ATLAS OF PLANT COMMUNITIES IN THE NETHERLANDS

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Abstract - Design and some preliminary results of an atlas with the distribution of plant communities in the Netherlands on the level of associations are reproduced.

Key words - atlas, distribution, vegetation, The Netherlands, plant community

Introduction

Mapping of the occurrence of species is a well established way for understanding the "behaviour" of species. On national and European levels a lot of Atlases of plant and animal species were published. In the Netherlands atlases (or at least maps) on species levels are published of vascular plants, mosses, stoneworts, mushrooms, mammals, birds, fishes, reptiles, amphibians, ground beetles, butterflies and some smaller insect groups.

Atlases or maps on a national scale on (plant-) community level are however seldom seen, although their value for scientific interest or environmental policy is undeniable high (Van Duuren, 1996).

Maps with the distribution of plant communities can be used for determining gaps in data used for classification of vegetation, for protection of plant communities (based on rarity and changes in occurrence), for spatial and environmental planning, for a better understanding of the relationship between vegetation and abiotic factors as soil types and groundwater regime (ecological meaning of the plant community) and as a framework for related flora and fauna data.

In 1995 a project was started in the Netherlands to publish an atlas with distribution maps of all plant communities (associations) of the Netherlands. The executive work is mainly done by IBN-DLO, the supervision and organisation is in hands of that institute and CBS. Financial support and accompaniment is given by several other institutes. This article give some information about this atlas project.

Method

As far as possible a complete distribution pattern of each association is presented on a map with a grid. For each grid cell (5 x 5 km) the presence or absence of a plant community is given. Each plant community is illustrated by a map of the more or less

