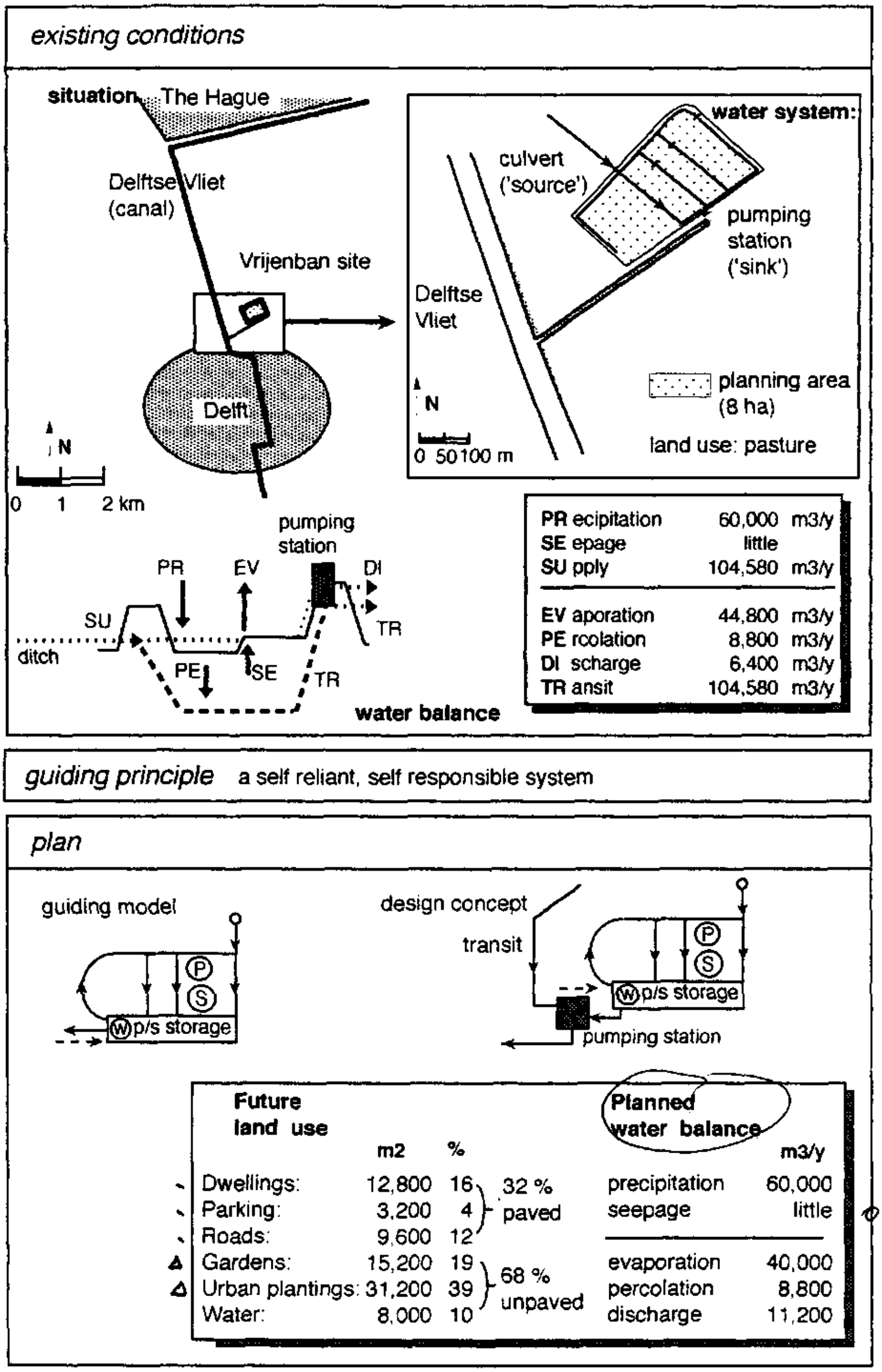


Figure 11.3:
Programme.

balance (figure 11.3 existing conditions, bottom left). The abbreviations refer to the terms of the balance quantified bottom right. *Seepage* (= upward seepage) can be observed in the field and is confirmed by the presence of indicator plant species in some ditches. *Supply* is the surplus of rainwater from the rest of the polder that has to pass through Vrijenban on its way to the pumping engine (*transit* function). There is considerable *percolation* because groundwater is withdrawn for cooling a nearby factory. *Discharge* is the rainwater surplus from the study area itself. The figures are calculated on the basis of data provided by the annual report of the local water board (Hoogheemraadschap van Delfland, 1986). They represent averages of the last 50 years. Water quality is analyzed regularly in the area. The water board classifies the polder water as bad as far as nitrogen and phosphate are concerned. (N-Kjeld > 2, P > 0.2 mg/l) Further data are not available.

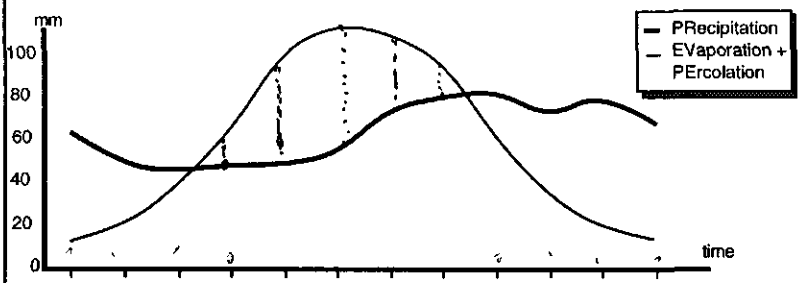
future conditions

In the Vrijenban site water from the polder upstream should be able to flow to the pump, without interfering with the new system. This water (the transit flow) is left out of the planned water balance. The general guiding model is adapted to these conditions. The starting point is a scheme for 400 dwellings, 320 of which are one family houses with gardens. The other 80 are upstairs flats without gardens. The scheme also includes a public park, a small part of which will be used to create habitats for native plants and animals (Londo, 1977).

In figure 11.3 *plan*, a first estimate of the future land use is formed. The relation between paved and unpaved surfaces is critical for the water system. Next, a rough water balance of the planned situation can be calculated. As a consequence of the paved surface, evaporation in urban areas is 40% less than in pasture. This assumption and other empirical reduction factors applied to the potential evaporation data (Penman) are taken from the annual report of the local water board. With the help of these data it will be possible to assess some quantitative effects of choices made during the design process.

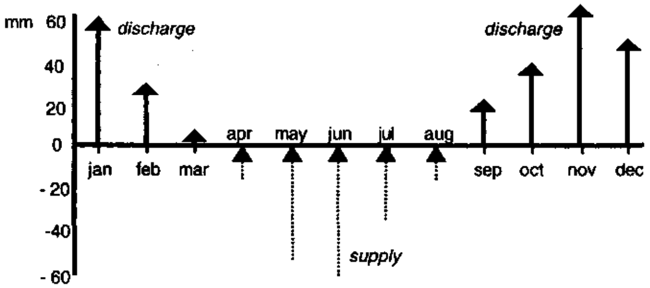
existing conditions

RHYTHM of PRECIPITATION, EVAPORATION and PERCOLATION



	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	per year
PR:	62	46	44	47	47	52	74	79	81	69	82	66	PR: 750 mm
EV+ PE:	12	18	37	65	101	113	109	94	59	31	16	12	EV: 560 mm PE: 107 mm + 667 mm

RHYTHM of SUPPLY and DISCHARGE (fixed water level)



	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
PR - (EV+PE)	+60	+28	+7	-18	-54	-61	-35	-15	+22	+38	+66	+54

guiding principles 1 storage of precipitation to cover summer deficit
2 peak runoff retention

plan

Storage calculation

a. Seasonal storage required = (evaporation + percolation in april-august) - precipitation = (183 mm)

1. *storage pond large 10% of total area*
   - groundwater fluctuation 30 cm — 44 cm
   - groundwater fluctuation 40 cm — 16 cm
2. *storage pond large 15% of total area*
   - groundwater fluctuation 30 cm — 33 cm
   - groundwater fluctuation 40 cm — 16 cm

fluctuation of waterlevel in storage pond

b. Retention of (24 h) critical rainfall (once in 10 years)

1. *storage pond large 10 % of total area* — 24 cm
2. *storage pond large 15 % of total area* — 16 cm

fluctuation of waterlevel in storage pond

Figure 11.4:
Rhythm.

STEP 2 RHYTHM (figure 11.4)
This step explores the time-related regulation aspects.

guiding principles

The key principle is to retain enough water to make up for the summer deficit from the system's own storage. As a consequence the rhythm of supply and discharge should be replaced by a rhythm of fluctuating water levels in the urban waters. Only the remaining annual surplus should be discharged. A second guiding principle is related to storm runoff. The system should provide for the 24 hours retention of heavy rainfall, occurring once in 10 years. It seems reasonable to take the 58 mm limit corresponding to this event.[9]

existing conditions

The first graph of figure 11.4 *existing conditions*, shows the rhythm of precipitation compared with the sum of evaporation and percolation. Between April and August there is a deficit but over the year this is more than compensated by the total rainfall. In the low laying and intensively used polders of The Netherlands a major objective of water management is to maintain fixed water levels in surface waters. Consequently, a yearly rhythm of supply and discharge is reacting to the periods of shortage and excess, as is shown by the second graph. As a result, relatively clean rain water is removed in the winter period and water of poor quality is used for supply in the summer.

Another rhythm, not given in figure 11.4 , is the rainfall frequency curve, used to calculate stormwater retention. In The Netherlands it is not uncommon to take a curve showing a critical rainfall depth of 58 mm after 24 hours. This occurs once per ten years and only once per hundred years will this depth reach 85 mm.[9]

future conditions

The design concept presented in figure 11.3 *plan*, does not have to change if the rhythms are studied more closely. But by doing so we are able to calculate how much storage capacity is needed for seasonal retention and for peak-runoff retention. From the graphs in figure 11.4 *existing conditions*, it can be seen that the excess evapotranspiration during the period of April to August is 183 mm. This figure is based on data for pasture. Water from urban plantings and private gardens might evaporate slightly more but the paved surface of gardens evaporates less. In the absence of reliable detailed information, the pasture figure is taken as an indication. The pasture evapotranspiration has been calculated from figures given by the local water board. The resulting summer deficit for open water is 220 mm. The storage need can be calculated from these two evaporation figures.

The storage capacity of the soil is estimated, assuming groundwater fluctuations of 30 cm or 40 cm respectively. If we consider the 32% paved and 68% unpaved ratio mentioned in the PROGRAMME stage (figure 11.3 *plan*) then the calculations show the following outcomes: (figure 11.4 *plan*)

9 *The figures are taken from the urban hydrology textbook by Segeren & Hengeveld, 1984, p. 210.*

1. A retention pond covering 10% of the total planning area will have to fluctuate by 44 cm or 16 cm in level to provide the storage required. The height depends on the storage in the soil that corresponds with groundwaterfluctuation of 30 and 40cm respectively.

2. A retention pond covering 15% of the total planning area will fluctuate 33 cm or 16 cm in the same two cases.[10]

The extra storage capacity needed to retain urban runoff caused by a heavy storm can be calculated according to current practice. The results are shown in figure 11.4 *plan*. In the exceptional case of a heavy rainstorm in early spring, the peak storage will come on top of the seasonal storage. This, however, will only last for a short period, the time the pumping station needs to remove the surplus.

For plant growth and for the design of the banks a fluctuation of 25 - 35 cm may be considered reasonable, therefore the pond large 0.8 ha (10%) combined with the 40 cm groundwater fluctuation is taken for further consideration in the next steps of the design process.

The uncertainty that goes with the results may not lead to higher levels of groundwater or surface water. This can be regulated with weirs and the pumping station. On the other hand, a level that is some decimeters below the average level at the end of the summer seems tolerable. The depth of the storage pond should be sufficient to prevent it from falling dry in summer. An emergency inlet remains necessary to supply water in case of extreme drought.

From these exercises it becomes clear that the storage pond should be located in a place low enough to permit a safely fluctuating water level.

STEP 3 ORIENTATION (figure 11.5)

The third step is to analyze orientation. Flow directions of water are the central issue, but also solar radiation and prevailing winds can be taken into account. Orientation decisions for the plan may be attuned to them.

guiding principle

Stable gradients are a key condition for ecological diversity in surface waters. Upstream pollution sources negatively affect all aquatic communities and the functional and aesthetic qualities in the water course. Therefore the guiding principle adopted is that water should flow from clean to polluted or from nutrient-poor to nutrient-rich. In this way a stable gradient situation can be maintained. This principle was first formulated by Van Leeuwen (1966) and elaborated by Van der Maarel (1975). Both authors investigated the conditions for stable ecological diversity in landscape. The basic idea has been successfully applied to habitat

10 Geldof, De Braal & Tjallingii, 1996), with the help of the simulation programme TAUWSIM, a more refined calculation confirmed that for seasonal storage the relation between open water surface and level fluctuations is in this order of magnitude.

