



environmental mapping

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27-4-2006

Masaryk University, Brno, 19-12-
2005

1

- **Environment:** geographical circumstances that influence (preserve, ameliorate, deteriorate) the human ecological system
- **Environmental mapping:** collection, processing and presenting data on the environment

Aims of environmental mapping:

- visualise conflict situations,
- provide insight in possible impact of man-made developments,
- explain environmental situations
- compute surface areas, border lengths or ratio's
- communicate views
- monitor processes
- serve as arguments in decision support systems
- serve as analysis tool

Start of environmental mapping in the 1960s: Pollution maps and inventory maps

Pollution maps

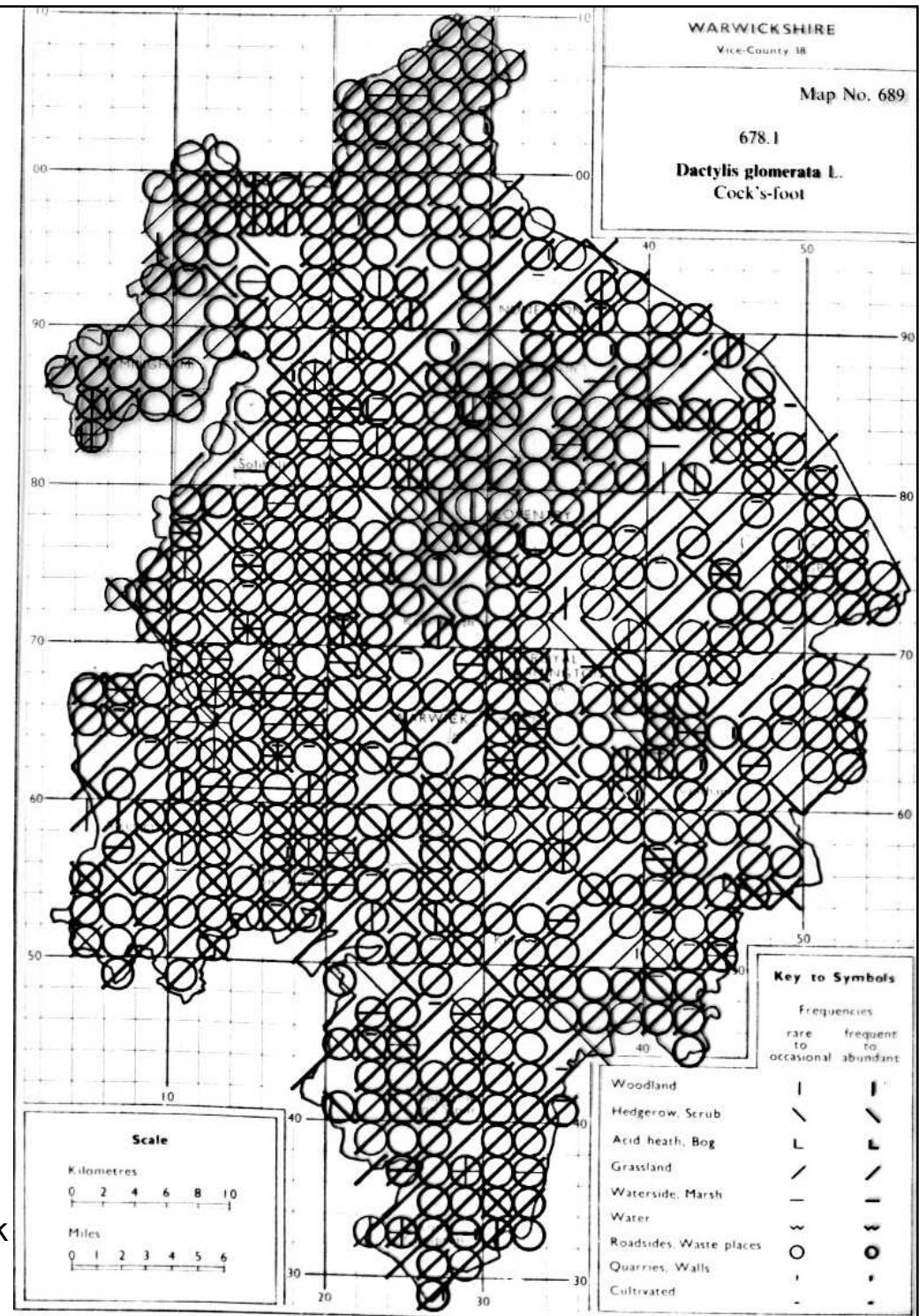
- aquatic**
- air**
- soil**

-Analytical environment maps of small areas

-Single element mapping, non-compatible

Single elements maps

- Distribution of *Dactylis glomerata* over Warrickshire according to habitat: woodland, hedgerow, scrub, bog, roadside, waste places, waterside (1960)



Pollution maps

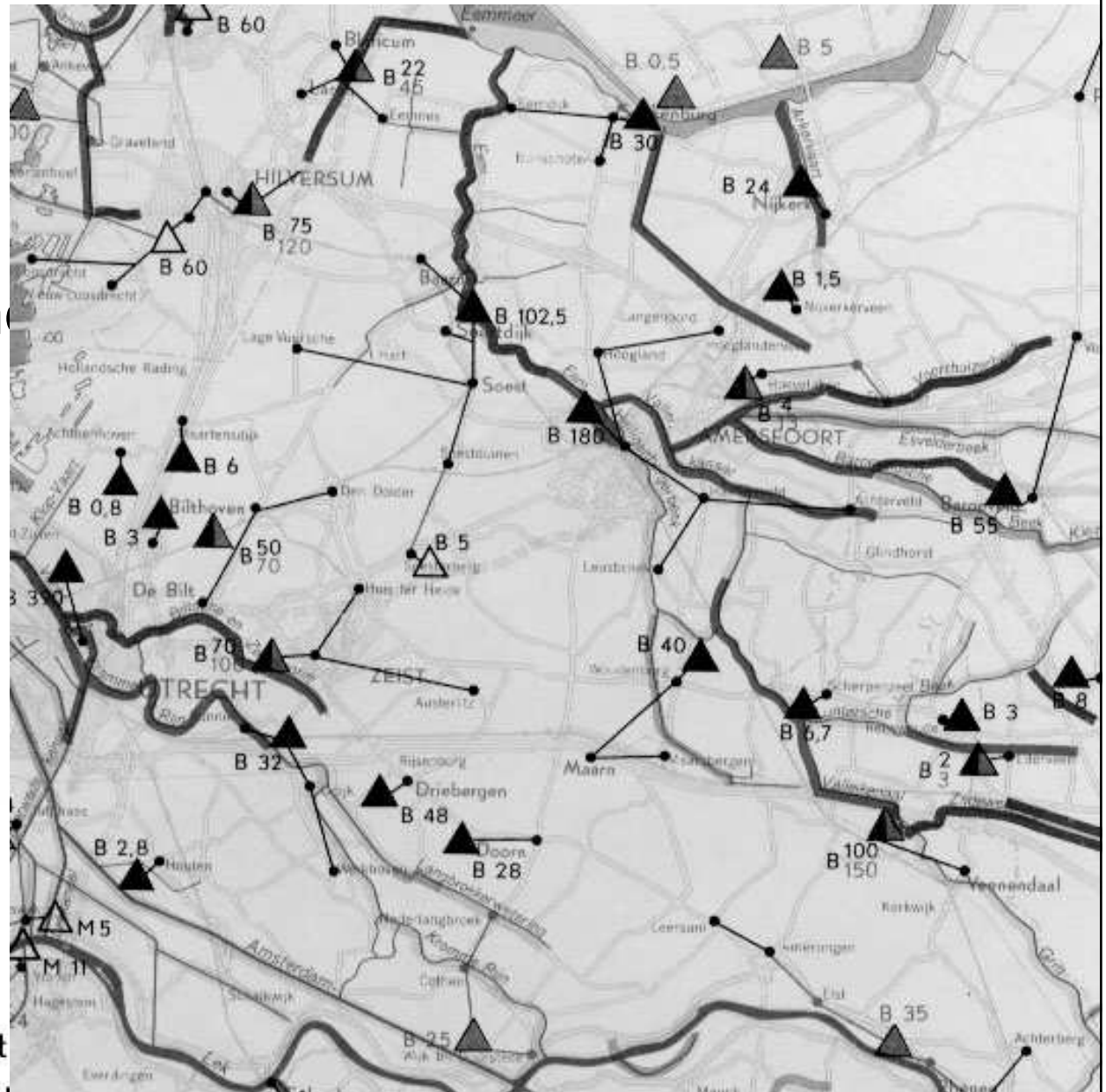
Water pollution map 1973, based on O_2 saturation, NH_3 % and biochemical O_2 use
 Black triangle: sewage treatment plant