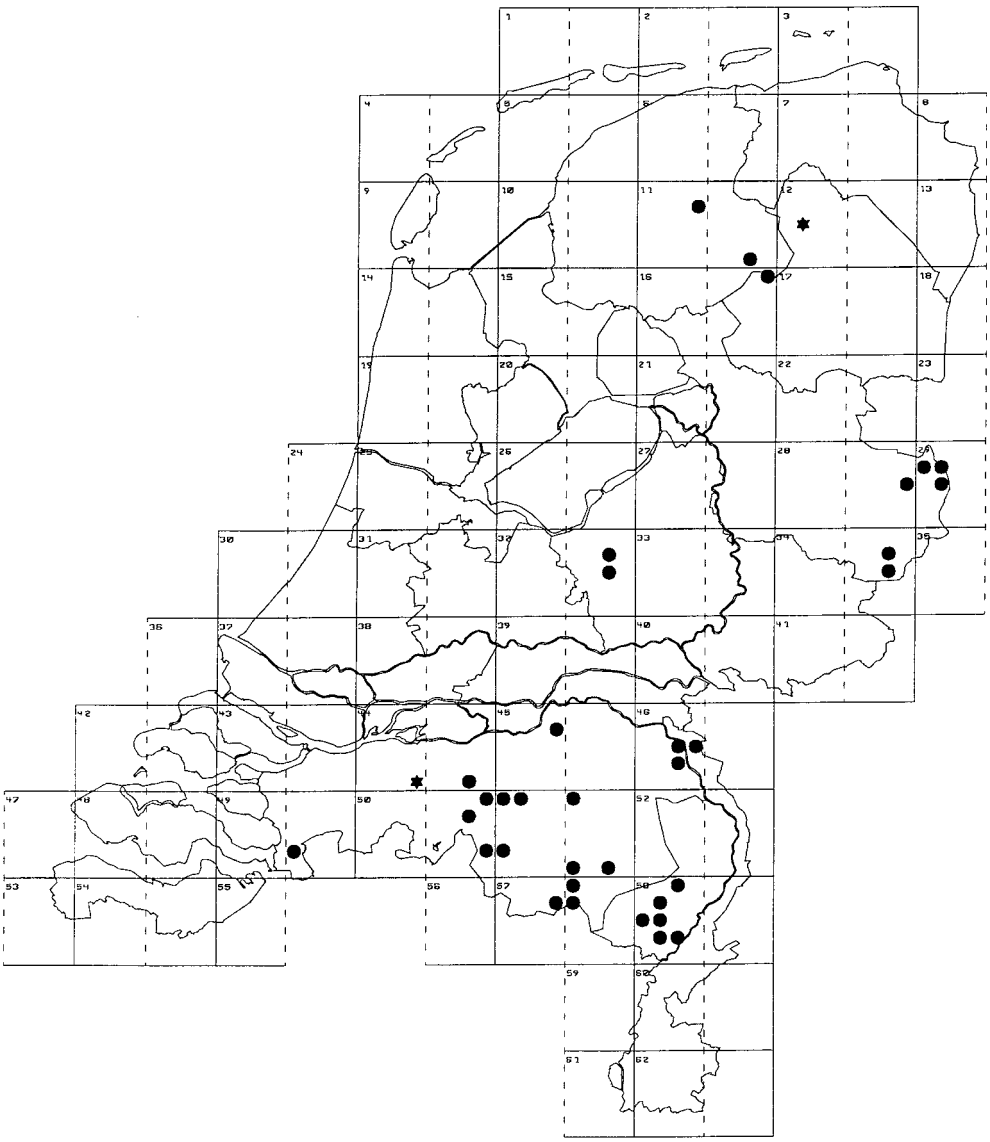

Fig. 1 - Distribution of Isoeto-Lobelietum in the Netherlands before 1980

recent distribution in the period after the year 1980 and by a map of its “historical distribution” for the period before 1980. Three different sources (see further on) are used to compile the map; these sources can also be distinguished on the map (see figure 1 and 2). For storing and mapping of the data the computer program VEGATLAS (Hennekens, 1996) is used.