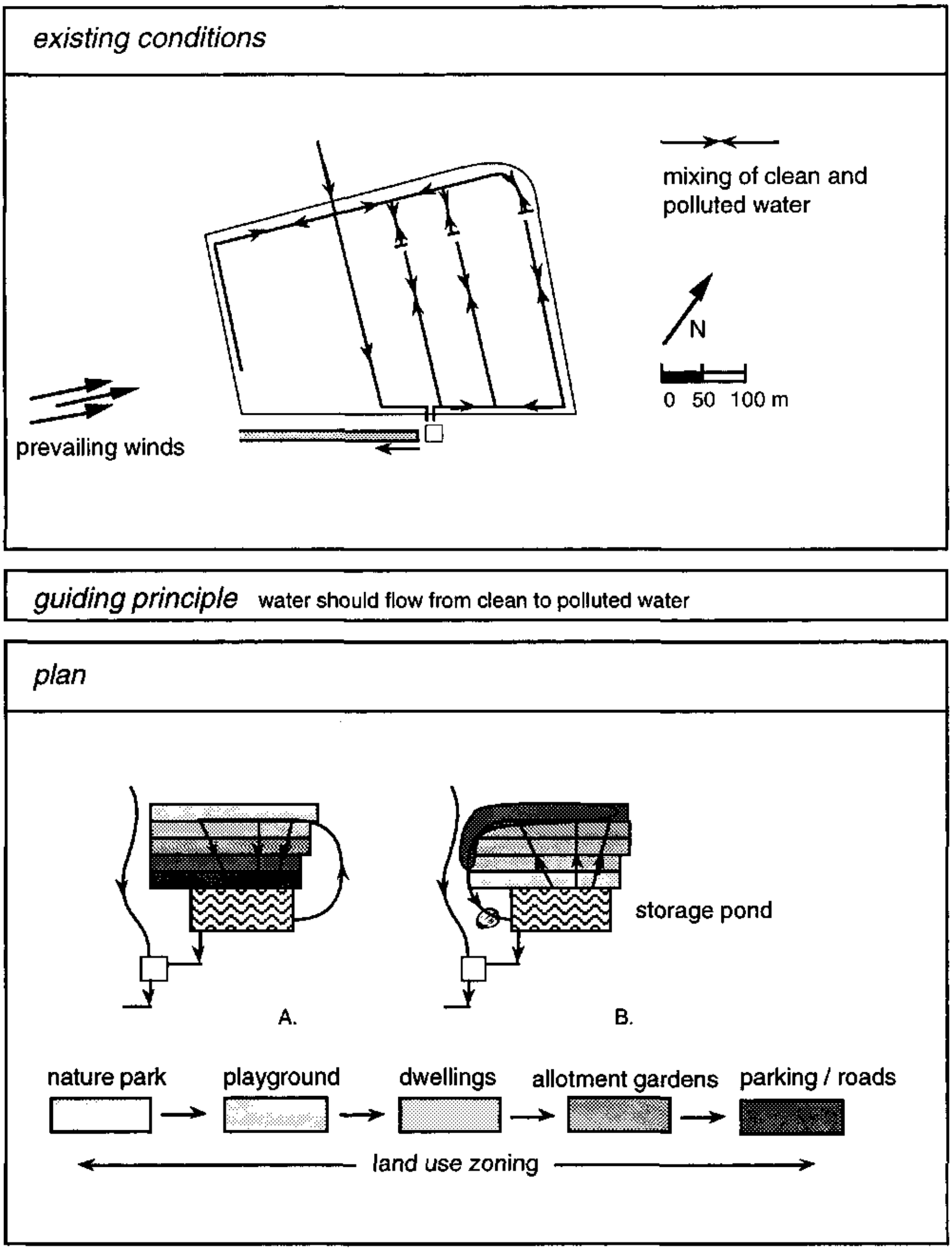


Figure 11.5:
Orientation.

construction in parks by Londo (1977). Its implementation in this case requires a zoning of polluting activities. General ideas about zoning in cultural landscapes proposed by ecologists (Van der Maarel, 1981) may now be translated into concrete and detailed design proposals. In the guiding models for the water chain in chapter 9.2 the principle was discussed at the regional level, here we use it at the detailed level of design.

existing conditions

Water flow in the main ditch to the pumping station is in one direction. But as shown on the map in figure 11.5 *existing conditions*, all the other ditches have water flows in two directions. As a result, relatively clean rainwater is mixed with polluted polder water. Further information about orientation aspects, the sun (north arrow) and the prevailing winds is also given on the map.

future conditions

First the relevant activities are listed according to their possible effects on water quality (figure 11.5 *plan*). Here the measures to prevent pollution are taken into account. Nevertheless, in spite of all efforts, there will be differences. These differences now may be a reason for the zoning of land use in the urban system. Water should flow through a sequence of land-use types from *clean* to *polluting* (or from nutrient-poor to nutrient-rich). We may also use the specific opportunities of series and parallel connections, discussed in figure 9.5 for the regional level, but at the detailed scale of the district the variety of options may be limited.

The design concept derived from the guiding model in Figure 11.3 *plan*, may now be elaborated. In figure 11.5 *plan*, two basic models are drawn using the sequence of land use as legend. Both in "A" and "B" water flows from the storage pond through zones of relatively clean land use to the central zone of the built up area. "A" represents a waterfront idea, whereas in "B" the pond is far away in the park. Clearly both models will only work if certain purification measures are included in the design of the storage pond. This might be a realistic possibility in view of the recent revival of wetland purification systems. Further discussion will follow under the appliances step.

STEP 4 SITUATION (figure 11.6)

Both the rhythm and the orientation steps deal with aspects that are still a bit flying over the area. Now the design concept will land in the concrete details of the local situation.

guiding principles

First, optimal use should be made of the existing ecological structure. Here the abiotic structure (soils, relief) comes first because it is less flexible than the biotic. But biotic elements such as hedges, and other connecting corridors should also be considered. Manmade structures like dikes, ditches, buildings are equally important.

The second guiding principle is related to the new situation. Here the location, form and size of the elements in the plan should be designed as a spatial configuration that creates optimal conditions for the functioning of the new system.

existing conditions

Figure 11.6 *existing conditions*, presents schematic versions of soil and relief maps. The first is derived from the 1: 50,000 Soil Map of The Netherlands, Sheet 37O (Stichting voor Bodemkartering, 1972). Data on relief are taken from the 1:25,000 Ordnance survey map. A further field survey was required to complete the information on topography and soils. Work on the rhythm and orientation stages of design made it desirable to look for detailed height differences in relation to storage and flow direction options. Also the occurrence of seepage as a possible clean water source was a reason for a field visit. In the field a remarkable boundary can be seen separating the *ridge* and the *basin*. Within 10 metres a higher, drier, sandy clay environment with a lime-rich subsoil passes into a lower, wetter clay-over-peat environment. This is interpreted as an interesting *stable gradient* as mentioned above, and called a *promising gradient* in accordance with Baayens (1985). In this zone conditions exist for the development of a flourishing and diverse nature park, as demanded by the programme. Similar soil and water conditions at other sites around Delft show interesting plant and animal communities. The field visits, in short, primarily aimed at discovering opportunities.

Soils also differ in their suitability for building on. The clay soils are good to build on but the peat in the basin poses problems of subsidence: To prevent distortion, buildings will have to be erected on piles, following a long established Dutch tradition. But the maintenance of roads, parks and gardens is more difficult. To create dry topsoil, water tables may be lowered but as a result the peat will oxidize and subside. More frequently the soil is improved by bringing up a thick layer of sand. However, the weight of the sand again causes subsidence. In many residential areas built on peat in the Western part of the Netherlands subsidence is 10 cm per year or even more. If there is a thick layer of peat, as is the case in the study area, these problems may last for centuries. In similar places every five years 50 cm of sand is brought up, causing, of course, further subsidence. Clearly we cannot expect good quality urban plantings and green areas under these conditions.

future conditions, the design emerges

At this stage, for the first time during the design process, the different parts of the plan are put in their proper place and given suitable proportions (figure 11.6 *plan*). Given the situation of the study area it seems logical to concentrate building on the clay soils in the western and northern parts. The park and the storage ponds may best be situated in the *basin*. The *promising gradient* is best suited for the nature park, designed as a northern extension of the park.

The water system of the adjacent polder can be connected with the pumping station by a main water course in the western fringe. The existing ditch should be extended for this purpose. The design of the other water courses is also based on existing ditches. From the storage pond the water may best be channelled to a central

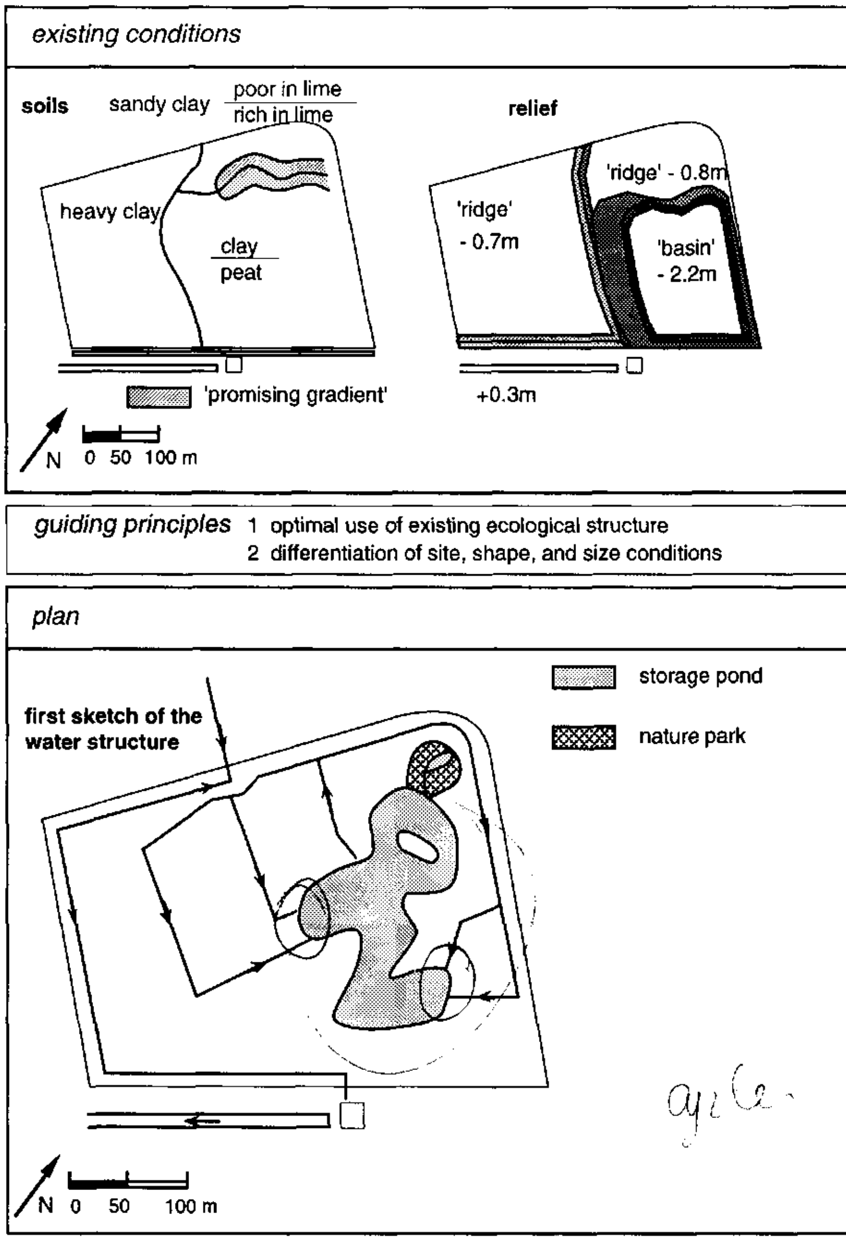


Figure 11.6:
Situation.

place in the encircling canal dividing the water over the built up area from which it runs back to the storage pond. The discharges into the pond are situated as far as possible from the nature park area. They are also clustered in order to allow for wetland purification treatment.

The shape of the pond is designed taking into account the prevailing wind as major ecological factor in the differentiation of life in shallow lakes. With the shape chosen, the fetch varies from place to place. If desirable this shape may be simplified considerably, while retaining the general idea.

At this stage the design seems to correspond to model "B" of Figure 11.5 *plan*, the storage pond being part of the park and situated some distance from the built up area. Looking more closely it appears that it will be possible to build close to the water along the western shore (model "A"). On the northeastern shore the design resembles model "B". There, however, no water runs from pond to buildings or vice versa. The nature park at this site can be provided with its own source of clean water, where seepage water from the *ridge* comes to surface. If a one-way flow is guaranteed, water quality will stay good.

STEP 5 APPLIANCES (APPROPRIATE TECHNOLOGY) (figure 11.7)

As the last step the appliances are designed, as a final touch that makes the system technically operational.

guiding principles

Technical constructions, appliances or devices should be installed in order to the enhance the selecto-regulator operations of rhythms, orientation and situation. Furthermore, the technology should be simple to operate, easy to maintain and robust.

existing conditions

Technical selectors in the existing situation of the water system are modest but effective for the functioning of the pasture. The pumping station, of course, is the essential device to be used in the plan.

future conditions

Power is required to bring the water from the storage pond to the higher level of the urban water courses (see figure 11.6 *plan*). A windmill or an electric pump will supply the necessary power. But the windmill may also operate as a generator for the electric pump. An additional advantage of a windmill is that it is a visible sign to the inhabitants that the water system is functioning.