WATERKWALITEIT

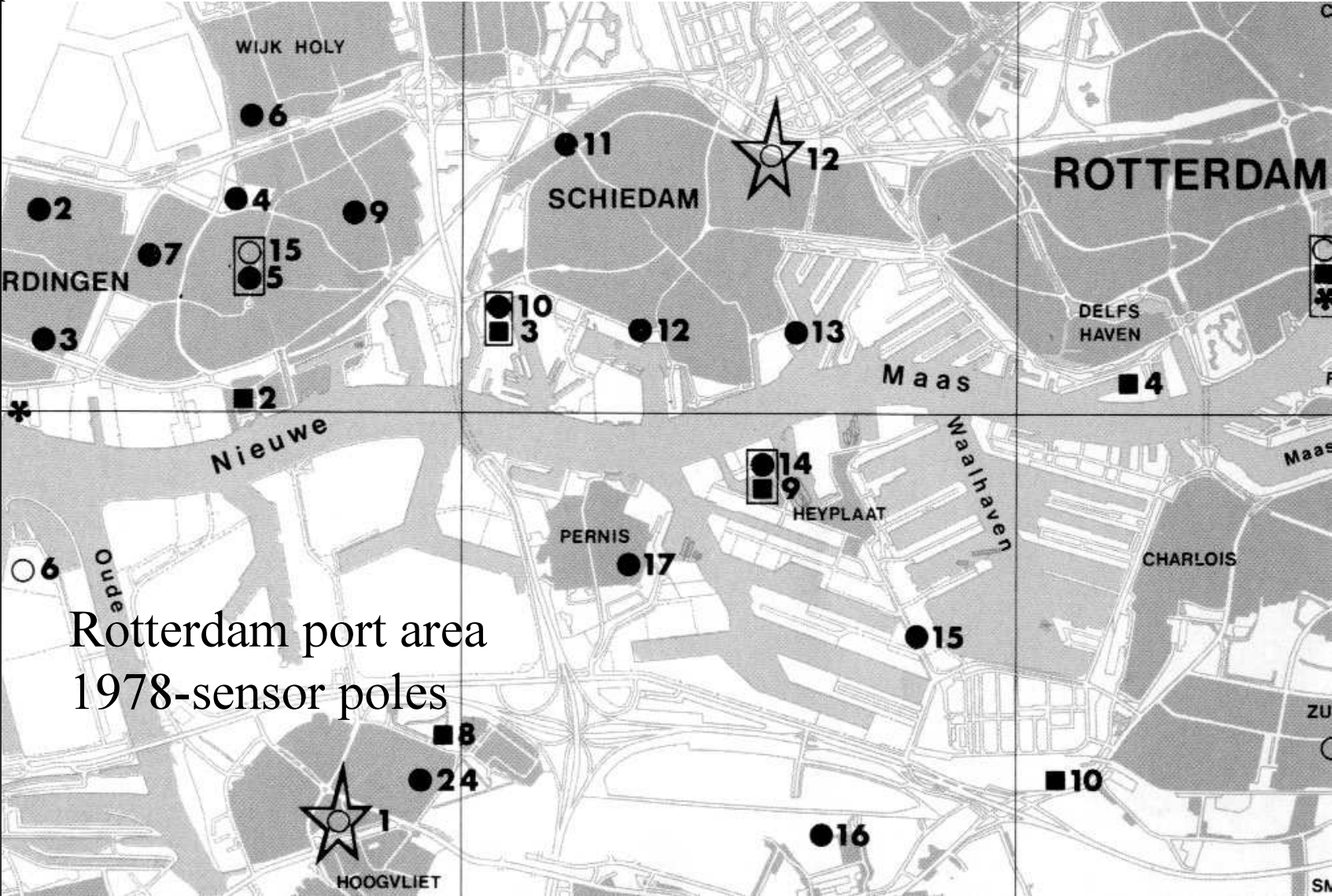
goed \longrightarrow slecht



De weergave van de waterkwaliteit zuurstofverbruik (B 7 V) het zuu



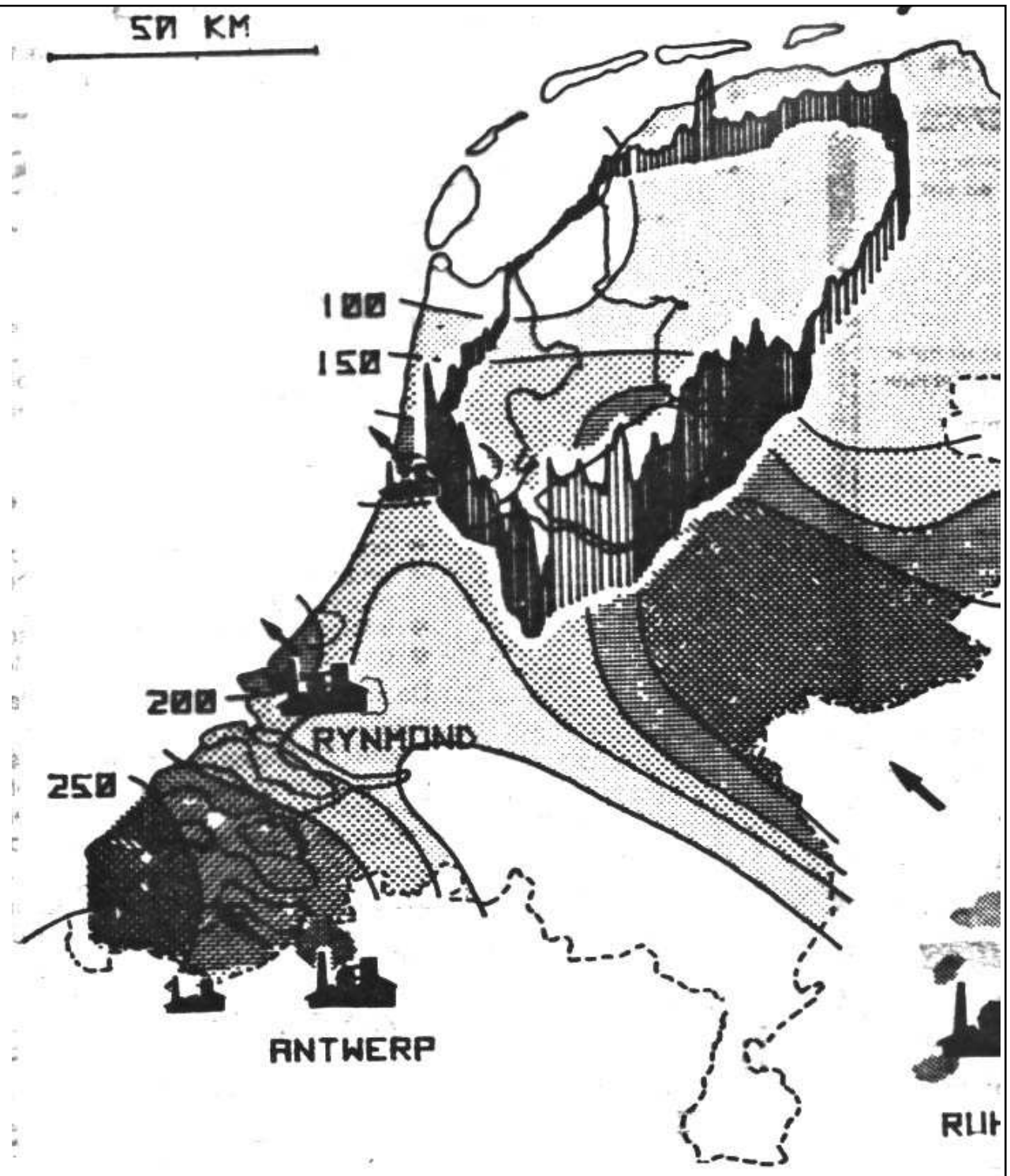
Sensor networks



Rotterdam port area
1978-sensor poles

Sensor maps

- SO₂ concentration on the basis of national sensor network (isoline map) and incidental sensor car route (3D)
- February 18, 1976, 15.00 GMT