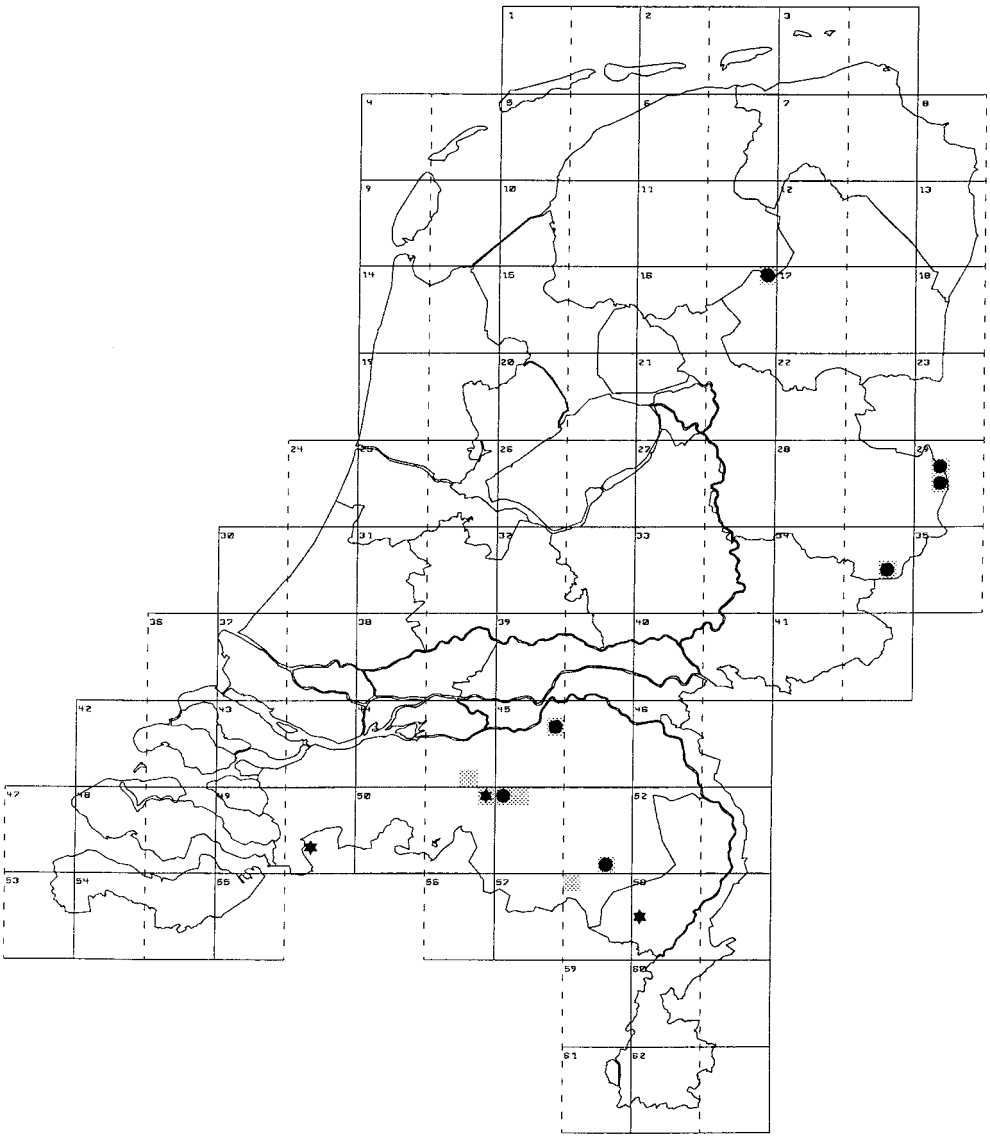

Fig. 2 - Distribution of Isoeto-Lobelietum in the Netherlands after 1980

VEGETATION DATA IN THE FORM OF RELEVÉS

The main source for the atlas is the database of the project dealing with a new classification of the plant communities in the Netherlands (Mucina *et al*., 1993; Schaminée *et al*., 1996a, 1996b, 1997). In order to classify the plant communities in the Netherlands more then 200,000 relevés has been collected and stored in a database (TURBO(VEG); Hennekens, 1995). The relevés are partly derived from publications, for a large part also from unpublished sources (e.g. notes in fieldbooks). For the benefit of the project "atlas of plant communities" additional relevés (also by fieldwork) are collected and stored in the same system. Because the criteria for suitability for the atlas project are less precise than for the classification (e.g. homogeneity), more relevés can be used then are selected for making the synoptic tables from the National Vegetation Classification. All relevés that are not used in synoptic tables, had to be classified according to the new system. For each relevé the geographical position is determined as exactly as possible, which means that most of them are exact enough for the used grid-system.

OTHER VEGETATION DATA

Besides vegetation data in the form of relevés, other sources can also be used for the atlas, although the possibility to check the classification is lacking. This type of data includes all interpreted vegetation data like description of occurrence of certain types in literature, vegetation maps, verbal contributions, synoptic tables (if the relevés are not available), herbarium labels etc. (figure

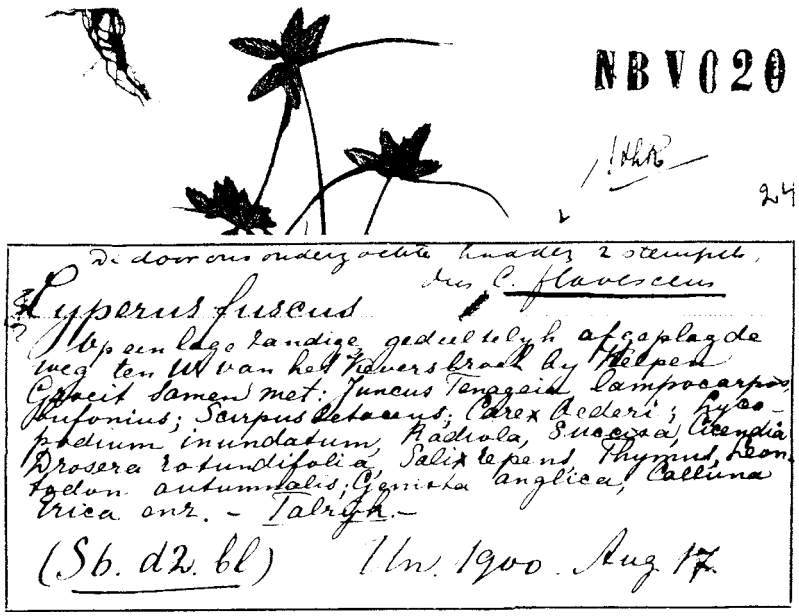

Fig. 3 - Herbariumlabel with information about the vegetation

3). Because of their different character, these data are mapped with a special symbols or grey squares.