Wetland purification is planned at the two sites where the urban water courses discharge into the pond. Various wetland systems are available (Duel et al., 1993; Mönninghoff, 1986). The *Root zone* system developed by Kickuth (1984) seems to be most effective, removing organic substances as well as phosphate, nitrogen and other contaminants. Being a dry system, this type of purification

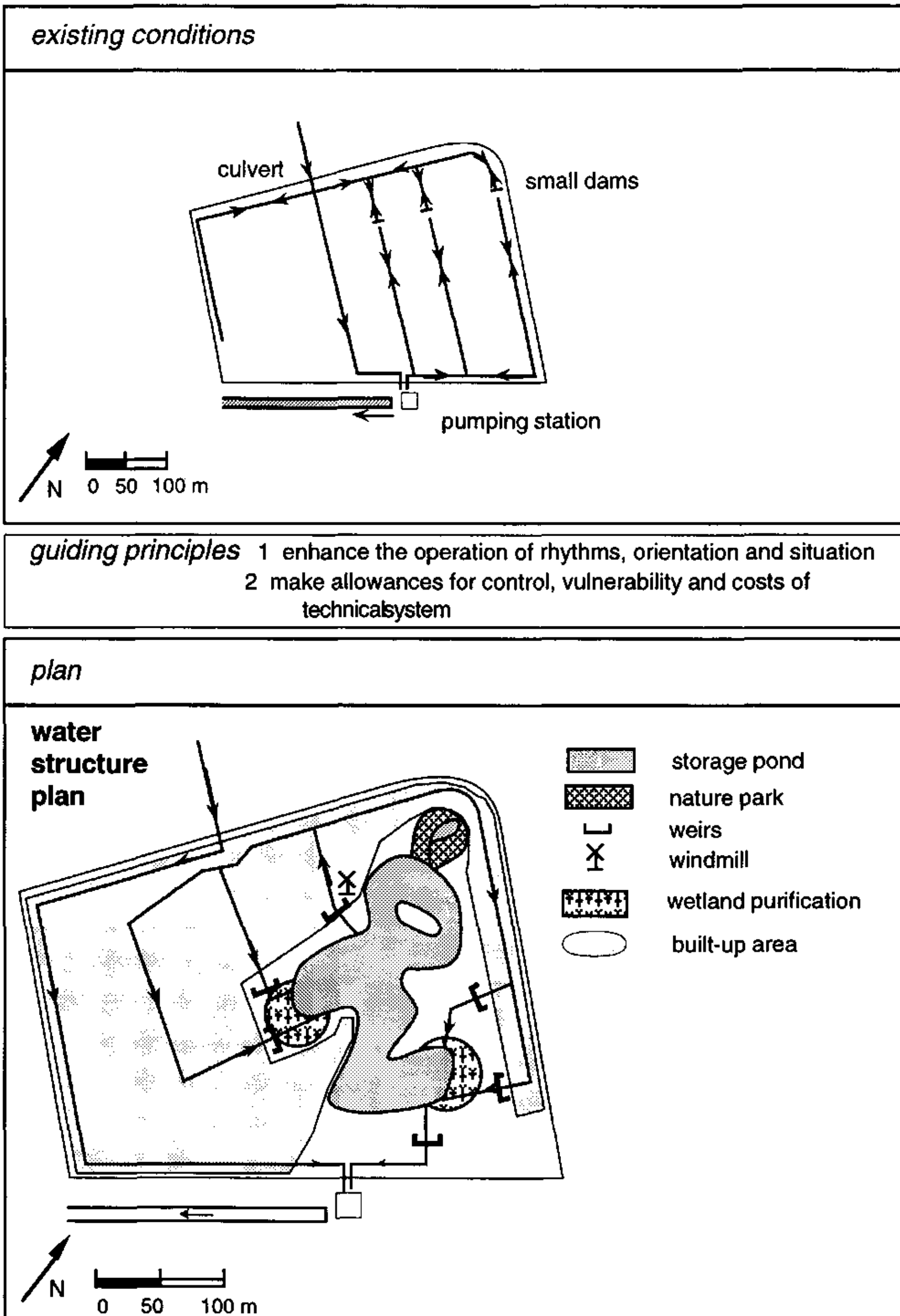


Figure 11.7:
Appliances.

facility, however, is more difficult to combine with other activities. It will be more easily disturbed and therefore it has to be protected by fences. A bulrush wetland, designed as a part of the pond, may be more attractive but is less efficient in removing pollutants.

Most important for the functioning of the water system at the district level are appliances and technical measures taken at the scale of buildings, roads and parking places: the details of prevention (P) and source control (S) as indicated in the guiding model. If these measures are effective, concentrations of pollutants will be low. In that case a more simple wetland purification by a marshy zone along the shores of the pond will provide a satisfactory solution.

DISCUSSION

Three questions that triggered this case study were mentioned in the introduction to this section. If we return to these questions a few remarks can be made:

1. It seems possible to design a water system that was described as *self-reliant* and *self-responsible* for a residential scheme at this scale. The plan indeed internalizes the principles described in the *responsible flow* paragraph of section 8.3. The Vrijenban case-study, as a pilot study, produced insights that were used in the making of real plans for real clients. In the mean time some of these real plans have been implemented. I will discuss one of them, Morra Park, in the concluding section of this chapter.

2. The PROSA approach step by step links explicit theoretical assumptions to practice. The result is a structural planning proposal for the whole area that can be evaluated both for internal consistency and for feasibility. This learning process may produce other planning proposals based on the same guiding model. But the assessment may also criticize the guiding model itself.

   Apart from the formal learning process, there is the joy of discovering new details, new solutions and.. new problems. It also makes one discover opportunities that were hidden in maps and reports, or were only to be seen in the field. The PROSA approach has been a useful and inspiring tool in a number of design and planning projects.[11]

3. By formulating guiding principles at each step the design process is open to both public and expert discussion about facts and value judgements. As a result, more transparency is brought into the interdisciplinary discussions and in the communication with clients and future users.

11 PROSA has been used, so far, in making plans for Amsterdam: Nieuw-Oost (Tjallingii & Dubbeling, 1989); Drachten: Morra Park (Tjallingii,1991d); Delft: Ecodus (SEV, 1993); Den Haag: Ypenburg (Jonkhof & Tjallingii, 1995a); Nijmegen: Waalsprong (Claringbould & Tjallingii, 1993); Vleuten: De Tol (Van Engen & Tjallingii, 1994); Hengelo: Vossenbelt (Jonkhof & Tjallingii, 1995b), Amstelveen (Tjallingii, Spijker & Jonkhof, 1996).

Unlike a list of standards or a map with limiting conditions, the water structure plan that results from the PROSA procedure is a positive contribution to the structure of the plan. Working with the procedure in a number of projects learned the approach has potential to interest architects, town planners and civil engineers in this way to integrate ecology in urban planning and design.

This section described a detailed procedure for the design of a water structure-plan. How does this procedure fit in a real planning process? This is the question that will be answered by the concluding section of this chapter.

11.3 The Morra Park case

The rigour of a step by step approach may seem contrary to the creative process of design. However, one should not follow the method too rigidly. The advantage of considering the questions generated by the PROSA steps is a close link between research and design. This link produces detailed information on different design options. The diversity of options is essential in consensus forming and in the elaboration of details geared to the specific wants of the future users. This will be demonstrated by the case of the planning of a small new residential scheme called Morra Park. The description of the case is largely based on De Haas, 1995; Gemeente Smallingerland, 1995 and Tjallingii, 1991.

THE ACTORS

a short history

For the discussion on Morra Park we go back to Drachten, a town with approximately 50,000 inhabitants in the northern province of Friesland.[12] In 1988 four small firms approached municipal officials with a proposal for a housing project including houses combined with studios, surgeries, offices etc. on the western edge of Drachten. The officials reacted positively to this initiative.[13] They seized the opportunity of combining it with their dream of realizing a pilot project that would explore the feasibility of what was called *sustainable building*, the elaboration of sustainable development for building. Although this concept was becoming more popular at that time, it was still rather vague. The municipal planners wanted to find out the practical options, as did provincial and national authorities. The latter were prepared to fund extra planning efforts for a pilot project. It was against this background that a steering group was formed in which a variety of actors took part: officials from various municipal departments, the province of Friesland, a private

12 Intermezzo 2 focused on planning dilemmas related to the urban expansion of Drachten.
13 In Dutch practice, as a rule, the local authority takes the lead in developing new residential and business areas. The municipality buys the land and has the groundwork (including drainage and sewerage) done. It then sells the ready-to-build land to private developers or to social housing corporations (semi-government). The local authority's investment involves risks of course. Therefore, municipal officers take an interest in contacts with potential builders, because their presence has a leverage on the realization of plans.

developer, a housing corporation, two architects and two consultants. Later, the regional water board, responsible for surface water management in the area, also became a member of the steering group. This group was in regular contact with the local government officials and council members who,ultimately, had to take the operational decisions on behalf of the municipality. Later, the housing corporation organized meetings for future tenants to discuss the plan and to make their needs and wants known. The future owners of owner-occupied houses were informed by the group of initiators and by the developer. So the participation of future users and residents focused on their houses, whereas the steering group prepared the plan for the structural conditions that were approved by the local council. The final plan for Morra Park evolved: a 14 ha area with 125 houses (see figure 11.8). Building started early in 1991 and later that year a special information centre was opened which was visited by people from all over the country. The pilot project turned into a real demonstration project.[14]

making sustainable development operational

The steering group developed a spirit of cooperation by making excursions to other projects in The Netherlands and in Germany and by meeting frequently to discuss opportunities and constraints. The first step in the making of a sustainable plan was a report on levels of quality for different themes (BOOM consultants, 1990). For a number of themes, such as water, traffic, building materials, energy, waste treatment etc., the report described four levels of quality:

A. The highest attainable level,
B. The level of minimal impairment,
C. The level of reduced impairment,
D. The level currently used in practice.

The four levels were specified in detail for each theme. The annual energy consumption per household, for instance, is 1400 m^3 natural gas equivalents (D level), 1150 (C level), 840 (B level) or 560 (A level). Specifying the options in this way made it possible to consider the functional, architectural and cost implications of different ecological options. Naturally, the intention of the steering group was to improve the level currently used in practice. The A level, as a rule, was considered too radical. Therefore, in most cases the discussions focused on the B and C levels. The quality level of certain themes, like traffic, the water system and the plan for green areas, had to be decided by the team for the whole area. A more flexible policy was adopted for other themes. Builders and architects, for example, could opt for the B level in building materials and for C in energy, or vice versa. The building plan was awarded points for each theme. The total number of points had to attain a minimum, to be checked at the moment the building permit was issued. The *four variants method*, as the approach was formally described by Duijvestein (1993), structured consensus building and stimulated discussions on implementation. As a result of these discussions the actors in the planning process operationalized the vague concept of sustainable development (De Haas, 1995).

14 The Demonstration Plans' Secretariat of the National Physical Planning Agency, which subsidized a small but symbolically important part of the making of the plan, published a special brochure on Morra Park. (Demonstration Plans' Secretariat, 1991)

In the Morra Park case the result was a plan that creates conditions for a B level water system and a C level traffic system. Both will be described below. At the level of the individual building site, there is a flexibility that allows for a variety of individual solutions. The costs of this new approach were actually slightly lower than they would have been if standard practices had been followed (Gemeente Smallingerland, 1995).

FLOWS

water (see figure 11.9)

The water system was designed following the PROSA steps on the basis of the *circulation model*, the guiding model for lowland conditions that was described in section 9.2, figure 9.4. The system has two ponds with a seasonal and peak storage function. Because a small windmill pumps the surface water round, actually the whole system contributes to the seasonal storage. This implies a fluctuating water level, which was taken into account when preparing the site for building. To prevent problems of damp in houses in periods of high water level, the houses in one low lying corner of the area have been built without the gap between the floor and ground (called crawl space) which is traditional in Dutch houses. These underfloor cavities for ventilation may cause problems if they become filled with water. Crawl spaces, however, are not essential for the building construction. This is just one example of a technical detail that can easily be solved, provided there is good communication on the way parts should contribute to the quality of the whole.

The water quality system starts on the roof, where zinc gutters are prohibited to prevent pollution. At the street level oil and other pollutants from parking lots are first separated from runoff water before this water runs into surface water. To this end parking lots have been concentrated, as shown by the layout detail in figure 10.10. Such measures do not prevent runoff water to pick up some dirt of the road. Therefore, some provisions have been made for purification in the circulation system. In this system the water runs into a pond on the southern edge of the area, as can be seen by following the arrows. There, the water passes through a purification wetland of bulrushes, before flowing to the northern corner of the plan where it is pumped up to a higher level and again enters a purification wetland. Then the clean water is stored in the pond that accentuates the entrance to Morra Park. From there, the surface water starts a new circulation cycle. An analysis of water quality parameters performed by the Agricultural University at Wageningen in collaboration with the regional water board, showed that the phosphate content in Morra Park is nearly 0.1 mg/l, whereas the water from the polder outlets of Friesland, which would have been pumped into this area if the plan had been conventional, contains 0.4 mg/l phosphate. The official Dutch standard is 0.15 mg/l.[15] Similar differences are found for nitrate. These figures confirm the message told by the luxuriant growth of higher plants in Morra Park's waters.

