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Biotope mapping in Rotterdam - the back-ground of a project

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The first discussions in Rotterdam about the subject of urban ecology started less than ten years ago. It resulted in the publication and adoption of several Nature and Environmental Policy Plans. In the second Nature Policy Plan it was admitted that a proper knowledge about the actual situation concerning the presence of plant and animal species in the city is lacking. As a direct result of this reflection the Rotterdam Institute for Urban Nature or 'bureau Stadsnatuur Rotterdam' (bSR) was founded in September 1997. It immediately started to develop plans to collect data on the Rotterdam urban flora and fauna, not only for the sake of science, but certainly - and perhaps mostly - for the sake of urban welfare. Few cities in The Netherlands have conducted ecological research so far. Some cities have published a bird atlas, a flora atlas, or similar studies on the urban natural life, but a thorough ecological mapping has so far not been made. The process of biotope mapping is an unknown phenomenon in The Netherlands. German and other European cities, on the other hand, have a long tradition of scientifically thorough mapping activities and have inspired bSR to promote starting similar activities in Rotterdam, with the ultimate goal of increasing the ecological and esthetical value of the urban greenery.

Biotoopkartering in Rotterdam - de achtergronden van het project - De eerste discussies in Rotterdam over het onderwerp van de stadsecologie zijn nog maar tien jaar oud. Het resultaat was de publicatie en implementatie van een aantal natuur- en milieubeleidsplannen. In de Startnotitie voor het tweede Natuurbeleidsplan werd opgemerkt dat een adequate kennis over het voorkomen van planten en dieren in de stad ontbreekt. Als direct gevolg van deze constatering werd bureau Stadsnatuur Rotterdam (bSR) opgericht. Het bureau is direct begonnen met het voorbereiden van een biotoopkartering in Rotterdam, niet alleen terwille van de wetenschap, maar vooral terwille van het verbeteren van het stedelijk leefmilieu. Slechts in weinig Nederlandse steden is tot nu toe ecologisch onderzoek verricht. Enkele steden hebben een vogelatlas, een flora, of vergelijkbare studies gepubliceerd, maar een grondige biotoopkartering is nog nergens gemaakt. Het verschijnsel biotoopkartering is in Nederland feitelijk onbekend. Daarentegen hebben veel Duitse en andere Europese steden een lange traditie op dit gebied. bSR is erdoor geïnspireerd om ook in Rotterdam dergelijke karteringen te verrichten, met als uiteindelijke doel om de ecologische en esthetische waarde van de stad te verhogen.

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INTRODUCTION

Cities are built by people and for people. People live in cities, work in cities, and also increasingly use cities for leisure activities. These three functions strongly shape the urban surroundings, the urban landscape or cityscape. This does not contradict a certain role for nature in the city. Nature is an important part of the urban environment, without which living in the city would be less attractive. A city with a green image attracts more people and more employment than cities that are considered dull or grey. A green image is achieved in the first place by a substantial amount, or quantity, of green space, that should be of a sufficient quality, and that should also be observable by the citizens and the workers. We thus talk about quantity, about quality, and about recognizability.

The urban ecosystem

Nature is everywhere in the city. It does not care about boundaries, edges of parks and

fences around cemeteries, but it is present wherever it can seize opportunities. Pigeons and sparrows can find food on the most unthinkable place, plants can grow between concrete blocks and in cracks in the pavement (Fig. 1), mosses, lichens, and wall ferns even on places where people never get. Small habitats comprising mosses, algae, spiders, collembola, mites and the like can exist on rooftops or in hollow trees next to a busy shopping mall. Each organism has its specific biotope, not only in the tropical rainforest or in coral reefs, but also in densely populated and smoke-choked cities. This means that each place in the city has its own natural value, whether we like it or not, and that each place plays a certain role in the urban ecosystem. The study of this ecosystem can give us precious knowledge about the functioning of urban nature, knowledge that can be used for improving the quantity and the quality of urban nature. This is what this volume is about. If we want to improve the quality of our city, we have to start with



Figure 1 Urban nature seizes opportunities such as joints between pavement stones. This photo shows *Eragrostis pilosa* (right) and *Poa annua* (left) in Rotterdam. [photo: J. W.F. Reumer]

knowledge about its functioning. If we want to improve the natural value of Rotterdam or other cities in The Netherlands, we have to study the whereabouts of the urban nature. Urban ecology as a science can be a tool in planning and maintaining our cities.