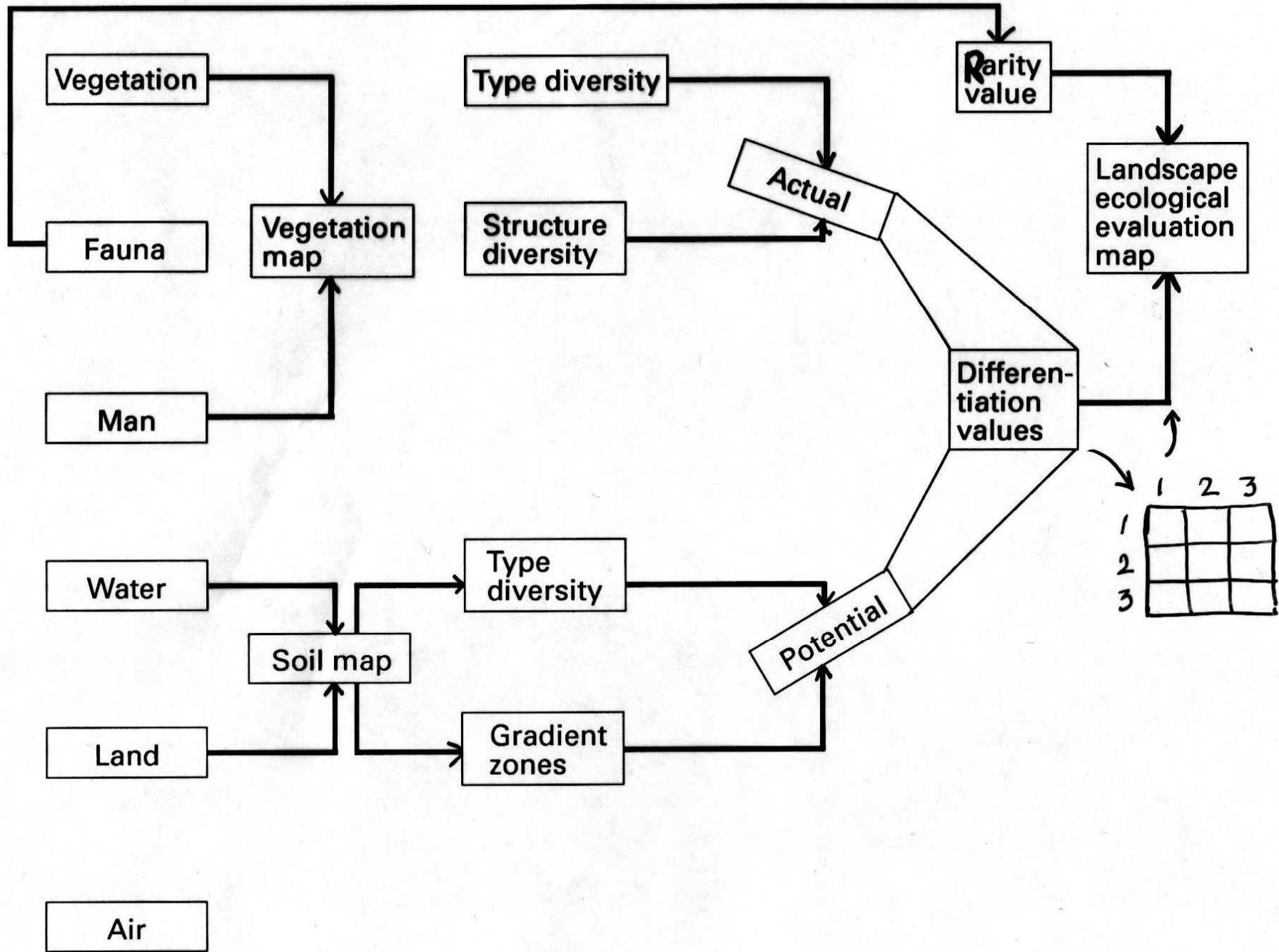


1970s: Integration of environmental aspects and evaluation

Example:

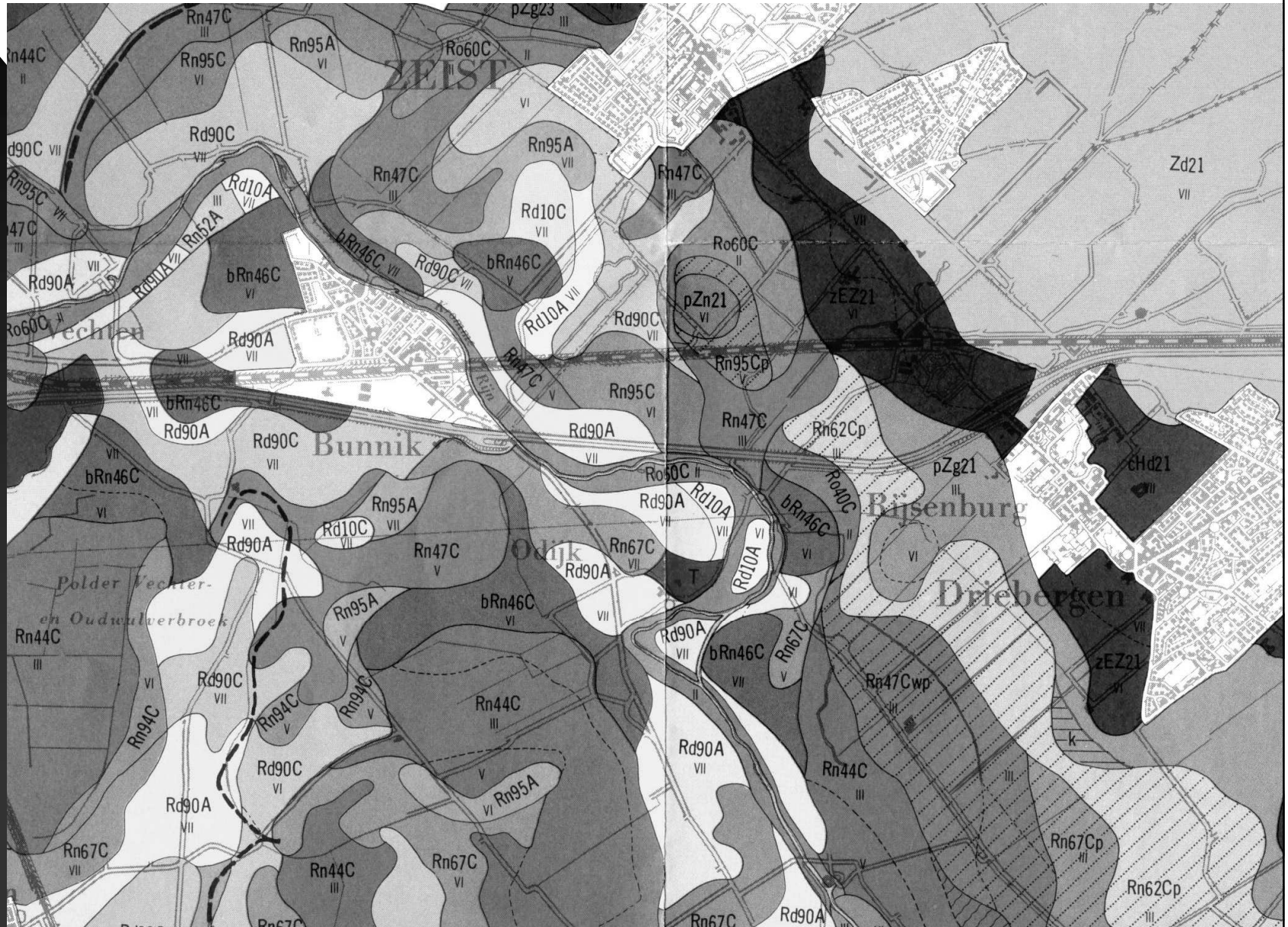
Kromme Rijn area, Southeast Utrecht prov.

Demonstration how, uniformly, data should be collected and processed for ecological evaluation, on the basis of rarity and diversity of soil and vegetation types



Soil map 1:50 000

Soil units and depth of water table



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POTENTIAL VALUES

**Influence of
gradient zone**

Soil types per km²

**Simplified
evaluation**

not

yes

Soil type diversity

1
2
3
4
5
6
7
8
9
10

1

1

2

2

2

3

3

3

3

Vegetation map 1:50 000

Greens:

Grass

Red and

Yellows:

Forests

Pinks:

Heaths

Browns

Arable

land, tree

nurseries

+waste-

lands

27-4-2006



ACTUAL VEGETATION VALUES

			Structure diversity			
	Vegetation types per km ²	Simplified	II	III	IV	V
Vegetation type diversity	3	1	3	4	5	6
	4					
	5	2	4	5	6	7
	6					
	7	3	5	6	7	8
	8					
	9					
	10	4	6	7	8	9
	11					
	12					
	13					
	14					