FLORA DATA

Because the above mentioned data are not collected in a systematically way, certainly not all occurrences are covered by the dots on the map. To get insight in the "completeness" of the maps a method was developed based on the distribution of so-called diagnostic species (see also Rodwell *et al*. 1993). Although the distribution of plant communities is not completely comparable with the distribution of such species, the last data can be used to give insight in the "potential actual" distribution. The source of the flora data is the atlas of the flora of the Netherlands and Florbase (a database with recent data about the distribution of plant species in the Netherlands from FLORON: Van der Meijden *et al*., 1995). The results are mapped as grey squares, which can be distinguished from the symbols. The way the distribution of plant communities is derived from the flora-data is for a large part conducted by expert judgement. At first the diagnostic species are selected, mostly character species. Secondly each selected species get a weighting factor. The sum of the values of the selected species must be surpass a threshold value. Selection, weighting factor and threshold values are determined for each association by the author of the map (see example in the framework).

Weight factors for Isoetum-Lobelietum

species	weight factor
Isoetes echinospora	2
Isoetes lacustris	2
Lobelia dortmanna	2
Littorella uniflora	1
Eleocharis multicaulis	0,5
Juncus bulbosus	0,5
Elatine hexandra	0,33
Luronium natans	0,33

Threshold value for each grid cell (above this value the grid cell is indicated): 2,8

e.g. Isoetes lacustris + Littorella uniflora = 3: indication: grey cell on map
Isoetes lacustris + Eleocharis multicaulis = 2,5: no indication: blank cell on map
Isoetes lacustris + Eleocharis multicaulis + Elatine hexandra = 2,83: indication: grey cell on map

ABIOTIC DATA

Abiotic data are of minor importance and only used for a small number of associations, which are strongly and clearly related to one abiotic factor. For the occurrence of *Spergula-Corynephoretum* the presence of drift sands is essential. This means that the potential area of this community is determined by the distribution map of drift sands. The distribution of the abiotic data can be combined with a map of the plant community in the program VEGATLAS in order to see the relation between the both and to give in sight in the completeness of the vegetation data.

Results

The results are in the first instance published in a book with four volumes, which follows the division in volumes in the classification of the plant communities in the Netherlands.

Contents of the four volumes of the atlas of plant communities

Volume1:	Communities of open water, marshes and wet heathlands
Volume 2:	Communities of grassland, dry heathland and fringe communities
Volume 3:	Communities of pioneer habitats, salt marshes and tall forb communities
Volume4:	Communities of scrubs, woodlands and clearings

In 1999 the first volume will be published and in 2001 the last one is planned. Together the four volumes contain 300 maps of the associations of the Netherlands. Each map will be accompanied by an introductory text, with at least the following parts: Ecological explanation, distribution and changes in distribution, completeness of the map, area in Europe, and distribution of sub-associations. Each volume and each vegetation class has a more general introduction, which is also intended for less specialised readers. The basic data, which are often more detailed than the published data, can be used in different ways for different projects.

For a more attractive sight on the project "Atlas of Plant Communities in the Netherlands", you can visit the Internet site of Statistics Netherlands. The address is http:\\www.cbs.nl (use the English flag to click on).

MAPS ON A EUROPEAN LEVEL

For several reasons the mapping of plant communities in the Netherlands is an important project (see introduction). But, in some aspects, the mapping of these communities on a European level would be even more important, because the mapping on a European level often covers the whole distribution area of the

community. In our view these aspects are: (1) Determining gaps or overlaps between the national data; (2) Protection of plant communities; (3) Relation to abiotic data: ecological meaning of the plant community and (4) Framework for related flora and fauna data.

If one or more classes of the European vegetation classification are published, it is of great value to use the collected basic data (relevés) with the method described in this article to make maps of the distribution of plant communities on a European level. If the grid system of the Atlas of the Flora Europaea is used, "potential actual" maps based on characteristic species can also be made. A first example of such an approach was presented by Zuidhoff *et al*. (1995), dealing with the distribution of eutrophic grazed grasslands of the *Cynosurion cristati*.

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