Increasing awareness

The first discussions in Rotterdam about the subject of urban ecology started less than ten years ago. In 1990 one of the political parties that was part of the newly elected city council had the desire to appoint a municipal urban ecologist. This soon resulted in discussions in the city council, after the city council member mrs. Francisca Ravestein launched a request whether or not the city would need such a person (the so-called 'motie Ravestein'). The council subsequently adopted this request, that was answered after quite some time. It was decided that there was no need to create such a central position, as all municipal departments have a responsibility in this respect. However, at the same time, the need became felt for increasing the ecological awareness amongst municipal workers. From 1990 onwards, the position of urban nature within the city met with increasing interest, and the awareness that urban nature must be treated as one of the more important factors in urban planning and maintenance became apparent. This process, part of which is a direct result of the 'motie Ravestein', resulted in the publication and adoption of two successive Environmental Policy Plans in 1990 and 1995, a Plan for the Outdoor Area in 1992, a first Nature Policy Plan in 1994, a Regional Policy Plan for the Green Structure in 1997, and finally, the concept for a second Nature Policy Plan in 1997.

AN OUTLINE OF THE MUNICIPAL POLICY

In the first Environmental Policy Plan ('Milieubeleidsplan Rotterdam', Beleidsgroep Milieucoördinatie *et al.* 1990), one-and-a-half of its 125 pages were dedica-

ted to the subject of nature conservation. Its goal was formulated as follows (translated): '*The policy concerning nature in Rotterdam aims at maintaining and – where possible – ameliorating the natural values and the landscape, taking into consideration the specific circumstances that constitute living, leisure, and working in Rotterdam*'. This is clearly a rather vague target. If one aims at maintaining or increasing the natural values, it should be clear what these values are. Such was not specified.

The situation had considerably improved by the time the second Environmental Policy Plan (Rotterdams Milieubeleidsplan 2, or shortly RMP2) was published in 1995 (Vuijsje 1995). Out of a total of 148 pages, almost two-and-a-half pages were now dedicated to 'Nature and Green'. One goal was specifically mentioned: '*Rotterdam wishes to increase the natural value of the green areas inside and around the city*'. Again, the qualitative or quantitative status of this natural value was not formulated, but reference was made to the Nature Policy Plan that was published the year before (dS + V & GW 1994). Of course this poses a considerable threat. If one plan refers to the other, and the other refers back to the first, we end up in a circle where nothing happens. Such was the case here. In the RMP2 it was specified that a working plan should be made in order to reach the targets that were mentioned in the Nature Policy Plan, and that the results of the Nature Policy Plan should be evaluated on a yearly basis. At the same time, however, the financial base of this all was observed to be absent, and the conclusion was reached that looking for the money was to be another target. It is obvious that such procedures lead to the production of paper but not to concrete results in the urban greenery.

The Nature Policy Plan was announced in 1992 in the Plan for the Outdoor Area ('Beleidsplan Buitenruimte Rotterdam',

dS+V 1992). In the latter, four rather vague and even holistic principles were formulated that should underly the policy:

- *'nature and landscape are an integral part of the city, the harbour and the surrounding area'*
- *'nature and landscape are an indispensable qualitative factor in the environment'*
- *'the city and its surroundings should be considered a single organic entity also as far as nature and landscape are concerned'*
- *'the intrinsic value of nature and landscape' should be treated with respect.*

The first Nature Policy Plan ('Natuurplan') then appeared in 1994 (dS+V & GW 1994). It was clearly the first attempt to formulate concrete targets. It was intended as a first step towards the development of a municipal nature policy, it analysed the status of the urban nature and clearly stated the development of a higher quantity and quality of green as a major goal. It literally stated (translated): *'This implies more plants and animals in and around the city (quantity as well as diversity)'*. Yet the conclusion was reached that for both the formulation and the execution of a proper nature policy the indispensable ecological data were lacking. And something like the Rotterdam Institute for Urban Nature (bSR) was already announced, but not actually founded.

One more policy plan needs to be mentioned. It is the recently published Regional Policy Plan for the Green Structure ('Regionaal Groenstructuurplan', Stadsregio Rotterdam 1997). In it, a clear connection is made between the greenery within the city and beyond its boundaries, in the surrounding region. It is concluded that there is little functional linkage between the green areas among themselves and between the green areas and the urban functions, which makes the greenery vulnerable to threats. The plan was intended to serve as a tool for spatial planning in the to-be-formed Province of Rotterdam. Since 1997 it has become clear

that there will be no Province of Rotterdam formed in the near future; it is to be hoped that the policy targets of the plan will still somehow be achieved.