15 The figures given here are averages for the year 1994, after the water system had been operating for three seasons.

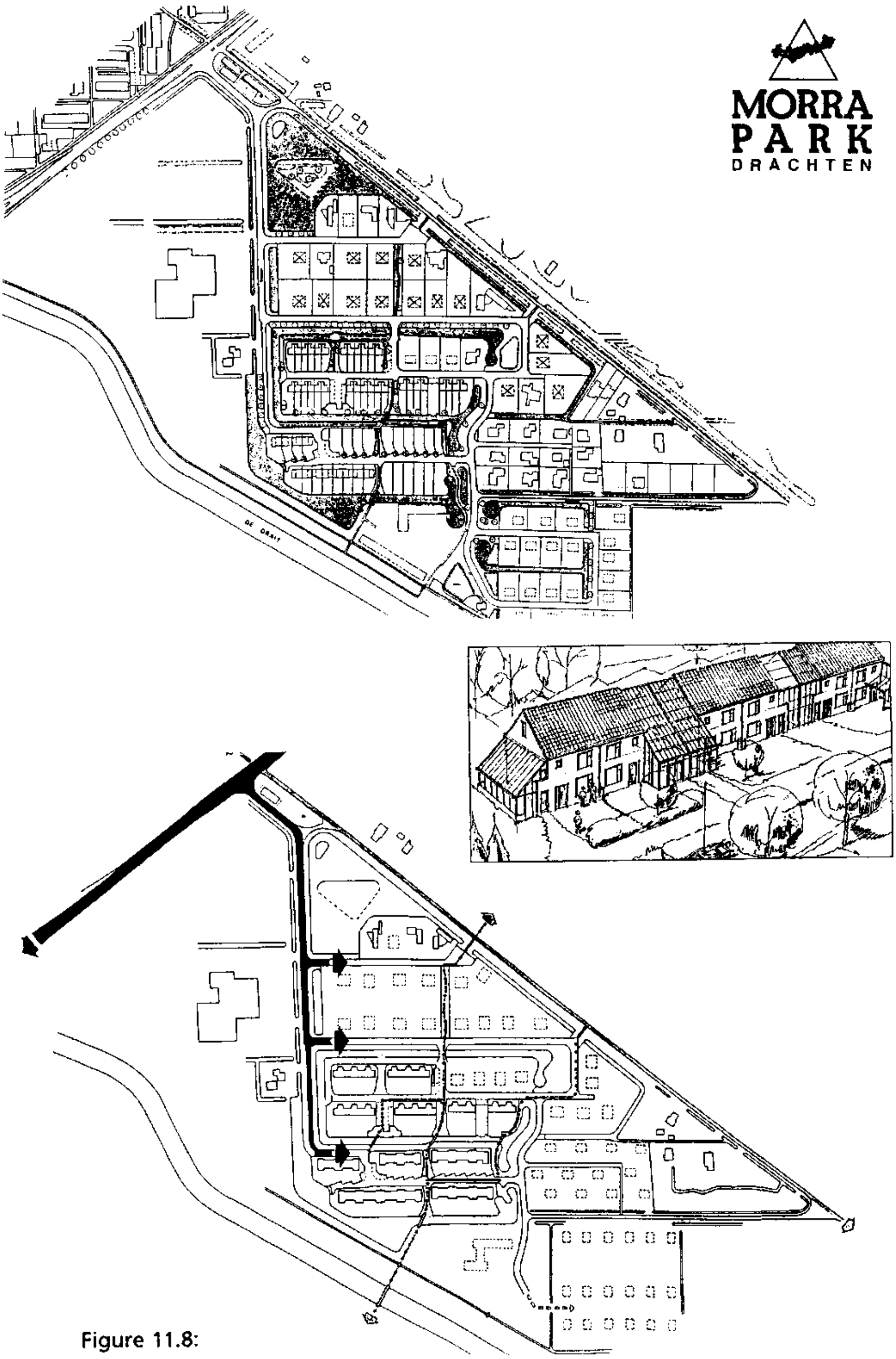


Figure 11.8:
Morra Park.
source: Gemeente Smallingerland, 1995.

traffic (see figure 11.8)

The traffic system allows good connections for cyclists to the town centre, which is to the northeast. Cars can reach all houses easily, but there is no through traffic.

THE AREA

Several elements of the plan use the potential of the original landscape. The northern corner is about one meter higher than the southern part, as a result of a small ridge. In designing the water plan it was therefore decided to let the water run to the south and use a small ditch on the western edge to conduct it to the northern corner where the windmill pumps it up again. In this way the water system uses the potential of the slightly sloping original landscape. An additional advantage of this dicision is that by following even a minor slope, less sand is required to level the ground to prepare it for building.

New opportunities originated from the digging of watercourses. The excavated loam was used to create hillocks in three places, for children to play on and to diversify the habitats for plants and animals.

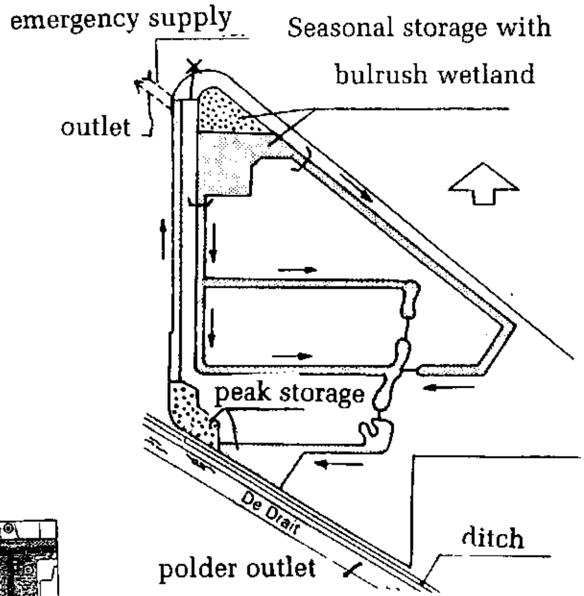
The land use of the area used to be meadows with alder hedges. Some of the old hedges are now part of the new residential district. The alignment of plots of land also follows the old orientation. Thus there is visual continuity between the new built-up area and the adjacent old meadowlands with lines of alder.

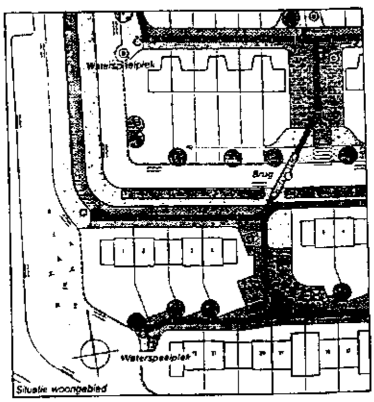
11.4 Summary and conclusions

To conclude chapter 11 I will return to the issue raised at the start of this chapter: the steps from guiding model to the individual plan. I have taken the plan for a new residential area as an example, but there is no reason why the approach should not be applicable to other types of planning tasks such as renovating existing urban areas or planning for rural areas. Indeed, the PROSA approach enables these differences to be coped with when making the plan. In all cases one needs a general guiding model that should not be used as a dogmatic static standard, but as a flexible core-idea that should be carefully attuned to the specific conditions of an individual case. The PROSA approach demonstrates the possibility of connecting research and design closely, step by step. Thus the approach discussed in this chapter shows the alternative to the method adopted by the Kromme Rijn project that was the starting point of this book. The Kromme Rijn way of linking ecology to planning is typical for the survey-before-plan approach that was criticized in section 7.2. PROSA is an example of a combined survey and planning process that opens the way for discussion about facts and values, about *objectifying in context*, to use the expression of section 5.1.

Opting for water as a starting point for planning processes of the Morra Park category has several advantages:

- thinking about the role of water, especially rainwater and groundwater, is an





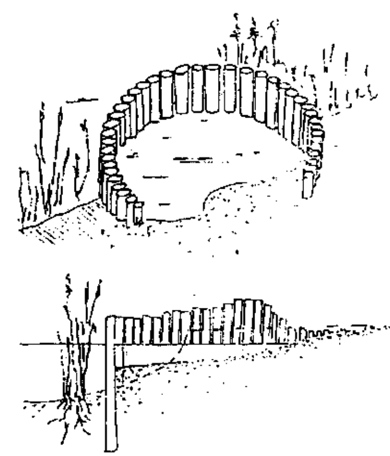


Figure 11.9:
Morra Park, water system.
source: Gemeente Smallingerland, 1995.

interesting entrance to the planning issues concerned with spatial organization; it links the existing drainage system to the measures related to a change of land-use.

- water also links polluting activities to the neighbours that may be affected or constrained in their plans; in the Morra case, building materials and pollution of parking places were taken into account; in other cases diffuse pollution from agricultural use or from combined sewer overflows in an existing urban situation might be the relevant issues.
- water is an element of the aesthetics of the place; therefore it may play a role in making ecological processes visible to residents and visitors of the area; if the designer does not opt to make ecological processes explicitly visible, he or she nevertheless needs to reach agreements with the other actors involved in using and maintaining water.

Of course planning is more than water, but water is more than meets the eye. As demonstrated by the Morra case, planning with water structures a planning procedure that otherwise puts all relevant issues on the agenda.

IV CONCLUSIONS

12. GOOD CONDITIONS

There are many different approaches and strategies in environmental planning. What difference does it make to follow the track of the Ecological Conditions Strategy? In this concluding chapter I will highlight the main features of this strategy, looking at the approach, at the fundamental issues and at three practical implications: the making of guiding models, planning as a learning process and two-tier decision making.

A GOOD CONDITIONS APPROACH

It is not uncommon to find spatial plans that start their analysis with a map called *constraints*, or *limiting* conditions. Such a map usually shows valuable areas for wildlife and valuable old buildings combined with noise nuisance zones, pipelines and heavily contaminated soils. It is also not uncommon to find environmental policy documents hammering on the need for hard figures to justify making the *sacrifices* required to meet environmental standards. One wonders whether the attitudes expressed by these approaches to environmental planning are part of the solution or part of the problem.

My point in this book is to start at the other side, the side of creating carrying conditions instead of *limiting* conditions. The main practical argument is the need to mobilize the potential for synergism instead of mobilizing the creativity to evade rules. Acknowledging the fact that we will need to indicate some limits, the priority lies with creating carrying conditions. Such an approach I call a *good conditions* approach. The Ecological Conditions Strategy belongs to this category. Opting for good conditions as the pivot of an ecological strategy makes a difference compared with many conventional planning and management practices. The focal point is not how far we can go with polluting and squandering activities, but how we can change them so they become sustainable and environmentally sound. This approach has become known as *ecological modernization*, a *discourse* seeking to combine innovation of current practices with *internalizing* ecological values in activities. Activities, here, are environment-use activities and the values involve strategies to improve their sustainability and their contribution to the habitability of the habitats for humans, plants and animals.

One cannot speak about good conditions without defining *good*. The Ecological Conditions Strategy clarifies *good* in three decision fields: *areas, flows and actors*. *Good*, including concepts like *sustainable* and *habitable* is rendered operational in the context of management and planning decisions in these three fields. The emphasis is not on criteria to assess plans and projects but on formulating guiding principles and guiding models (solutions-in-principle) for the making of plans. In doing so, the issue is *how to make* a good plan rather than what is a good plan. This choice resulted from frustrating experiences with assessment procedures with good criteria in the absence of good plans.

Adopting this approach has implications for research priorities too. Thus my priority is not to research *ecological standards* indicating the limits to activities, but to develop guiding models to make these activities more ecological. I would also not recommend focusing research on assessing *nature's values*, a research programme that aims at making wildlife more equal to other land-use functions by increasing its *price*. Unsatisfactory experience with that approach in the Kromme Rijn project led to the search for alternatives to the defensive approach of increasing prices or imposing standards. This search led to the Ecological Conditions Strategy.

In the context of the Ecological Conditions Strategy the difference between carrying conditions and limiting conditions makes a difference in practical matters concerning planning and research. However, the two approaches also show fundamental differences.

TWO "LANGUAGES"

The fundamentally different approaches are best described by the metaphor of the two *languages*: the *language of control* and the *language of interaction* (see figure 7.6). *Language*, here, is a metaphor for a *discourse* which has its own internal rationality of concepts that are interlinked. Both languages play an important role in planning. We need the two to create good ecological conditions, but the Ecological Conditions Strategy gives priority to the *language* of interaction. First, I will describe the two *languages* briefly with key words that take us through the discussions of chapters 4 - 7. The figures refer to the sections. For the sake of discussion I have sharpened the contrast between the two languages.

the language of control

The metaphysical *model of the two worlds* (Descartes) places man and nature in opposition to each other. This fits in very well with a basic attitude in which man wants to control nature or to be in control. Human action towards nature is self evident in this thinking. What needs to be justified therefore are the *limits* imposed on humans for environmental reasons. The *deontological ethical theory* fits into this picture; it is based on obligations (4.1). The need for the obligations has to be justified by scientific research about the direct risks or about the carrying capacity of the earth. Moreover, the limitations should be the same for everyone. Therefore they should be justified in an objective way, preferably - beyond discussion - (5.1). This requires complex wholes to be *reduced* to simple cause and effect and simple goals and means relationships. This is why *cleaning technology* with easily measurable effects tends to be preferred (5.2). Reducing complexity produces the hard figures required. Preferably, value statements are left out. One is looking for instruments that are thought to be neutral such as cost-benefit analysis (5.4). Dealing with risks, in this control-oriented approach, implies primarily risk-avoiding fail-safe solutions (6.2). The planning tradition that best suits to this *language* is *policy analysis* with its tendency towards the technocratic concept of decision-making. Direct regulation is the preferred policy instrument to achieve goals (7.1). The role of the government may be either one of strong control (*the engineer model*) or a receding role, limited to the role of a referee between competing interest groups. In both cases there is a need for objective hard figures (7.2).