Final actual evaluation values

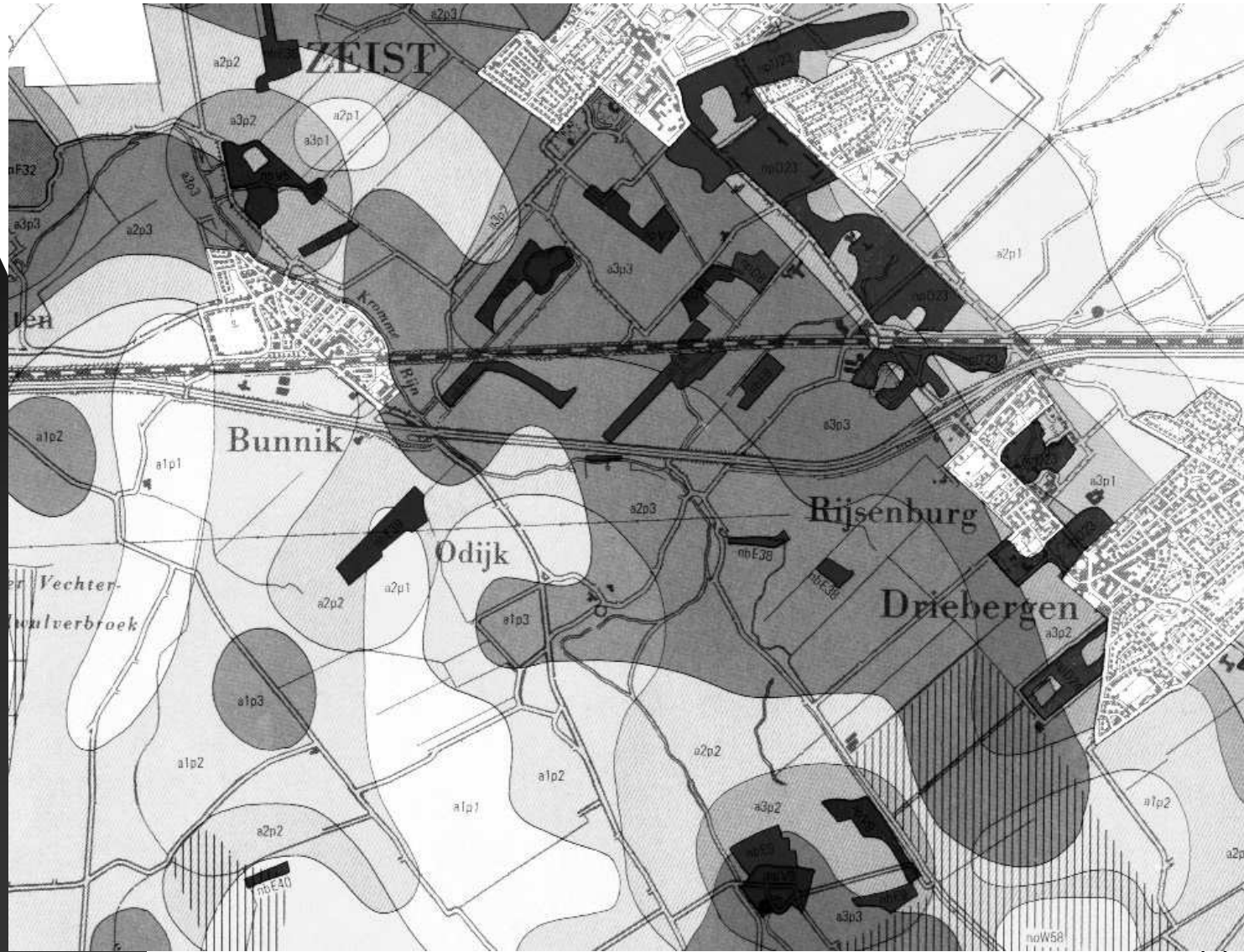
3,4 —> 1

5,6,7 —> 2

8,9 —> 3

Evaluation map

For every grid cell, diversity values and rarity values are combined

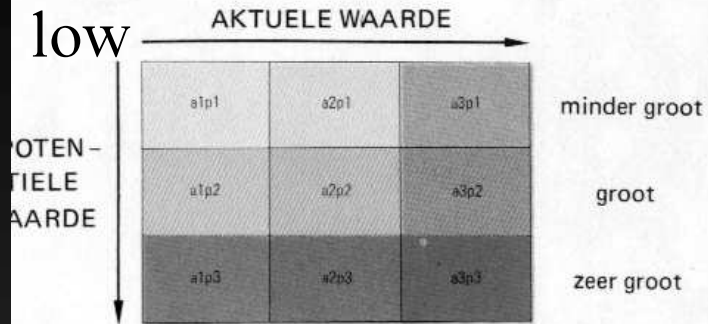


Evaluation map: legend

A. DIFFERENTIATIEWAARDEN

Differentiation values

1A WAARDERING T.B.V. NATUURBEHOUD
EN NATUURBOUW



minder groot groot zeer groot high

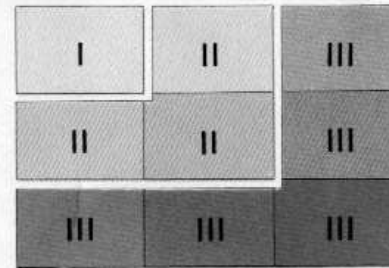
a... aktuele waarde, belang voor natuurbehoud

..p. potentiële waarde, belang voor natuurbouw

vulnerability

2A KWETSBAARHEID

KANS OP ONHERSTELBARE VERLIEZEN
BIJ GROVE') INGREPEN



- I de kans op onherstelbare verliezen is minder groot
- II de kans op onherstelbare verliezen is groot
- III alleen aangepaste lichte ingrepen kunnen zonder onherstelbare verliezen plaatsvinden

in alle gevallen is nader specifiek onderzoek vereist

*) zie toelichting tekst onder 4.2.2

Areas with high rarity value

B. GEBIEDEN MET EEN HOGE ZELDZAAMHEIDSWAARDE

Generally worthwhile

Botanically worthwhile

1B IN VELE OPZICHTEN WAARDEVOL

2B MET NAME IN BOTANISCH OPZICHT WAARDEVOL

npV vochtige parkbossen 1 t/m 22

nbE essenhakhout 2, 3, 6, 8 t/m 13, 16, 31, 36 t/m 48

npD droge parkbossen
4, 8, 16, 23 t/m 31

nbG dijkgraslanden 35, 49 t/m 56

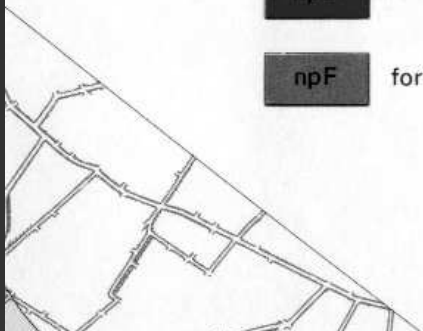
npF forten 32 t/m 35

3B MET NAME IN ORNITHOLOGISCH OPZICHT WAARDEVOL

noW weidevogelgebieden 35, 40, 53, 54, 56 t/m 59

zie voor verklaring van volgnummers en de lettercode de lijst van natuurgebieden, aanhangsel 1

Ornithologically valuable



Water

Bebouwing

Evaluation criteria

- rarity
- type diversity
- structure diversity
- maturity
- irreplaceability
- vulnerability
- susceptibility

Criticism on environmental mapping in the 60s and 70s

- encroachment on non-highly evaluated areas
- use by the un-initiated

Result, end of 70s:

-Environmental mapping went underground

-systematic and continuous collection of all environmental data, and

-storage in environmental database, only to be used by experts.

Dangers?

Local initiatives 1980s:

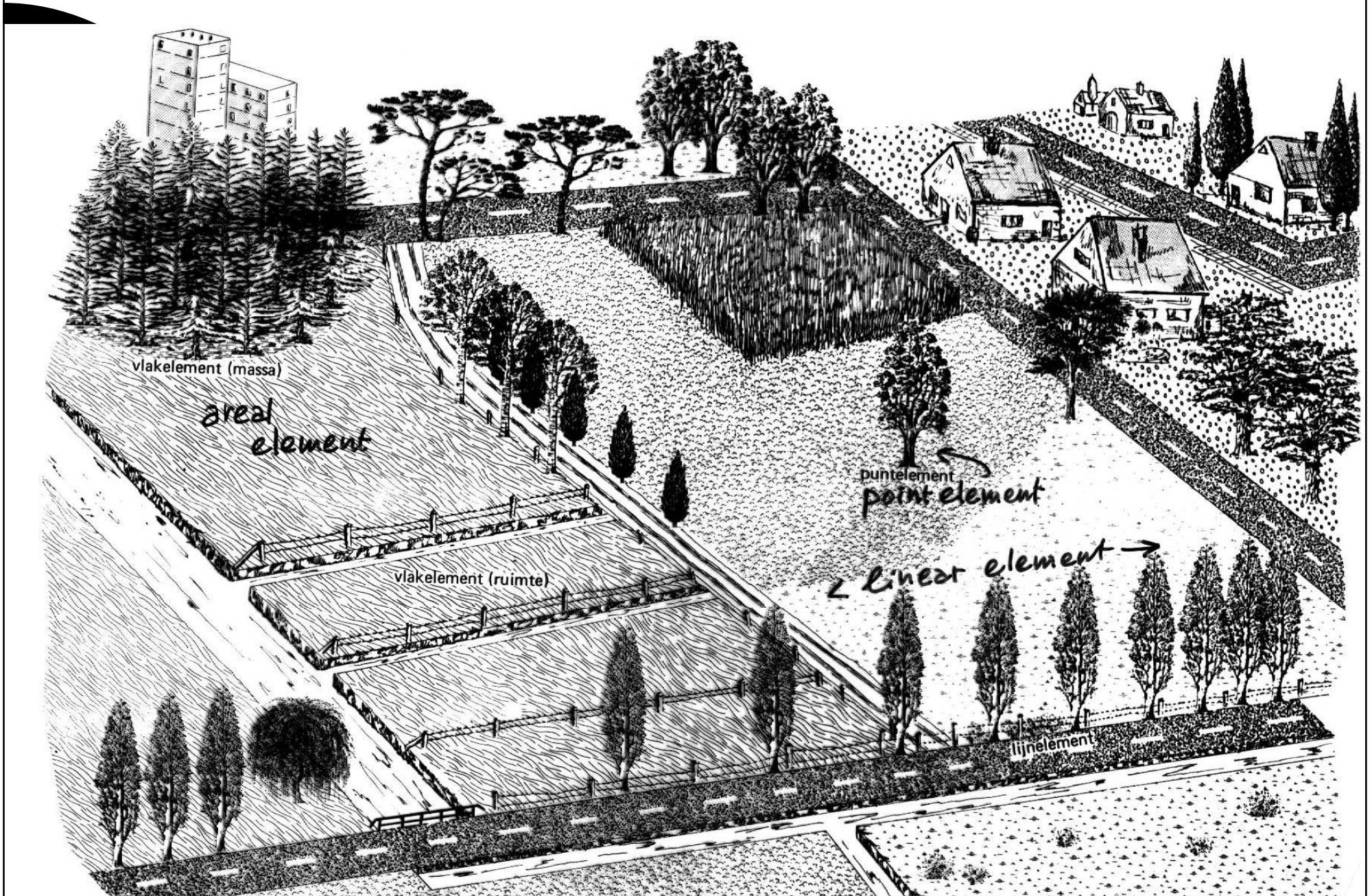
Detailed, ad hoc

-Environmental Impact Reports/Assessment Studies

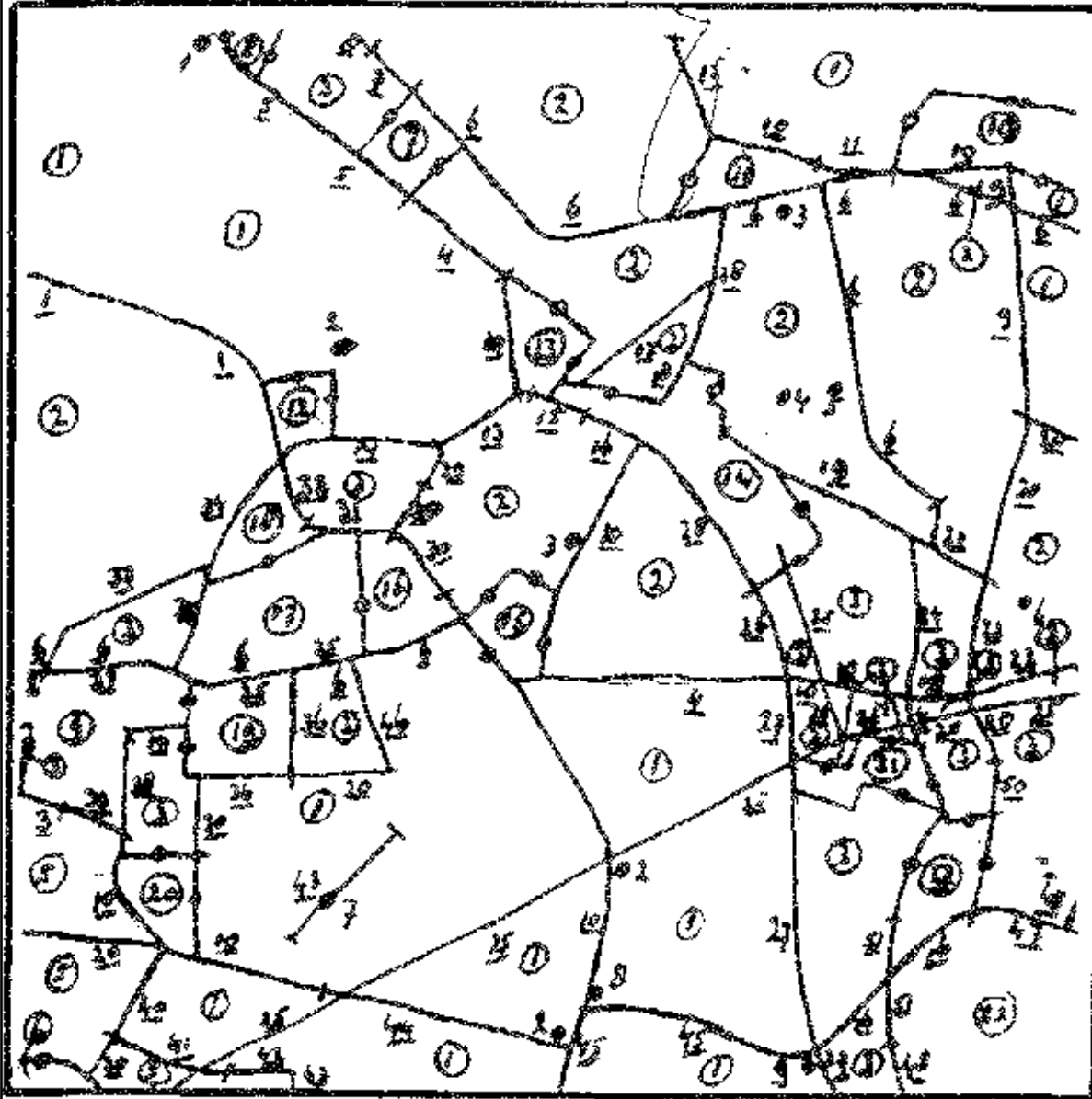
Example Aalten municipality:

- Inventory of all point, line and area elements of the vegetation
- Location, species, age, status (present/future), quality (healthy/diseased)
- Survey in 1x1 km squares

Point, line and area elements



Survey of landscape elements



OPNAME
LANDSCHAPSELEMENTEN

VELDKAART NR. 28

IDENTIFICATIE VAN SQ.KM.:

ZW HOEK 440-236

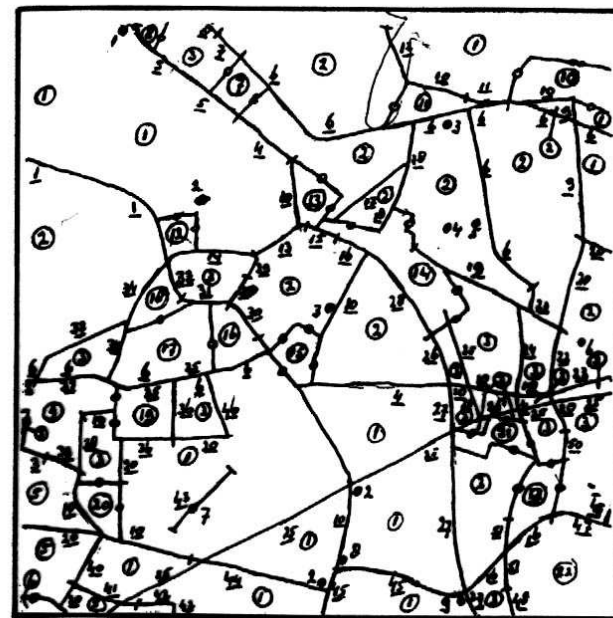
TOP. KAARTBLAD NR. 41W

OPNAME DOOR: A. Buitenhuis

DATUM: 5 juli 1973

	PUNTELEMENTEN					LIJNELEMENTEN					VLAKELEMENTEN					LIJNELEMENTEN					VLAKELEMENTEN										
	SOORT					SOORT					SOORT					SOORT					SOORT										
	BG	BB	O	H	BZ	BG	BB	O	H	D	BZ	BG	BB	O	STR	H	D	BZ	BG	BB	O	H	D	BZ	BG	BB	O	STR	H	D	BZ
1	40			9		40	41	12	3			32	33					37	40	41	12	12									
2	10			5		53	41	12	3	3		40	33					38	10	36	3	3									
3		24				10	36	9	5	3		40	9					39	14	36	3	9									
4	40			5			36			5	7	2	6		5			40	32	2		9	13								
5	20			5		32	36	9				32	9					41	20			2	11								
6	7			0			16				32	13	40		6			42	10			3	9								
7	21			0			16			5	13	4	6		5			43		49	2										
8	10			3		32	16	5	6		7	2	6		5			44		9											
9	10			9		10	36	3	9		32	2	6		9			45		41											
10							36				7	5	6		5			46	44			9	13								
11						13	36	5	9		32	0	6		9			47		41			5								
12						40	41	9	0		10	4	6		3			48		49	2										
13						40	41	6	2	3	16	2	6		5			49	4			5	7								
14						40	41	6	0		32	0	6		5			50	32			3	3								
15						17	41	3	4		10	4	6		3			51	32			2	13								
16							41				32	2	6		9			52													
17							35	0				8	9					53													
18						40	41	6	4		10	2	9		5			54													
19						32		6	6		10	2	9		3																
20							17				10	4	9		9																
21						62	16	3	10		39	10	6		9																
22						15	16	9	3			0	45																		
23						40	16	9	2	14																					
24						14		3	9																						
25							27	9																							
26						16	41	3	9																						
27						10	41	5	3																						
28						16	41	5	9																						
29						10		9	3																						
30						40		6	9																						
31						32		5	9																						
32						10		3	12																						
33						53		6	12																						
34						40	41	12	9	3																					
35						40	36	6	3	3																					
36						63		2	11																						