Policy targets

In the various policy plans we can observe two different kinds of policy targets. On the one hand the vague and rather abstract targets (treating the city as an organic entity), on the other hand the more concrete and potentially quantifiable targets (development of more and better greenery). The implementation of the first Nature Policy Plan was hampered by the lack of knowledge that we mentioned before. Qualitative and quantitative improvement of the situation of urban nature implies that there is a certain knowledge about the quality and the quantity at the chosen starting point. As such knowledge is absent in Rotterdam (or perhaps sometimes present, but not in an accessible form) it is difficult, if not impossible, to meet the goals.

In the second Nature Policy Plan, of which a first draft was published in May 1997 ('Natuurbeleidsplan Rotterdam, startnotitie', Van der Wal & Hendriks 1997), this lack of knowledge was not only frankly admitted, but for the first time a concrete action was announced in order to gather knowledge: *'In the (first) Nature Policy Plan the conclusion was reached that a proper knowledge about the actual situation concerning the presence of plant and animal species in the city is lacking. (...) In order to collect ecological data, as well as for increasing our knowledge, the founding of an expert centre will be considered'*. This centre (the Rotterdam Institute for Urban Nature, in Dutch 'bureau Stadsnatuur Rotterdam', shortly 'bSR') was founded in September 1997 as a joint effort of the Natural History Museum and the city's Department of Public Works. It immediately started to develop plans to collect data on the Rotterdam urban flora and fauna, not only for the sake of science, but certainly – and perhaps mostly – for the sake of urban welfare.

Ultimately, it will be an important task for bSR to assist in the development and the maintenance of the outdoor area by providing data and advice. For this reason, bSR needs to collect data and knowledge about the urban nature in Dutch cities in general, and from Rotterdam in particular.

FLORA AND FAUNA IN DUTCH CITIES

Few cities in The Netherlands have so far conducted ecological research, or even whatever kind of inventory of the urban flora and fauna, let alone biotope or habitat mapping. Some cities have published a bird atlas, a flora atlas, or similar studies on the urban natural life. Examples are Amsterdam (NNV 1941, Melchers & Timmermans 1991, Denters *et al.* 1994, Melchers & Daalder 1996, Denters & Vreeken 1998), Den Helder (Schendelaar 1986, Creutzberg *et al.* 1995), Delft (Mostert 1995) and Eindhoven (Maréchal & Veenhuizen 1997). Most of these cases concern research conducted by independent (amateur) groups of bird-watchers and naturalists, and not by municipal officers. This means that the scientific level of such publications is often quite satisfactory, but that there is no link to applying the accumulated knowledge to the development and maintenance of the urban greenery. It is science for science's sake, interesting and important, especially within the framework of biotope mapping in the urban environment. Yet however, in our view such studies are a tool for biotope mapping, and subsequently biotope mapping itself is a tool in the urban planning process, and not a goal.

The efforts of the city of Amsterdam stand out. Already as early as 1941 an important publication appeared on the urban wildlife of this city (NNV 1941), with contributions about birds, plants, mammals, microorganisms, really nearly every aspect of the urban wildlife. It then took half a century before the study of the Amsterdam nature resulted in

new important publications. A number of books on the Amsterdam wildlife appeared during the last few years, some dedicated to the general public (Melchers & Timmermans 1991, Denters *et al.* 1994, Melchers & Daalder 1996), others more scientifically oriented (Denters & Vreeken 1998). The mapping of urban nature has also been started in Amsterdam. Two interesting publications have recently appeared (Van Zoest 1998a, 1998b) with the first steps towards what is called Ecological Valuation, but even in our capital a thorough ecological mapping has so far not been made. In summary, knowledge about urban nature in Dutch cities is present in a generally unstructured and scattered way, and the process of biotope mapping (or habitat mapping, *Biotopkartierung* in German) is an almost unknown phenomenon in The Netherlands.

URBAN ECOLOGY AND BIOTOPE MAPPING IN ROTTERDAM

Rotterdam has no tradition in scientific research. The city does have a university (the Erasmus Universiteit Rotterdam), but this university does not have faculties in (natural) sciences, architecture, urban planning or other sciences that have any relation to our subject. Rotterdam is, at the same time, a city that traditionally likes to work and not to contemplate. If we, in Rotterdam, think about doing research into urban nature, this must be research with a strong link to practical applications.

Knowledge about the Rotterdam wildlife is – as elsewhere in The Netherlands – to some degree available in an unstructured way. Amateur groups of birdwatchers, bat spotters, botanists and other naturalists have sometimes produced reports on such subjects as the breeding birds in parks or the distribution of bats along the northern city limits. These reports have usually not been widely distributed. Organizations working on a national scale have data in their possession about the distri-

bution of, for example, butterflies, mammals, and plant species, and such data often contain information about the distribution of taxa within Rotterdam's city boundaries. It will be one of the tasks for bSR to gather such data in a central database and to make it available for use by both municipal workers and the general public. The bulk of the data, however, is either not existing or not available, and therefore a thorough research programme must be developed. We now anticipate to start a programme of biotope mapping.