the language of interaction

The metaphysical *one-world model* (Spinoza) conceives of man as a part of the unity of nature. This fits in very well with a basic attitude in which man and nature are seen as *partners*. If living together (also in the sense of man living with nature) is the essence of life, then a *teleological ethics* which includes nature in the concept of good life is the most obvious choice (4.1). To use this ethics as a basis for action requires an understanding of complex relationships between humans and their environmental context. This is in keeping with Popper's view of objectifying by an open discussion about statements, taking into account their context: both the context of interpretation and the context of the observed object. In (5.1) this was called *objectifying in context*. The approach tends to appreciate indirect conditional relationships between causes and effects and between goals and means. Thus there is space for a preventive conditional approach to environmental problems (5.2). An explicit discussion on values is typical for this approach. This suits a *two-tier approach* to decisions on values, about which I shall say more below (5.4). Dealing with risks in the interactive approach is giving attention to "safe-fail" options, to living with risks rather than avoiding them. This may lead, for example, to a preference for enlarging a floodplain with spillways rather than building higher dikes (6.2). The planning tradition that best suits to this language is *social learning* with its emphasis on communicative interaction and learning by doing (7.1). The role of the government in planning is best described by the guide model which emphasizes cooperation of actors in the planning process. This role goes well with interactive instruments like covenants (7.2).

interaction and control as two discourses

The two languages are not causal chains. The relationship of the links in the chain is best described as conditional. There is an internal rationality that makes it unnecessary to explain why one point of view is combined with another as long as one stays within one language. The different positions are linked by a discourse, by a way of reasoning and by the institutions justified by a way of reasoning. The relevance of this metaphoric representation is the analysis of the role of the two languages in day-to-day decision making. This may be illustrated by the making and the assessment of plans (conceived as frames for making decisions).

priority for the language of interaction

This book argues for the language of interaction to be accorded a more important role. Part II discusses the theoretical arguments for this. Part III demonstrates the practical feasibility. Summarizing the arguments to give priority to the *language of interaction* by starting with the interaction options, I may list the following points:

1. Starting with interaction is a way to avoid *premature programming* and *premature consensus*. Multi-dimensional issues should not prematurely be reduced to one dimension.
2. The psychology of stimulating and limiting conditions requires starting with the *carrot* and ending with the *stick*.
3. The interaction creates basic conditions for coexistence and cooperation of environment-use activities instead of competitive war. This does not exclude

competition as a powerful and effective instrument at the micro-economic level.

4. The language of interaction reflects a *learning* attitude that is essential in dealing with risks in a changing world.

The *good conditions* approach is interactive, not by excluding control but by starting with interaction. The approach gives priority to interactive *stimulating or carrying conditions* and, only complementarily and as far as necessary, adds controlling *limiting conditions* to the planning programme.

Elaborating the good conditions approach leads to concrete strategic proposals for the three interlinked decision fields: areas, flows and actors. Bearing in mind that the three come together in the plan, we may look at the plan from each of these angles separately. This is what Part III of this book does. It describes strategic guiding models that use areas or flows as an entrance to the making of plans. In this book I do not discuss formal guiding models that take the actor entrance. However, the structuring of the learning process prepares the ground.

STRATEGIC GUIDING MODELS

Guiding models guide us from knowledge to action. They represent the solutions-in-principle for certain categories of decision situations. Some of them have a special strategic meaning: the "strategy of the two networks" addresses the plan from the area angle, the "sandwich strategy" addresses it from the flows angle.

the strategy of the two networks

This strategy takes the area as its starting point. The Strategy of the Two Networks originated from a search for a guiding model that should be able to cope with the persistent problems of suburbanization. The approach adopted by the Strategy of the Two Networks is to focus planning efforts on the carrying structures of *water and traffic systems.* The strategy conceives of the water network (including groundwater flows) as a carrier for activities like quiet recreation and wildlife conservation. The traffic network is planned as a carrier of activities like agriculture and manufacturing industry. The two networks combine their capacity of carrying a zoning plan and their function of managing flows. Thus the Strategy of the Two Networks combines ecologically sound flow management with using the ecological potentialities of the local landscape. The networks themselves form a sustainable backbone that creates space for flexible decisions. Public transport axes may carry urban growth in a process of development that keeps intact town-country contrasts. The traditional area-covering red and green plans give way for process-oriented *blue and grey* network plans.

The carrying structures are less than pictures, they do not provide a detailed image of the final result. In fact, there is no single final result. The carrying structures are also more than pictures; they link the visible physical and social processes to the invisible ones.

the sandwich strategy

This strategy takes flows as its starting point. The Sandwich Strategy originated from discussions on upscaling versus downscaling flow management. The strategy rejects the extreme upscaling and downscaling positions. Large central facilities may sometimes seem efficient from a technical or economic point of view but ignore the human actor side of consumer commitment. The extreme downscaling position, leading to the *autonomous home*, ignores the division of labour in cities. Instead, the Sandwich Strategy opts for a policy of the government (the top layer) of *creating conditions* to stimulate environmentally sound behaviour of households and enterprises (the basic layer). The *layers* stem from a diagram of levels, from the building to the national level of organizing flow management. An important role is assigned to *visible projects* at the intermediate (neighbourhood to city) level. A learning process based on these conditions and projects may open up new prospects and provides a strategic answer to large irreversible investments that frustrate preventive and source-oriented measures. Thus, it seems, the difficult road to sustainability has to be explored. The Sandwich Strategy addresses the synergistic potential of the chain. In doing so the strategy does more than impact assessment or output analysis that usually only addresses individual links. Moreover, the Sandwich Strategy links flow management to area and actor aspects.

THE LEARNING PROCESS

The search for ways to incorporate ecological thinking in everyday activities started with learning from design and planning projects.

structuring the learning process

In this book I propose *structuring a process of learning* from planning projects. An important step in this learning process is generating *guiding models*, solutions-in-principle that may guide managers, planners and designers in the making of individual plans. Guiding models may be the focal point for evaluative studies and herewith the development and improvement of guiding models becomes a central issue of research. The structure of the learning process proposed in chapter 8 contains the following elements: developing shared aims, guiding principles (what to do?), guiding models (how to do it?), evaluation studies, pilot projects, scenario studies and a forum to assess and feed the learning process.

learning and risk

The role of learning is important at two levels: the level of improving performance in day-to-day decision making and the level of long term change that requires changing physical and social structures. The latter is the category of learning that involves research, strategies and pilot projects. This learning process is also highly relevant for coping with uncertainty and risk. In chapter 6 I argued that the abstract weighing of environmental and social risks is a blind alley leading away from ecological modernization. In the face of environmental risks such as global warming or acid rain, there may be not enough political support for general incentives, for instance for increasing energy prices. But starting a programme of learning from pilot projects for energy saving in buildings does not involve social risks and may bring about an increase in social support. Moreover, if an environmental crisis increases public support, then not only the problem but also the solutions will be on the political agenda. Learning is anticipating.

In the Ecological Conditions Strategy, the clue to dealing with uncertainty and risk is learning by doing, not certainty and control.

TWO-TIER DECISION-MAKING

This book does not conceive of environmental planning as a matter of distributing commodities. Rather, creating ecological conditions is the central issue. Like infrastructure, ecological conditions belong to the domain of macro-economic decisions. This is the first tier in the two-tier *approach* to decision making developed by *ecological economists*. Decisions about goal and context are in the first tier and decisions about optimizing means and allocating funds in the second. In other words, the approach separates creating conditions from performing activities.The case studies presented illustrate how a two-tier approach can be used in environmental planning. This leads to a strategy of first-tier decisions about carrying structures (financial, spatial, social, ecological) creating conditions for second-tier decisions about location choice and claims. Thus an alternative is offered to the unsatisfactory use of cost-benefit and multicriteria methods in these cases. Typically these methods are second-tier approaches, reducing complex situations to a simple matrix by means of weighting and aggregation. Integration, however, is more than aggregation. Ecologically sound integrated plans first require good conditions. These provide the first criteria for decisions in environmental planning. Creating Ecological Conditions goes beyond static decision making. It puts day-to-day decisions in the perspective of a dynamic process of social learning.

SAMENVATTING

Dit boek gaat over stad en land, over de ruimten en over de fysieke en sociale processen. Het gaat vooral over de *ecologische condities*, de ecologische voorwaarden die de basis vormen voor ons leven en overleven en over de vraag hoe wij die voorwaarden kunnen scheppen of herscheppen. Ecologie wordt in dit boek niet alleen op planten en dieren betrokken maar vooral ook op mensen. Centraal staat het maken van plannen die richting geven aan onze dagelijkse beslissingen op het gebied van ruimtelijke ordening en milieu, bij de stedebouw en de landinrichting, en bij het beheer van groengebieden, water- en verkeerssystemen, in het algemeen gesproken dus om plannen voor de omgang met onze fysieke omgeving. Het boek is geschreven voor hen die bij het maken van deze plannen betrokken zijn. Daarbij is de Nederlandse situatie het vertrekpunt, maar de meeste problemen en oplossingen, de benaderingen en de perspectieven spelen in de een of andere vorm in vele delen van de wereld. Het boek wil een bijdrage leveren aan de internationale discussie.

Het *eerste deel*, CONTEXT, gaat over de achtergronden en de praktijksituaties waarin de strategische concepten uit dit boek zijn ontstaan. Het *tweede deel*, FUNDAMENTELE VRAGEN, gaat in op de onderliggende kwesties die opgeroepen worden bij het werken met deze concepten-in-ontwikkeling. In het *derde deel* , VAN STRATEGIE NAAR PLAN, worden de conclusies uit deze discussie verwerkt in een nieuwe formulering van de *Ecologische-Condities Strategie*, waarvan de kerngedachten eerder als *Ecopolis* zijn beschreven (Tjallingii, 1995). Deze strategie wordt vervolgens uitgewerkt in *gidsmodellen*, en in ontwerpstappen voor het maken van een individueel plan. Hiervan worden in de laatste hoofdstukken voorbeelden gegeven. In het vierde deel, CONCLUSIES, komen de hoofdlijnen van het boek samen.

Met het begrip *condities* wordt in dit boek bedoeld: fysieke en organisatorische *structuren*, zoals wegen en wetten. Daarbij horen institutionele *voorwaarden voor leerprocessen* die gericht zijn op veranderingen in de richting van een meer duurzame interactie met onze fysieke bestaan. Het begrip *duurzaamheid* wordt in dit boek in drie dimensies uitgewerkt: in de omgang met gebieden, met stromen en met actoren. Dit zijn drie velden waarin beslissingen verantwoord moeten worden. Als we hierbij ecologische criteria gebruiken kunnen we spreken van *ecologisch verantwoord.*

Condities vormen de dragers voor individueel gedrag en voor *milieugebruikende activiteiten*, een begrip waarmee georganiseerd milieugebruik aangegeven wordt: produceren, bouwen en beheren en de directe interacties met het fysieke milieu die daarmee samenhangen. Het begrip grondgebruik is hier te beperkt, ook water en lucht worden gebruikt. Als we streven naar een ecologisch meer verantwoord maken van milieugebruikende activiteiten, dan spreken we van *ecologiseren* of van *ecologische modernisering* van deze activiteiten.

DEEL I : CONTEXT

1. EEN PERSOONLIJKE ZOEKTOCHT

Dit hoofdstuk gaat over de context waarin de *ecologische condities* benadering is ontstaan. Het beschrijft een aantal momenten in mijn persoonlijke zoektocht tussen 1970 en nu naar de vraag " hoe kan ecologie bijdragen tot een goed plan?". Deze vraag spitst zich aanvankelijk toe op de bijdrage van ecologische inzichten aan het maken van basiskaarten, zoals bodemkaarten. Vervolgens wordt de aandacht gericht op de rol van basiskaarten en waarderingskaarten bij het maken van plannen. Maar al snel wordt de vraag gesteld hoe een ecologisch verantwoord stedebouwkundig plan gemaakt wordt.

In dit hoofdstuk wordt duidelijk hoe in reactie op vragen uit de ontwerppraktijk een *procesgerichte ecologische benadering* is ontstaan. Deze maakt gebruik

- van ecologische inzichten die voortkomen uit de ervaringen van beheerders,
- van een analyse van mogelijkheden tot preventie van milieuproblemen,
- van interdisciplinaire samenwerking, en
- van een systeemtheoretische beschouwing.

In de ecologische benadering wordt, onder invloed van de ervaringen in onderwijs en praktijk, steeds meer nadruk gelegd op de ruimtelijke en organisatorische structuren die voorwaarden scheppen voor verschillende vormen van grondgebruik. Bij het maken van stedebouwkundige plannen blijkt de waterstructuur een belangrijke rol te kunnen spelen in de ruimtelijke organisatie van het plan en bij het sturen van ecologische processen zoals regenwaterafvoer en de groei van straatbomen.

2. LANDSCHAPSWAARDERING EN PLANNING, EEN CASE-STUDY

Dit hoofdstuk begint opnieuw in het begin van de jaren zeventig, maar nu wordt dieper ingegaan op de inhoud van de vraagstelling aan de hand van het Kromme-Rijnproject. De belangrijkste vraag was of in het streekplan meer dan gebruikelijk een zorgvuldige afstemming van grondgebruiksplannen op ecologische mogelijkheden van het landschap kan plaatsvinden.

Het maken van een geschiktheidskaart beantwoordde niet aan zijn doel, omdat de ecologische landbouw en de ecologische stedebouw, die van de potenties op deze kaart gebruik zou kunnen maken, onvoldoende of in het geheel niet ontwikkeld waren. De bestaande praktijk, zowel in de landbouw als in de stedebouw ,was nivellerend. Bodem en grondwater werden aangepast aan de technische principes, begroeiing werd verwijderd om ruimte te maken.