Register
mit
Inventar
der Punkt-,
Linien- und
Areal-
elementen



OPNAME
LANDSCHAPSELEMENTEN

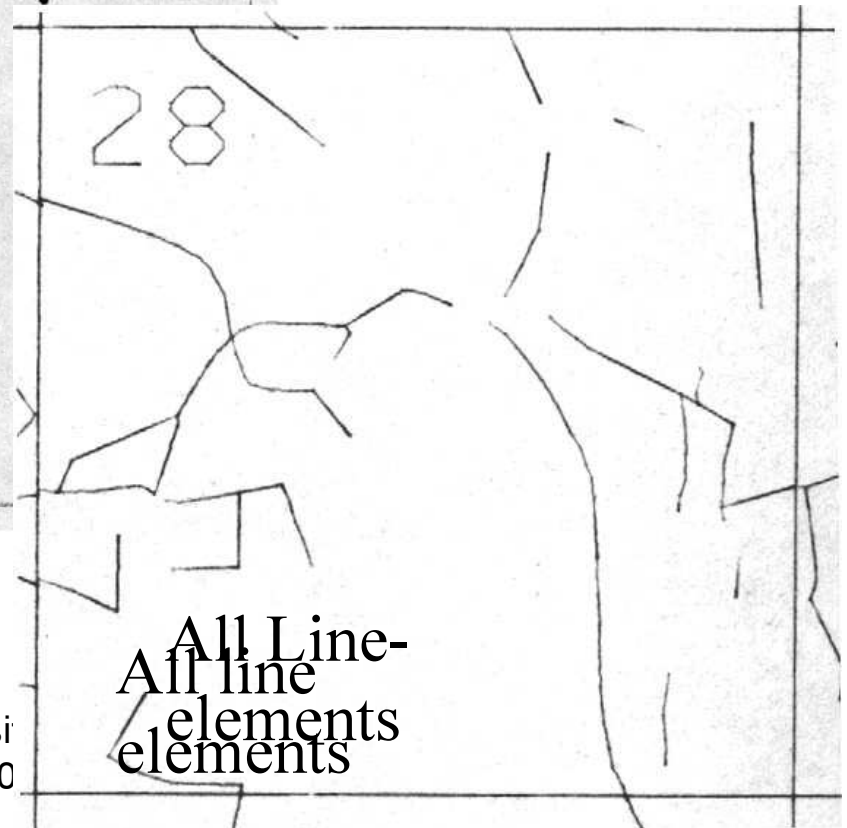
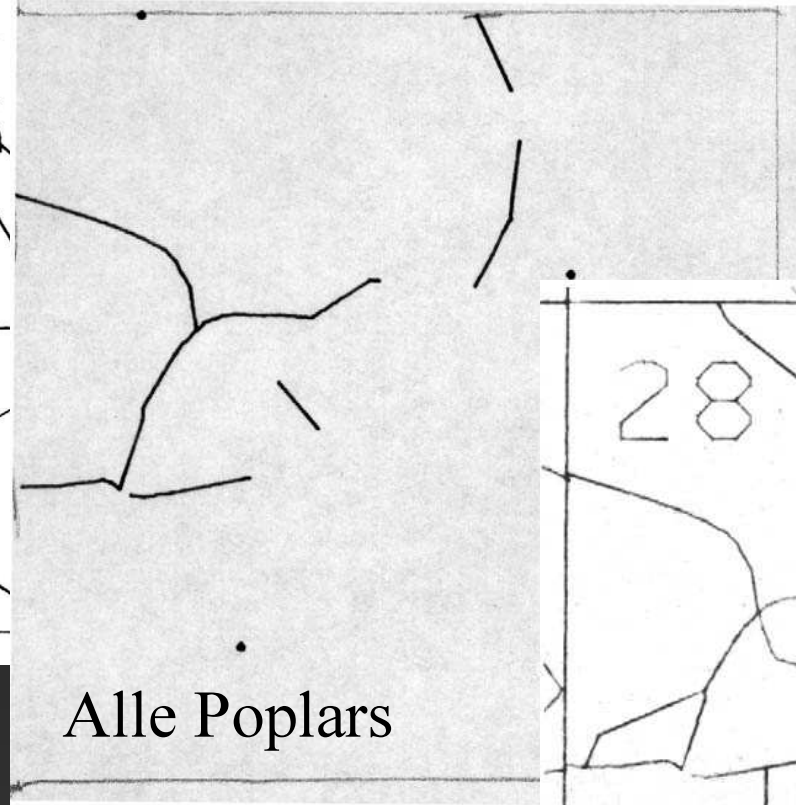
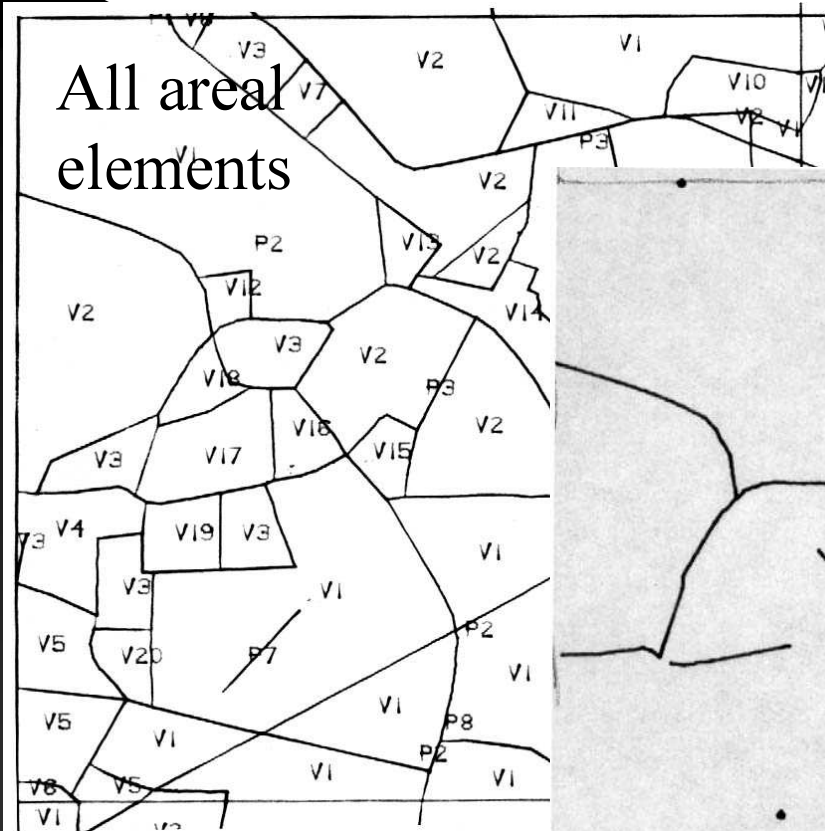
VELDKAART NR. 20

IDENTIFICATIE VAN SQ.KM.:
ZW HOEK 440-236

TOP. KAARTBLAD NR. 4114

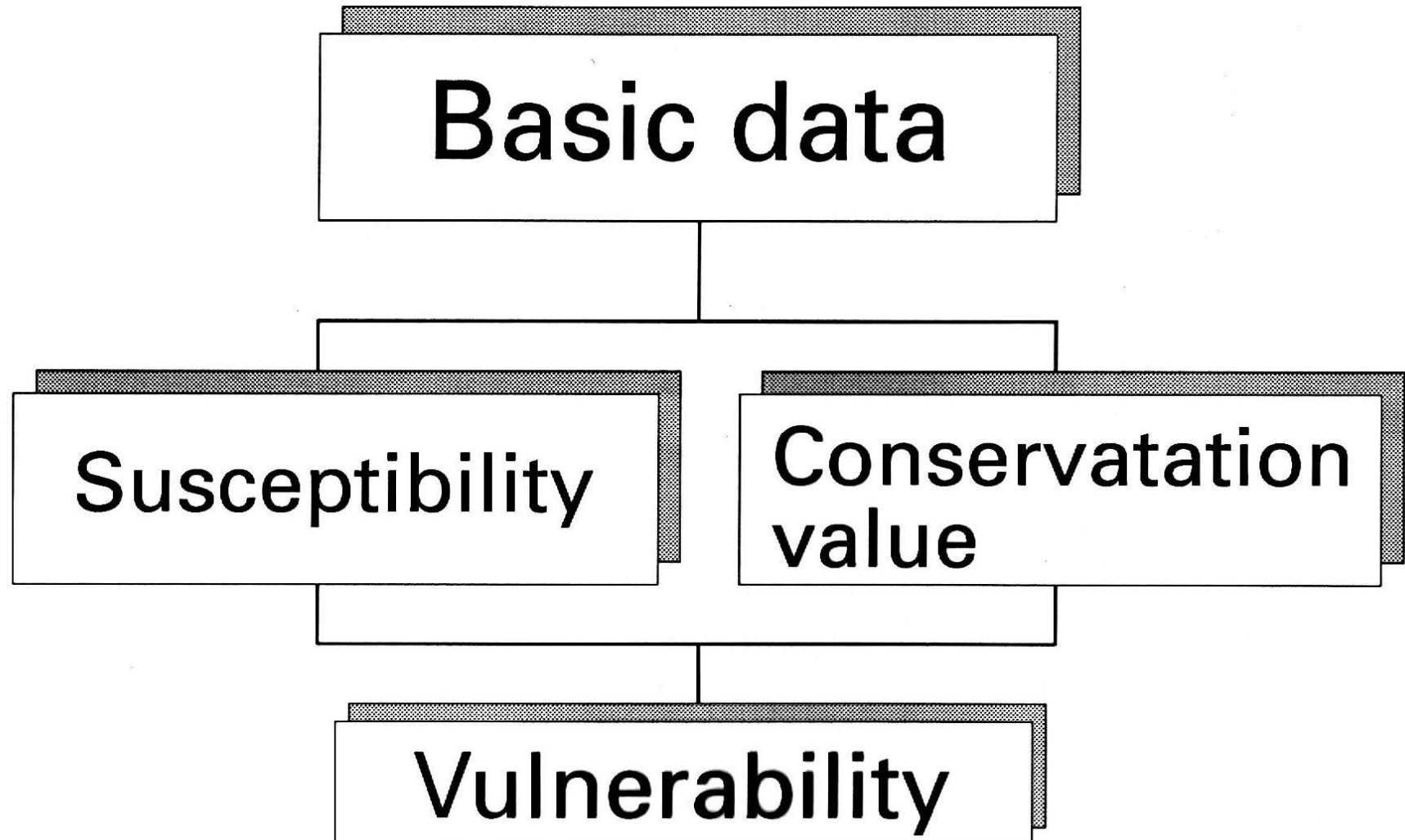
OPNAME DOOR: A. Bontenkamp
DATUM: 5 juli 1977