Foreign experiences

As said, biotope mapping is an unknown procedure in The Netherlands, so in order to find examples we immediately look at cities in other European countries. It was thought to be a fitting idea to invite researchers from some of these other European cities to contribute to a one-day symposium (held on 9 October 1998 in Rotterdam) and to invite them to contribute to this volume. Through their experiences Dutch municipal workers could get an impression of the importance of biotope mapping for the planning procedures and for the improvement of the quantity and quality of urban greenery. German cities have a long tradition of scientifically thorough mapping activities. As was made clear during the conference and in this volume, biotope mapping has been carried out in over 200 German cities (Werner 1999). Of these, we have chosen three cities and invited workers from these three cities to present their experiences. The examples of Berlin (Sukopp 1990), Leipzig (Saßin 1994; Breuste 1996, 1999; Wächter 1999), and Mainz (Frey 1997, 1999) will be presented and will inspire bSR to start similar activities in Rotterdam. The extreme – may we say German – thoroughness with which the results of the research have been presented (e.g., Sukopp 1990, Schulte *et al.* 1993, Breuste 1996) is a stimulation to reach high standards in the research in Rotterdam. The example of London (Goode 1999), where the London Ecology Unit is publishing Ecology Handbooks on the level of the borough, is at the same time an inspira-

tion to conduct this work on the level of the Rotterdam equivalent of the borough (the 'deelgemeente' or sub-municipality), as well as to present the results in a way that will appeal to the general public.

Biotope mapping in Rotterdam

We thus want to start biotope mapping activities in Rotterdam. The research will be carried out by workers of the Rotterdam Institute for Urban Nature (bSR) at the Natural History Museum and the Department of Public Works, with support from other municipal departments, such as the Harbour Authorities, the Department of Town Planning and Housing, and the Department of Environmental Education. Since one of the important goals of the work is the integration of nature in the urban scenery of living, working, transport, and leisure activities, we have to choose a method that will provide results that are readily usable for spatial planning, and more precisely for the integration of nature and natural values into spatial planning. Nature, or urban green, will then become more recognizable and appreciated.

It is necessary in the first place to obtain knowledge about the different biotopes or habitat types there are in Rotterdam. What types are there, how are they distributed over the city, what species live in them? Selective biotope mapping is a quick method to obtain a first impression. One selects all areas that are worthy (or potentially worthy) of protection. In these areas simple criteria, such as the size, the major period of development, the relative rarity within the city, and its flora and fauna, are investigated in order to obtain a rough idea about the value of the area under investigation. Of course there are serious drawbacks to this method. One of these is that the value of a certain area is not something that is restricted to the area: an important part of the value comes from the position the area has in the context of its surroundings. Green areas are influenced by, and influence, the surrounding habitats even though these surrounding habitats them-



Figure 2 The landscape in the Kralingse Bos, a park area in the northern part of Rotterdam [photo: A. Ulmer].

selves may not appear ecologically outstanding. Therefore also rather typical and widespread biotopes must be taken into account (Starfinger & Sukopp 1994) and ultimately the entire city will have to be investigated and mapped. This is the core of the second method: comprehensive biotope mapping. It will be clear that at this stage of our work in Rotterdam it is impossible to investigate and to map the entire city, including the harbour area. Thus, acknowledging the importance of the ecological urban network, we consider combining the two methods. Areas that are indisputably of great importance (e.g. because of planned large-scale changes in the spatial structure) will be investigated with priority. Examples of these are the Zuiderpark area, the Kralingse Bos (Fig. 2), and the Noordrand area (the northern city boundary) for which drastic changes are expected. Then, in order to get an overall picture of the urban nature and of its potentials, we plan taking representative samples of each different biotope type. When these samples are chosen as much as possible in

areas bordering the areas already investigated, the value of the data will become higher. Having determined the different biotopes or habitat types, and having mapped their distribution over the city, it will become possible to predict the effects of different scenarios in spatial planning on the urban nature. Nature will then finally be integrated into spatial planning, the ultimate goal of which will be to increase the ecological and esthetical value of the urban greenery.

The one-day symposium 'Biotope Mapping in the Urban Environment' that was held on 9 October 1998 and this volume, which is the scientific result of the conference, are intended to mark the formal beginning of the mapping process in Rotterdam. The organizers of the conference and the editors of this volume have tried to invite contributions from a number of cities in which biotope mapping has been worked on, scientists who will be able to explain the subject from both a scientific and a political point of view.

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