Ook het maken van een waarderingskaart voor natuur en landschap blijkt niet een effectief middel om ecologische inzichten bij de planvorming een grotere rol te laten spelen. De benadering is defensief maar slaagt er niet in om gebieden met een hoge waardering, zoals het landgoed Amelisweerd bij Utrecht, effectief te verdedigen tegen de aanleg van een autoweg. De teleurstelling over het gebruik van de resultaten leidt tot de vraag of er andere, betere, methoden zijn om ecologie en planning aan elkaar te koppelen.

3. ECOLOGIE EN PLANNING, VIER BENADERINGEN

Welke mogelijkheden voor deze koppeling vinden we in de praktijk? Vier verschillende benaderingen worden in hoofdstuk 3 besproken en vergeleken: 1. De *waarden van de natuur* benadering. De waarden hebben vooral betrekking op de spontane planten en dierenwereld. 2. De *streefbeelden van de natuur* benadering. Ook hier gaat het vooral om wilde natuur. 3. De ecologische normen benadering. De normen hebben in dit geval betrekking op grenzen die aan vervuilende milieugebruikende-activiteiten gesteld moeten worden terwille van de kwaliteit van water bodem en lucht. 4. De ecologische strategieën benadering. Hierbij gaat het om de samenhangende ontwikkeling van alle vormen van milieugebruik.

De ecologische-strategieën benadering komt naar voren als de aanpak die de meeste perspectieven biedt voor het koppelen van ecologie en planning: ecologische strategieën richten zich niet op het verdedigen van de planten en dierenwereld maar op het ecologisch meer verantwoord maken van landinrichting en stedebouw en van alle activiteiten die het milieu gebruiken. Hiermee wordt gekozen voor een bredere interpretatie van het begrip ecologie, die overigens de smallere, op planten en dieren gerichte, niet uitsluit maar omvat. Deze benadering wordt in de rest van het boek uitgewerkt. Eerst wordt in deel II een aantal fundamentele vragen besproken met de bedoeling het programma voor de Ecologische-Condities Strategie te verantwoorden.

DEEL II FUNDAMENTELE VRAGEN

4. HOUDINGEN, LEEFSTIJLEN EN BEELDEN

In dit hoofdstuk gaat het om de vraag of ecologische strategieën zich moeten richten op een bepaalde grondhouding ten opzichte van mens en natuur ('een mentaliteit'), of op een bepaalde leefstijl, of op een bepaalde esthetiek. Een tweede vraag komt voort uit de praktijk van de ruimtelijke ordening waarin ecologie vaak wordt gezien als een *belemmerende voorwaarde*. In de praktijk van het milieubeleid wordt gesproken over het verantwoorden van de *offers* die gebracht moeten worden. Gaat het bij een ecologische strategie om beperkingen en offers of is er ook een positieve benadering mogelijk?

In het hoofdstuk wordt beargumenteerd dat de grondhouding van partnerschap met de *natuur* een optimale basis vormt voor ecologische strategieën. Maar ook vanuit andere grondhoudingen kan voor deze strategieën gekozen worden. De inzet van de strategie is het verkennen van wegen om de menselijke activiteiten zo bij te sturen dat ze niet vervuilen en niet verspillen maar wel in onze basisbehoeften voorzien en een grote keuzevrijheid laten voor de wijze van leven. Dat zal wel een verandering in consumptiepatroon met zich meebrengen, maar het hoeft niet een aantasting te zijn van de persoonlijke leefstijl. De strategie richt zich ook niet op bepaalde architectonische beelden maar op de onderliggende structuren. *Daarmee wordt de vormgeving opengelaten. Voor het programma van de Ecologische-Condities Strategie wordt de metafoor gebruikt van de boom: ecologische voorwaarden zijn te zien als de stam die een uitwaaierende verscheidenheid aan takken draagt, symbool voor de diversiteit van leefstijlen en beelden. Op de overgang van stam naar takken bevinden zich dikkere hoofdtakken die de milieugebruikende activiteiten, zoals landbouw, woningbouw en industriële produktie symboliseren.*

In de analyse van de grondhoudingen blijkt er een samenhang te bestaan tussen de *meester der natuur* grondhouding, waarin het menselijk handelen vanzelf spreekt, en een *deontologische ethiek*, een plichtenleer, waarin de morele gronden beargumenteerd worden om aan dat menselijk handelen beperkingen op te leggen. In dit kader past de praktijk van ruimtelijke ordening en milieubeleid waarin *over natuur en milieu wordt gesproken in termen van belemmeringen en offers*. In contrast hiermee is er samenhang tussen de grondhouding van het *partnerschap*, waarin de interactie tussen mens en natuur een eigen waarde heeft, en de *teleologische ethiek* die de nadruk legt op de positieve kwaliteiten van het *goede leven*. In dit kader past een ecologische strategie die naar een ecologisering van het menselijk handelen streeft. *Hoewel we in het programma voor de Ecologische- Condities Strategie het stellen van grenzen niet geheel kunnen missen zal de nadruk toch liggen op de teleologische benadering waarin ecologische voorwaarden een deel worden van goede voorwaarden. Dit zijn niet in de eerste plaats beperkende maar dragende voorwaarden.*

5. OBJECTEN, CONTEXTEN EN WAARDEN

Er zijn in verschillende situaties uiteenlopende ecologische voorwaarden. Voor ik inga op de aard van die voorwaarden is het nodig stil te staan bij daaraan voorafgaande vragen:Hoe kunnen we vaststellen wat ecologische voorwaarden zijn en hoe beslissen we of ze goed zijn. Om te beginnen gaat het er om hoe uitspraken in een planningcontext wetenschappelijk en maatschappelijk verantwoord kunnen worden. In hoeverre kunnen en moeten ecologische voorwaarden *geobjectiveerd* worden. Vervolgens wordt het begrip voorwaarden nader bekeken. Hoe passen voorwaarden bij een causale benadering (oorzaken en gevolgen), en bij een finale benadering (doelen en middelen)? Dit leidt tot een positiebepaling van de ecologische benadering in dit boek in het veld van wetenschappelijke tradities en disciplines. Nadat zowel *ecologisch* als *voorwaarden* verhelderd zijn, zal ik het waarderingsvraagstuk bespreken aan de hand van de literatuur over economie en ecologie. Uit die discussie komt de *tweetraps-waardentheorie* tevoorschijn als een perspectiefrijke optie. Deze optie zal worden getoetst aan enkele voorbeelden uit de praktijk van ruimtelijke ordening en milieubeleid.

conclusies

1. Ecologische voorwaarden kunnen niet buiten een maatschappelijke discussie om wetenschappelijk en waardevrij worden vastgesteld, ze vragen om een open besluitvorming. Hier sluit ik aan bij de filosofie van Popper. De maatschappelijke context met inbegrip van de bestaande machtsstructuren kan bij

die open discussie niet buiten schot blijven. Analytisch wetenschappelijk onderzoek moet wel een bijdrage leveren aan de besluitvorming over ecologische voorwaarden, maar het werkelijke leerproces is een *learning by doing* in levensechte situaties. Hier sluit ik aan bij de filosofie van Dewey en Habermas (zie hoofdstuk 7). *Het leerproces is een belangrijk element in het programma voor de Ecologische-Condities Strategie.*

2. De begrippen causaal (oorzaak-gevolg relaties) en finaal (doel-middelen relaties) alléén bieden niet voldoende ruimte om deze problematiek te kunnen bespreken. Het begrip *conditioneel* moet toegevoegd worden. Daarmee ontstaat ruimte voor *indirect werkende*, voorwaarden scheppende, relaties.

De meeste disciplines hebben de neiging om de oorzaak-gevolg en doel-middelen relaties te vereenvoudigen tot direct aantoonbare verbanden. Dit kan leiden tot een verdeling van het plan in taartpunten, de één de mensen, de ander de gebouwen , de derde het groen. Dit leidt niet tot een samenhangend plan. Het gaat niet om taartpunten maar om gezichtspunten van waaruit naar het hele plan gekeken wordt. Sommige ontwerpers hebben de neiging de controle over het geheel te claimen. Maar er zijn vele samenhangen en goede plannen ontstaan wanneer alle disciplines daar oog voor hebben. *Beheersing van de totaliteit is niet mogelijk en niet wenselijk, wel is er behoefte aan het ontwikkelen van dragende voorwaarden. Daarvan dienen ecologische voorwaarden deel uit te maken. Ze kunnen alleen in een interdisciplinaire inspanning ontwikkeld te worden.*

3. Als de na te streven waarden in de doelstellingen van het milieubeleid eenmaal zijn vastgesteld, dan kan het doorberekenen van milieukosten in de prijzen, zoals bij de ecotax, een goed middel zijn. Daarover zijn economen van verschillende scholen het wel eens. Over het *vaststellen van milieuwaarden* wordt echter verschillend gedacht. In de neo-klassieke economie, in zijn meest uitgesproken vorm, worden ecologische waarden (hulpbronnen, vervuiling en natuur en landschap) herleid tot kosten. Bij het vaststellen van waarden van schone lucht of natuurgebieden leidt deze visie tot een geforceerde constructie: milieu wordt herleid tot door individuen te verwerven goederen. In andere economische scholen (de institutionele en de ecologische economie) wordt milieu op een andere wijze benaderd. Milieu is dan niet een individueel te verhandelen goed maar een collectief goed. De waarde daarvan kan niet worden vastgesteld door na te gaan wat individuen er voor willen betalen (*de willingness to pay*). Wie arm is kan niets betalen, volgende generaties en andere soorten al evenmin. Bovendien gaat de door veel neo-klassieke economen voorgestane "willingness to pay methode" er *per definitie* van uit dat rekening houden met milieu het leven *duurder maakt*. Dit past bij het denken in termen van offers (zie hoofdstuk 4).
Een benadering die meer recht doet aan de collectieve waarde van milieu is de *tweetraps-waardentheorie*. Hierin wordt milieu in de eerste plaats op het macro-economische niveau behandeld, samen met bijvoorbeeld de, ook in de neo-klassieke benadering op dat niveau geregelde, vrede en veiligheids vraagstukken. *In de tweetraps-waardentheorie hoort milieu bij de waarden van de*

eerste trap die het kader aangeven voor waarden van de tweede trap: de kosten en baten voor bedrijven en huishoudens: het micro-economische niveau.

4. De tweetraps-waardentheorie vraagt om een besluitvorming in twee trappen: eerst over het kader en dan over de invulling er van. Aan de hand van enkele case studies worden de perspectieven van deze benadering verkend. *De conclusie is dat de tweetraps-waardenbenadering opgenomen moet worden in het programma voor de Ecologische-Condities Strategie.*

6. RISICO'S EN LEERPROCESSEN

Welke ecologische voorwaarden zijn essentieel om rekening mee te houden bij het maken van plannen? Sinds het rapport van de Brundtland commissie (1987) is het begrip duurzame ontwikkeling ingeburgerd. In dit hoofdstuk ga ik eerst in op de uitwerking van dit begrip tot *milieugebruiksruimte*, de ruimte die er voor onze activiteiten op aarde is met het oog op de draagkracht van deze planeet. Hoe groot is de milieu-gebruiksruimte? De kloof tussen de huidige toestand en een duurzame is groot. Maar hoe zeker zijn we over de berekeningen? En hoe alarmerend is de situatie, gezien onze technologische mogelijkheden? Wat zijn de risico's als we de grenzen overschrijden? En wat zijn de sociale risico's als we binnen de grenzen willen blijven? Wat doen we als het beleid niet voldoende effect heeft? Al deze vragen over onzekerheden en risico's maken het nodig om eerst stil te staan bij het vraagstuk van de omgang met onzekerheden. Hoe wordt in de empirische wetenschappen met onzekerheid omgegaan, en hoe gebeurt dit in de theorie en de praktijk van de planning? Uit alle ervaringen en beschouwingen komt het belang van leerprocessen naar voren. Na deze verdieping keren we terug tot de discussie over *milieurisico's* en *sociale risico's*. Welke rol kunnen leerprocessen spelen in de praktijk van milieubeleid, groenbeheer, waterbeheer?

conclusies

1. Als we onder duurzaam verstaan dat hulpbronnen niet in absolute zin uitgeput mogen raken, dat vervuiling niet dient te accumuleren en dat verstorende activiteiten zoals erosie niet sneller mogen gaan dan herstelprocessen verlopen, dan zal de milieubelasting in de westerse industrielanden, uitgedrukt in energie- en grondstoffengebruik, in de komende 50 jaar tot 5% van het huidige niveau moeten worden teruggebracht. Dat is een gezaghebbende berekening van de *milieugebruiksruimte* (eco-capaciteit) die rekening houdt met het gerechtvaardigde verlangen van ontwikkelingslanden om welvaartsachterstanden in te halen. Op deze alarmerende cijfers is verschillend gereageerd: a. De cijfers kloppen niet. b. Het is niet zo ernstig want we vinden er wel wat op door technologische innovatie. c. De noodtoestand moet worden afgekondigd en de wereld moet desnoods met dictatoriale maatregelen in het goede spoor gebracht worden. Er is verwarring en onzekerheid. Hoe kunnen we daar mee omgaan?