Selection of Elementes or Combinations



NATIONAL INITIATIVES: landscape-ecological mapping

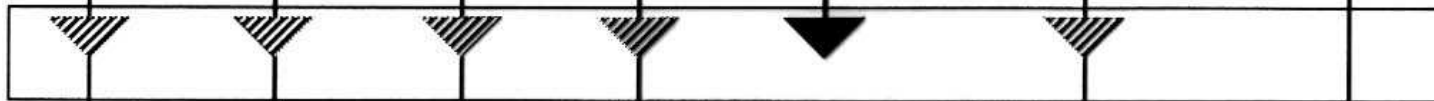
If phenomena are both susceptible and rare (and therefore have a high conservation value), they are vulnerable and in need of protection



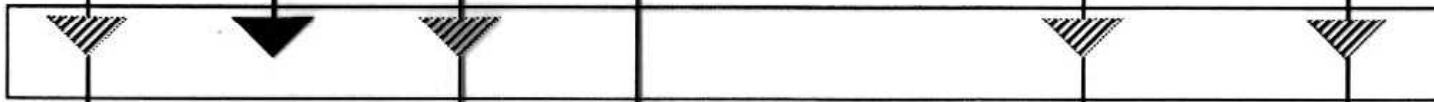
ABIOTIC DATABASES				BIOTIC DATABASES		
relief	ecological relations	ground-water	soil	landuse	vegetation / flora	birds

CULTURAL ARTEFACTS

V

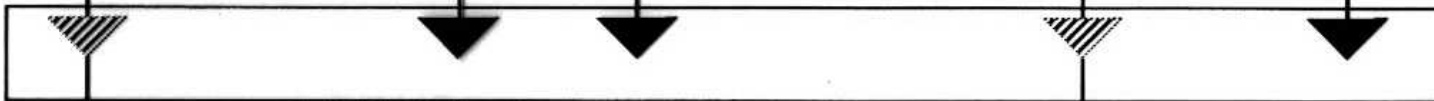


Description of BASIC DATA

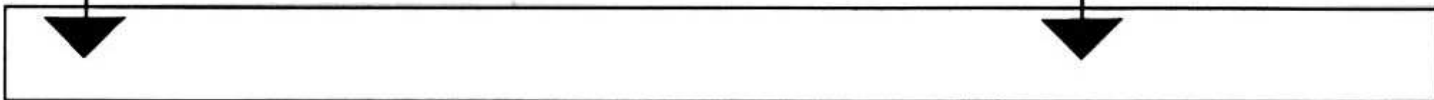


Susceptibility

+

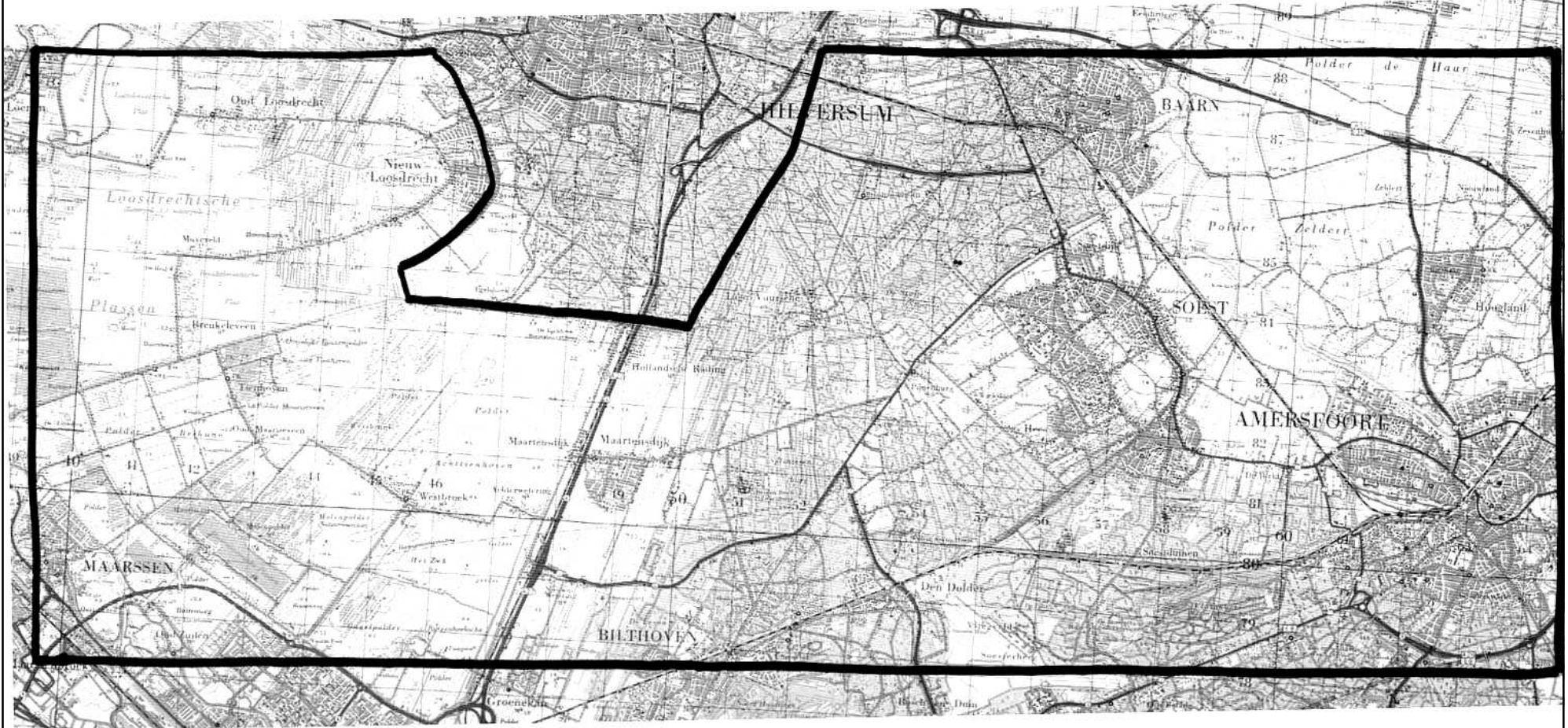


Conservation value



Vulnerability

test area: north part Utrecht province



Inventory map examples

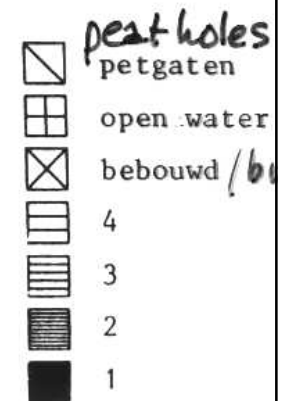
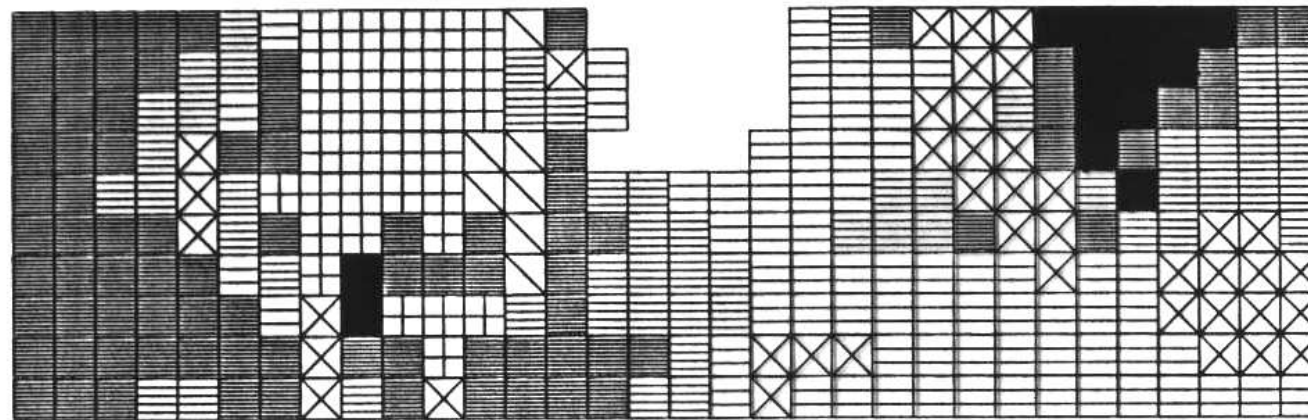
Groundwater table