2. In natuurlijke ecosystemen komen twee strategieën voor om met onzekerheid om te gaan: weerstand en veerkracht. Ook in de techniek en in de bestuurs-

kunde komen we die twee benaderingen tegen: controleren en interactie. Is de onzekerheid groot dan is absolute controle niet mogelijk. Dit is het geval bij de evolutie van het leven op aarde die verloopt via mutatie en selectie. Dat is een interactieve overlevingsstrategie die berust op het *genereren van verschil en het selecteren* van wat het beste bij de veranderde omstandigheden past. Ook denkprocessen en planningsprocessen kunnen zo worden voorgesteld: een leerproces dat berust op de creativiteit bij het ontwikkelen van alternatieven (verschil) *en* de strengheid bij de toetsing met behulp van criteria (selectie). De onzekerheid is groot op vele terreinen, soms omdat we het nog niet weten, maar vaak omdat die onzekerheid inherent is aan veel processen. De chaostheorie geeft dit aan voor kleine oorzaken die grote gevolgen kunnen hebben. In de planningtheorie is dit uitgewerkt voor onzekerheden over doelen en middelen. Niet verdergaande controle maar het verder ontwikkelen van interactieve leerprocessen is het antwoord op onzekerheden.

3. Welk uitzicht bieden deze inzichten voor de verwarrende discussies over de alarmerende cijfers, over de milieurisico's en sociale risico's? Er is geen enkel sociaal risico verbonden met het op gang brengen en stimuleren van bijvoorbeeld een programma voor energiebesparing. Het heeft dus ook geen zin om op een hoog abstractieniveau milieurisico's af te wegen tegen sociale risico's, zoals de Wetenschappelijke Raad voor het Regeringsbeleid (WRR) doet. Ook als we niet precies weten hoeveel energie we moeten besparen om binnen de milieugebruiksruimte te blijven kan het leerproces beginnen. Het sociale draagvlak kan al doende groeien. Maar wat te doen als het milieuprogramma niet voldoende is? Soms maken milieurampen ineens de afgrond die we naderen zichtbaar voor een groot publiek. Op dat moment kan er een breed draagvlak zijn voor de keuze van alternatieven. Die alternatieven moeten dan wel beschikbaar zijn, en zichtbaar met hun praktische consequenties. Het leerproces om die alternatieven te ontwikkelen begint in kleinere proefprojecten, die zonder risico kunnen worden opgezet. Mislukt zo'n klein project dan is het ook maar een kleine mislukking, waar toch veel van valt te leren. Deze benadering komt in de buurt van wat Popper *piecemeal engineering* noemt. De proefprojecten vormen ook een hoeksteen voor de *social learning* traditie die in het volgende hoofdstuk besproken wordt.

De risico-discussie moet niet te zwaar aangezet worden. Als de weg lang is en het doel ver en onzeker, dan is het goed om het reizen zelf zinvol en aangenaam te maken. Het verre doel hoeven we niet exact te kennen om de richting aan te geven van de ecologisering van *normale milieugebruikende activiteiten*: de produktie, het bouwen en het beheren. Hierbij spelen ook andere milieu-aspecten een rol die niet direct met de mondiale problematiek te maken hebben, maar niettemin voor het lokale milieu van groot belang zijn: de betrokkenheid van bewoners bij de lokale gebouwde omgeving en het cultuurlandschap, de lokale flora en fauna, en aspecten van de dagelijkse leefomgeving zoals geluidshinder. In dit verband spreekt men van *leefbaarheid.*

Voor het programma van de Ecologische-Condities Strategie betekenen deze *conclusies dat de energie minder gestoken moet worden in het berekenen van de grenzen, en meer in het ontwikkelen van leerprocessen bij het normale werk en in het genereren van meerdere praktische alternatieven. Hierdoor ontstaat een scala van opties waaruit in een onzekere situatie gekozen kan worden. In de dagelijkse praktijk is het vooral van belang om te werken aan de integratie van mondiale duurzaamheidsaspecten in lokale leefbaarheidsprojecten. De betekenis van deze stappen in een ecologisch verantwoorde richting wordt niet ontleend aan een ver verwijderd doel maar aan deze projecten zelf.*

7. ACTOREN EN INTERACTIE IN DE PLANNING

In hoofdstuk 4 is het belang van *dragende voorwaarden* naar voren gekomen en in de hoofdstukken 5 en 6 dat van *leerprocessen*. In dit hoofdstuk is de vraag hoe deze bouwstenen voor een ecologische strategie in praktijk en theorie van planningprocessen hun plaats kunnen vinden. Wat is de rol van verschillende actoren zoals onderzoekers en politici (7.1) en hoe verhouden zich de rollen van de actoren die de sectorbelangen en die het publieke domein vertegenwoordigen? (7.2).

conclusies

1. Van de vier *planningtradities* die onderscheiden worden door John Friedmann, social reform, policy analysis, social learning en social mobilization, biedt *social learning* de meeste aanknopingspunten voor de zoekrichting die zich aftekent in de hoofdstukken 5 en 6: de nadruk op interactieve leerprocessen. Kan social learning ook een rol spelen bij het scheppen van voorwaarden zoals infrastructuur? Op het eerste gezicht lijkt dit onzinnig. Kleine leerprojecten passen hier niet bij. Je kunt niet een stukje autoweg aanleggen en daar van leren. In de tweetraps-waardenbenadering uit hoofdstuk 5 past echter wel een *social learning* aanpak van de mobiliteitsproblematiek, die op lange termijn alternatieven kan genereren. Deze lange-termijn opties kunnen verkend worden met een programma voor proefprojecten (autoluwe wijken, 'road pricing' parkeertarieven etc). Op korte termijn kan een ecologische benadering hooguit tot natuurvriendelijk bermbeheer leiden, op langere-termijn staat het mobiliteitssysteem ter discussie. (zie de chaining waters case in 10.3). Leren kan plaatsvinden op twee niveaus: in de dagelijkse besluitvorming en in een langere termijn onderzoekscyclus (figuur 7.4). In beide gevallen gaat het om directe, *operationele beslissingen* die verbindend zijn of irreversibel en anderzijds om *strategische beslissingen* die indirect zijn, strategisch, richtinggevend. Operationele beslissingen over infrastructuur gaan vaak over grote investeringen en zijn irreversibel. Daar moeten *eerste traps* strategische beslissingen aan voorafgaan waarbij ecologische overwegingen van belang zijn. *In een Ecologische-Condities Strategie moeten moeilijk omkeerbare operationele beslissingen die milieubedreigende effecten hebben zoveel mogelijk worden uitgesteld om ruimte te scheppen voor leerprocessen waaruit alternatieven kunnen voortkomen. Het veranderingsperspectief voor een verdergaande ecologisering kan hierdoor op langere termijn worden opengehouden.*

In dergelijke complexe keuzevraagstukken is interactie vereist tussen beslissers en onderzoekers. Dit wordt gevonden in het, bij de social learning traditie passende, *pragmatische model*, het interactieve model dat door Habermas geplaatst wordt tegenover het technocratische model (de wetenschappers ontwikkelen één systeem dat geen keuze openlaat) en het decisionistische model (de politici zijn de eenzame beslissers, de wetenschappers voeren uit). Habermas, die zijn wortels heeft in de filosofische school van de Kritische Theorie, noemt dit model pragmatisch onder verwijzing naar het 'pragmatisme', de filosofie van het "learning by doing" van Dewey. De essentie van het model is de interactieve communicatie van beslissers, onderzoekers en direct betrokkenen, tijdens een gezamenlijk leerproces met behulp van praktijkprojecten.

Mijn voorkeur om voor het programma van de Ecologische-Condities Strategie aan te sluiten bij de social learning traditie komt ook voort uit de slechte ervaringen bij het Kromme Rijnproject met een werkwijze die als *survey before plan* procedure kan worden beschreven, waarbij het onderzoek gescheiden is van het maken van het plan. In hoofdstuk 11 wordt, als voorbeeld. een interactief ontwerpproces beschreven waarbij onderzoek en plankeuzen in één procedure zijn samengebracht.

2. De relatie tussen sectorbelangen en ecologische condities die basisvoorwaarden scheppen voor alle sectoren, kan in verschillende rollenspellen beschreven worden. In het model *van de overheid als scheidsrechter* leidt zij de wedstrijd tussen concurrerende partijen. Zwakke partijen, zoals de natuurbescherming worden aangemoedigd hun belangen harder te maken. Dit vergroot hun marktwaarde en past bij het marktmodel, het eentrapsmodel, waarbij alle milieugebruikende-activiteiten op hetzelfde niveau worden afgewogen. De scheidsrechter heeft hierbij een grote behoefte aan eenduidige *objectieve* afwegingscriteria. De eisen voor afzonderlijke milieugebruikende activiteiten nemen toe en het gevolg is een strenge ruimtelijke functiescheiding zoals in het geval van landbouwgebieden en natuurreservaten. Helaas kunnen water en luchtverontreiniging zich moeilijk aan deze scheiding houden waardoor de zwakte van het model aan het licht treedt. Natuurbescherming en landbouw bijvoorbeeld, kunnen op deze wijze niet naast elkaar bestaan: verdroging en eutrofieëring, grondwaterverontreiniging en ammoniak-emissie zijn grensoverschrijdende milieuproblemen.

In het model van *de overheid als gids* is de metafoor niet de wedstrijd maar de expeditie die door samenwerking tot een goed einde gebracht kan worden. De samenwerking wordt gestimuleerd. De eisen per activiteit worden afgestemd op de ecologische basisvoorwaarden. Ruimtelijke scheiding en verweving van functies kunnen beter op elkaar worden afgestemd. *Voor de Ecologische-Condities Strategie biedt het model van de overheid als gids de beste aanknopingspunten. In dit model dienen overheidsafdelingen in samenwerking met andere actoren de structurele voorwaarden te scheppen en te beheren voor duurzaam milieugebruik.*

DEEL III VAN STRATEGIE NAAR PLAN

8. EEN ECOLOGISCHE-CONDITIES STRATEGIE

Het begrip Ecologische Condities is in deel II van dit boek zoveel mogelijk losgemaakt uit de sfeer van beperkingen, offers en plichten. Het gaat niet in de eerste plaats om het stellen van grenzen aan milieugebruik dat in de kern vijandig is aan het milieu. Het gaat om het ontwikkelen van fysieke structuren die de dragers kunnen zijn voor een min of meer stedelijke landschapsontwikkeling. Bovendien gaat het om organisatorische structuren voor een interactief leerproces leidend tot verandering: van een verspillende, vervuilende en verstorende relatie met het milieu naar een inspirerende en duurzame.

De opgave in dit hoofdstuk is om deze conclusies uit deel II samen te brengen in een strategiekader, een raamwerk dat als drager kan dienen voor een familie van strategische concepten die zich moet kunnen ontwikkelen en vernieuwen. Hoe moet de strategie geformuleerd worden om bruikbaar te zijn voor een team dat voor de taak staat om een plan te maken? De vraag is dan bijvoorbeeld: wat maakt een plan duurzaam of ecologisch verantwoord? Dit vraagt om een conceptueel kader waarbinnen richtlijnen en beoordelingscriteria passen. De eerste vraag is dan: uit welke elementen dient dit kader te bestaan? Dan volgen verdere vragen: Voor wie is het bedoeld? Welk type plannen en resultaten wordt aan gedacht? Welke doelen zijn van belang?

conclusies

In het kader voor de strategie, die we Ecologische-Condities Strategie noemen, worden de volgende elementen opgenomen:

1. De gebruikers. De strategie richt zich op alle actoren die betrokken zijn bij milieugebruik. Per plan kan dit ingevuld worden.

2. Het object van planning zijn de voorwaarden voor milieugebruikende activiteiten, dat zijn dus alle menselijke activiteiten die effecten hebben op het milieu. Het is niet een strategie voor het behalen van vastgestelde doelen maar voor het kiezen van de koers en het zetten van eerste stappen.

3. De beslissingsvelden. Er worden velden onderscheiden waarin beslissingen genomen worden: *stromen*, *gebieden* en *actoren*. Deze keuze wordt onder meer gemotiveerd door de afstemmingsnoodzaak: beslissingen dienen op elkaar te worden afgestemd wanneer ze betrekking hebben op dezelfde ruimte, op verschillende ruimten die door een of meer stromen verbonden zijn, zoals langs een rivier, of omdat ze betrekking hebben op actoren die met elkaar te maken hebben. De drie velden kunnen wel onderscheiden worden maar niet gescheiden. In elke planningsituatie is er sprake van een problematiek in drie dimensies. Wel kunnen we één van de beslissingsvelden als *ingang* nemen.

4. Hieraan gekoppeld zijn de strategische doelen waaraan in hoofdstuk 8 de volgende motto's worden gegeven: *levende gebieden, verantwoordelijke schakels*

en participerende actoren. Deze motto's duiden aan dat de strategie bij het beheer van gebieden gericht is op het inschakelen van abiotische en biotische processen op de plaats van het plan (levende gebieden). Bij de omgang met stromen dient elke schakel zo ontworpen te worden dat de verantwoordelijkheid voor de in- en uitgaande stromen aandacht krijgt. Voor de omgang met actoren is de strategie gericht op participatie van actoren in het ecologische interactieproces. De strategische doelen vormen ook de basis voor drie criteria voor duurzaamheid. Ecologisch verantwoord wil zeggen voorzien van een verantwoording in deze drie richtingen.

5. De middelen zijn gidsprincipes en gidsmodellen voor stromen, gebieden en actoren (organisatie).

6. Het leerproces wordt verder uitgewerkt tot de elementen: consensus over doelen, gidsprincipes, gidsmodellen, evaluatiestudies, proefprojecten, scenariostudies en een forum om het leerproces te bewaken.

9. GIDSMODELLEN: STROMEN ALS INGANG

Tussen strategie en plan staan gidsmodellen. Ter illustratie worden in dit hoofdstuk enkele gidsmodellen besproken die de problematiek en het beslissingsveld van stromenbeheer als ingang hebben. Daarbij gaat het eerst om een algemene discussie over centrale en decentrale organisatie van het stromenbeheer. In antwoord op de vraag of er algemene strategische principes zijn op te stellen voor de aanpak van dit vraagstuk wordt de *sandwich strategie* gepresenteerd. Dan volgen specifieke vragen over schaalniveaus en afstemming, toegelicht aan de hand van het voorbeeld van de waterstromen.

conclusies

1. De technische diensten lijken te kiezen voor schaalvergroting, bijvoorbeeld voor steeds grotere afvalverbrandingsovens. Milieupioniers lijken juist in de ban van kleinschaligheid, alles in eigen huis. De discussie gaat over efficiency en risico's, maar ook passendheid en leerprocessen verdienen in dit verband aandacht.

2. Een mogelijke uitweg uit het centraal-decentraal dilemma biedt de *sandwich strategie*, een algemeen gidsmodel voor stromenbeheer. Hierin wordt een richting aangegeven voor het zoeken naar oplossingen die bestaan uit drie niveaus: een niveau van de voorwaarden-scheppende overheid (incentives, fysieke condities) een niveau van huishoudens en bedrijven die binnen dit veld milieuvriendelijk handelen ontwikkelen, en een niveau van kleinere collectieve en samenwerkingsprojecten in de stad, zichtbaar en dicht bij.

3. Het gidsmodel voor de waterketen dat besproken wordt is ontwikkeld uit evaluatiestudies van projecten op verschillende schaal. Het geeft op elkaar afgestemde gidsmodellen voor gebouw, wijk, stad. regio en land. Het model op wijkniveau, het circulatiemodel, wordt apart besproken. Het geldt voor pol-

dersituaties en het biedt een startpunt voor de beschrijving van het ontwerpvoorbeeld in hoofdstuk 11. Uitgangspunt in alle modellen is het vasthouden van schoon regenwater en het bestrijden van watervervuiling bij de bron

10. GIDSMODELLEN: GEBIEDEN ALS INGANG

In dit hoofdstuk worden ter illustratie enkele gidsmodellen besproken die de problematiek en het beslissingsveld van gebiedenbeheer als ingang hebben. Net als bij de stromeningang is het slechts een *ingang*. Bij de planvorming komt vervolgens weer de vraag naar voren hoe de samenhang tussen stromen, gebieden en actoren gestuurd kan worden. In dit geval ga ik in op de problematiek van suburbanisatie en de compacte stad optie. In antwoord op de vraag naar algemene strategische principes voor de aanpak van dit vraagstuk wordt de *strategie van de twee netwerken* gepresenteerd. Tenslotte wordt als uitwerking een stadsconcept besproken, een ruimtelijk gidsmodel voor stedelijke ontwikkeling.

conclusies

1. De compacte stad discussie, tegen de achtergrond van de *driving forces* van suburbanisatie en de toename van het autoverkeer, wordt opnieuw geformuleerd in termen van de problematiek van stromen, *gebieden* en actoren. Als we, zoals in dit geval, gebieden als ingang voor de planningdiscussie kiezen, dan komt vervolgens toch de interactie tussen gebieden, stromen en actoren aan de orde. De discussie gaat over woonwensen en bereikbaarheid, maar ook over passende combinaties van wonen en vervoer in een contrastrijke omgeving. Ook in dit verband verdienen leerprocessen de aandacht.

2. Een mogelijke uitweg uit de compacte stad dilemma's biedt de *strategie van de twee netwerken*, een algemeen gidsmodel voor de omgang met gebieden. Hierin wordt een richting aangegeven voor het zoeken naar oplossingen waarbij niet de verdeling tussen rood en groen (bebouwing en groene gebieden) maar de twee netwerken van water en verkeer (rood en grijs) het vertrekpunt zijn. Door het waternetwerk (met inbegrip van grondwaterstromen) als drager te ontwikkelen van natuur en rustige recreatie, en het verkeersnetwerk als drager van stedelijke en landelijke productielandschappen ontstaat een strategie die meer op de processen van het milieugebruik is gericht. Het wonen kan van twee walletjes eten met zowel groen in de nabijheid als goed openbaar vervoer. Verdere verstedelijking is in deze strategie alleen wenselijk langs openbaar-vervoer assen. Alleen een combinatie van een ruimtelijke strategie met de strategieën voor stromen, in dit geval die voor verkeer en water, biedt perspectieven.

3. Een uitwerking van de strategie van de twee netwerken op het niveau van de stad leidt tot een vernieuwing van het concept van de lobbenstad. De vernieuwing bestaat vooral uit het doorwerken van de implicaties van de strategieën voor stromenbeheer voor de verkeer en waterstromen. Ter illustratie van het maken van plannen met behulp van de gidsmodellen van de twee netwerken en van de lobbenstad wordt een prijsvraagontwerp besproken voor de Randstad: Chaining Waters.

11. HET MAKEN VAN EEN PLAN

Gidsmodellen zijn bedoeld als gereedschap bij het maken van een individueel plan. Hoe gaat dit in zijn werk? En hoe verloopt het bij uitstek ecologische proces van het afstemmen van algemene principes op de bijzondere lokale potenties? Is ook de methode elke keer anders of alleen het resultaat?

conclusies

1. In dit hoofdstuk wordt een ontwerp-benadering in stappen gepresenteerd. Deze wordt , naar de beginletters van de stappen PROSA genoemd (Programma; Ritme; Orientatie; Situatie en Apparatuur). De methode is ontwikkeld om een interactief proces van ontwerpers en onderzoekers vorm te geven, waarvan de normatieve keuzen zo helder mogelijk toegankelijk worden gemaakt voor een discussie met alle betrokkenen.

2. Het werken met de PROSA methode wordt vervolgens geïllustreerd aan de hand van een studieplan voor een dragende waterstructuur in een nieuwe woonwijk.

3. Ter illustratie van de toepassing van deze benadering in een praktijksituatie wordt een korte schets gegeven van het planproces bij een inmiddels gerealiseerde en voor de waterhuishouding ook geëvalueerde woonwijk: Morra Park in Drachten.

IV CONCLUSIES

12 GOEDE CONDITIES

De Ecologische-Condities Strategie richt zich niet in de eerste plaats op beperkende, maar op dragende voorwaarden voor onze omgang met het milieu. Dit wordt de *goede condities* benadering genoemd. De achtergronden en implicaties van deze keuze worden verduidelijkt door de metafoor van de twee talen: *de taal van de controle* en *de taal van de interactie.* Het zijn twee, intern samenhangende *discoursen.* Ze spelen beide een grote rol in de vele dimensies van ruimtelijke ordening en milieubeleid en in het algemeen bij het plannen van milieugebruikende-activiteiten. Een korte typering in trefwoorden zonder nuanceringen kan verduidelijken om welke verschillen in benadering het bij deze twee "talen" gaat:

de taal van de controle

Het metafysische *twee werelden model* plaatst de mens tegenover de natuur. Hierbij past een grondhouding die gekenmerkt wordt door de wil om de *natuur te beheersen*, of op zijn minst beheersbaar te maken. Als het menselijk handelen zichzelf rechtvaardigt moeten vooral de grenzen die daaraan gesteld worden, bijvoorbeeld op grond van milieu-overwegingen, verantwoord worden. Hierbij past een plichtenleer, een *deontologische ethiek.* Om met deze doelstelling te kunnen werken zijn wetenschappelijke inzichten nodig in de draagkracht van de aarde. Waar liggen de grenzen die in acht genomen moeten worden? Omdat het gaat om op te leggen beperkingen, is het van belang om deze zo objectief mogelijk wetenschappelijk vast te stellen, het liefst *boven elke discussie verheven*. Hierbij past een streven naar *reductie van complexe gehelen* tot directe oorzaak-gevolg en doel-middelen relaties. Door de reductie kunnen de uitspraken beter hard gemaakt worden. Normatieve positiekeuze wordt zoveel mogelijk achterwege gelaten. Bij het afwegen van belangen wordt gezocht naar neutraal geachte instrumenten zoals kosten-baten analyse of multi-criteria analyse. Bij de omgang met risico's wordt in de eerste plaats gezocht naar vergroten van de veiligheid door *uitsluiten van het gevaar*. Dat bepaalt de dijkhoogte. In de planning sluit dit aan op een grote rol voor een technische, *beleidsanalytische benadering*. Deze tracht doelstellingen in de eerste plaats te realiseren via normstelling en regelgeving. De rol van de overheid is hierbij vooral die van *scheidsrechter tussen maatschappelijke belangen*, waarbij het opstellen van regels en het toezien op de naleving daarvan de belangrijkste overheidstaken zijn.

de taal van de interactie

Het metafysische *één-wereld model*, waarin de mens gezien wordt als deel van het geheel van de natuur, past goed bij een grondhouding waarin *mens en natuur als partners* gezien worden. Als het menselijk leven in essentie samen-leven is, dan ligt een doel-aangevende, *teleologische ethiek* voor de hand die zich richt op goed met de natuur samenleven. Om met deze doelstelling te kunnen werken zijn wetenschappelijke inzichten nodig in de complexe betrekkingen tussen de maatschappij en haar fysieke milieu. Dit zijn, in de brede zin van het begrip, ecologische inzichten, die alleen geobjectiveerd kunnen worden in een *open discussie over uitspraken* met betrekking tot de werkelijkheid. Daarbij gaat het niet alleen om uitspraken die de werkelijkheid reduceren maar vooral om een leren over de *verschijnselen in hun context*, waardoor ook de indirecte relaties tussen oorzaak en gevolg en tussen doelen en middelen aandacht krijgen. Om met inzichten te kunnen werken zijn normatieve uitspraken nodig. In dit kader past een theorie over de omgang met waarden die is beschreven als *tweetraps-waardentheorie*. Deze theorie maakt onderscheid tussen waarden die de inzet zijn van beslissingen over kaders en waarden die bij de invulling van dat kader aan de orde komen. Kosten-baten overwegingen horen bij de invulling, milieuvoorwaarden bij het kader. Het kader van ecologische condities dient ook voorwaarden te scheppen voor de omgang met risico's. In de "taal van de interactie" wordt in de eerste plaats gekeken naar het vergroten van de veiligheid door *een betere omgang met gevaren*. Daarop zijn principes zoals buffervoorraden en flexibiliteit gebaseerd. In de planning sluit dit aan op de traditie van *planning als leerproces*, waarbij, bijvoorbeeld met behulp van proefprojecten, beslissers, onderzoekers en direct betrokkenen samen een interactief leerproces doormaken. Hieruit blijkt wat begaanbare wegen zijn om doelstellingen in de praktijk te brengen. De rol van de overheidsdiensten hierbij is vooral het zoeken van *samenwerking met alle maatschappelijke actoren*, in dit geval om het project ecologische modernisering verder te brengen.

een interactieve benadering

De "twee talen" zijn hier tegenover elkaar gesteld maar in de praktijk zijn vele combinaties mogelijk en wenselijk, zoals bijvoorbeeld een interactieve benadering bij het vaststellen van de beleidsuitgangspunten en een meer op controle afgestemde beleidsuitvoering. Ook in de Ecologische-Condities Strategie zal een zekere rol voor de "taal van de controle" nodig zijn maar in dit boek wordt toch in de eerste plaats aandacht gevraagd voor interactie. Dat een interactieve benadering van in brede zin ecologische vraagstukken *nodig is* wordt duidelijk gemaakt door de analyses uit deel II. Dat een interactieve benadering mogelijk is wordt gedemonstreerd aan de hand van de strategie en de uitwerkingen in deel III.

Met de twee talen wordt een samenvattend overzicht gegeven van deel II, het theoretische gedeelte van deze studie. Maar de twee talen voegen ook een nieuwe gedachte toe: ze zijn op te vatten als discoursen. Daarmee wordt een verband gelegd met de *discours analyse* die past bij een argumentatieve benadering van sociale veranderingsprocessen. Deze gaat er van uit dat sociale rollen niet geheel vast liggen door machtsverhoudingen en dat het sociale processen ook niet geheel gedomineerd worden door een confrontatie van diepgewortelde overtuigingen (ideologieën). De argumentatieve benadering richt zich op de betekenisstructuur van de discours en op de wisselende coalities die verschillende discoursen steunen en daar steun bij hebben.

In dit boek gaat het voor een groot deel om sociale leerprocessen, waarbij *gidsmodellen* een sleutelrol vervullen. Gidsmodellen vormen de inzet van een onderzoeksprogramma dat praktijkgericht is. Bovendien vormen ze de inzet van een ontwerp en planningprogramma dat op theorievorming gericht is. De drie strategische gidsmodellen die tot nu toe ontwikkeld zijn vormen een vertrekpunt voor het leerproces met stromen, gebieden en actoren als ingang. De Sandwich Strategie, de Strategie van de Twee Netwerken en de Forum Proefprojecten Strategie zijn al in de Ecopolis studie ontwikkeld. De laatste is in dit boek niet meer als zodanig behandeld maar is verder uitgewerkt in de structuur van het leerproces.

Dit boek bevat vele gezichtspunten. Maar een wijze van zien is ook altijd een wijze van niet zien. Dat maakt interactie essentieel.

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INDEX