- % forest
- Soils, etc

per 2x2km grid cell
which allows for rapid
estimation

KAART A.3.B
GRONDWATERTRAPPEN

Groundwater table height classes



LEGENDA

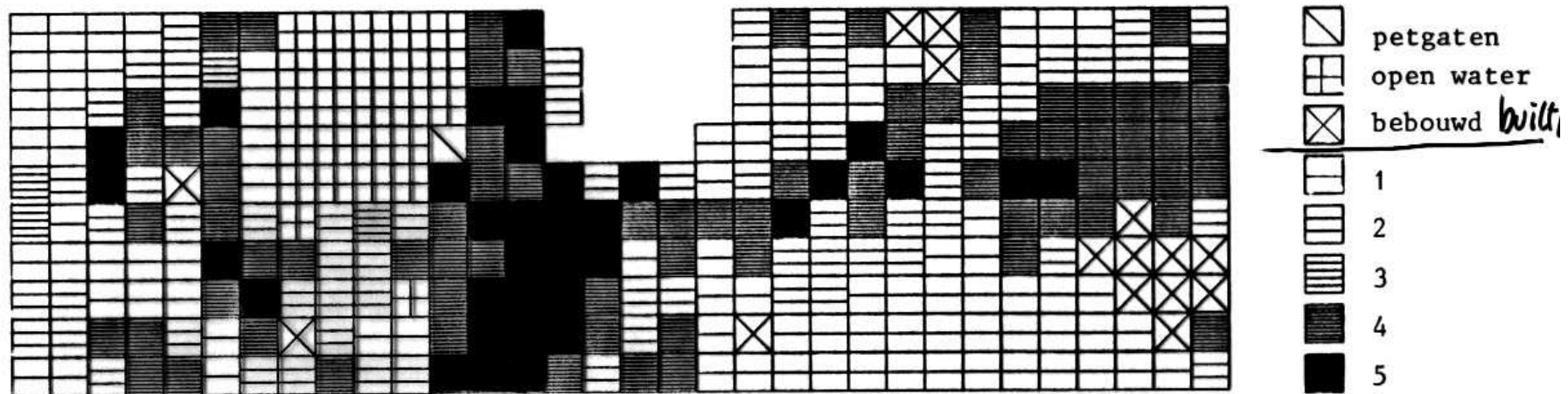
- 1 grondwatertrappen I, I/II
- 2 grondwatertrappen II, II/III
- 3 grondwatertrappen III, V, III/V, III/VI
- 4 grondwatertrappen IV, VI, VII

Susceptibility maps

- Susceptibility of soils to fertilizer
- Susceptibility of flora to groundwater lowering
- Susceptibility of soils to exhaustion
- Susceptibility of fauna to habitat fragmentation
- etc

Diversity or rarity maps

Number of map units per grid cell compared to number of legend units per grid cell



LEGENDA

number of legend units

Aantal kaart-
vlakken
(afwisseling)

Aantal kaarteenheden (variatie)

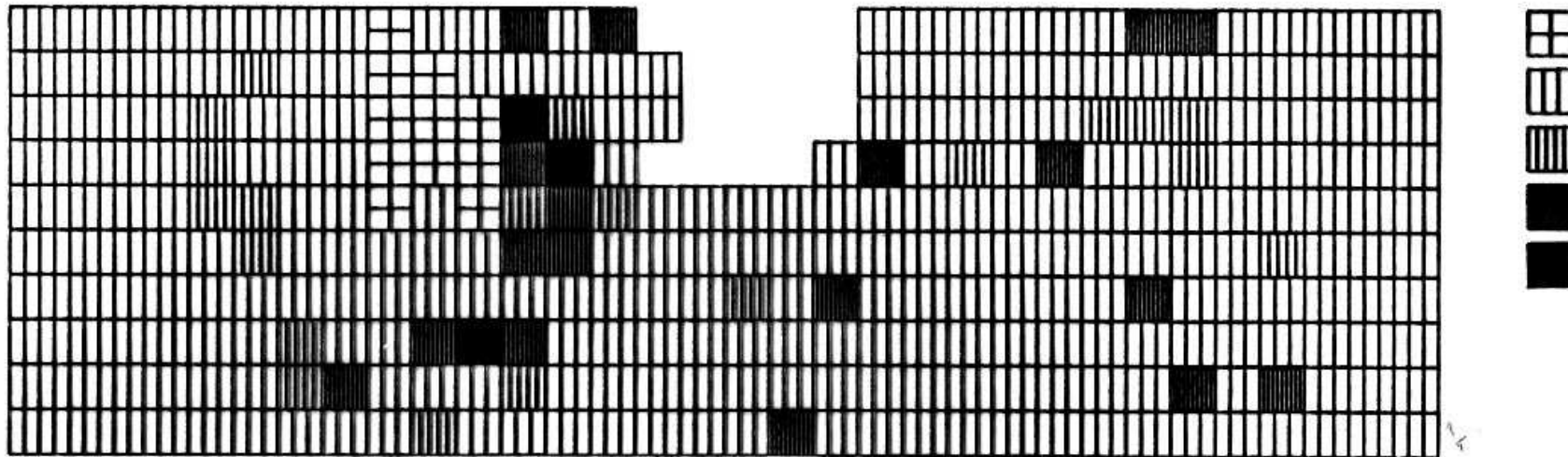
	1	2	3-4	≥5
1	1	-	-	-
2-4	-	2	4	-
≥5	-	3	5	6

number of map units

Vulnerability maps

Areas that are both susceptible and rare are vulnerable!!

This map: Vulnerability of flora to groundwater lowering

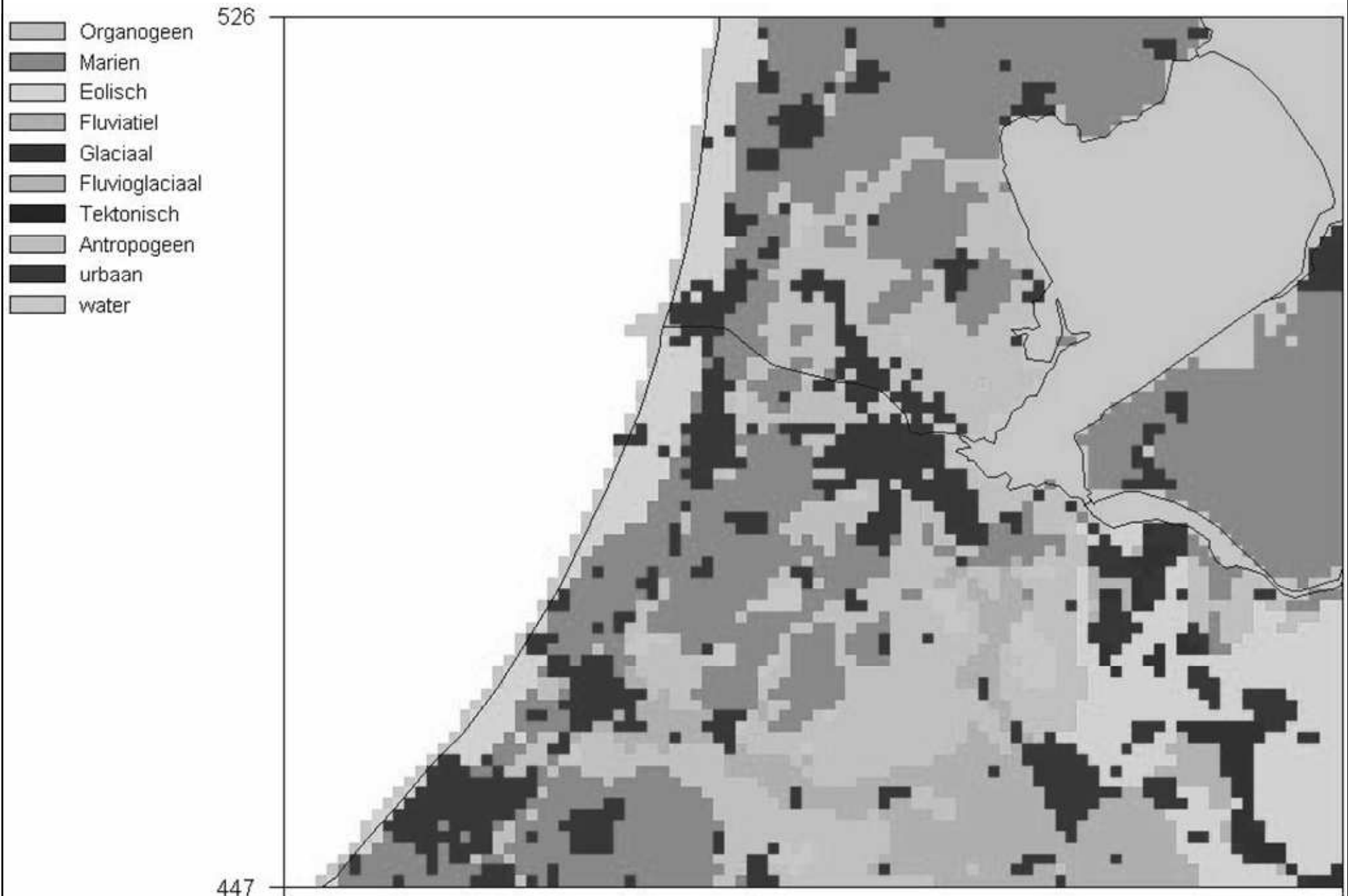


LEGENDA

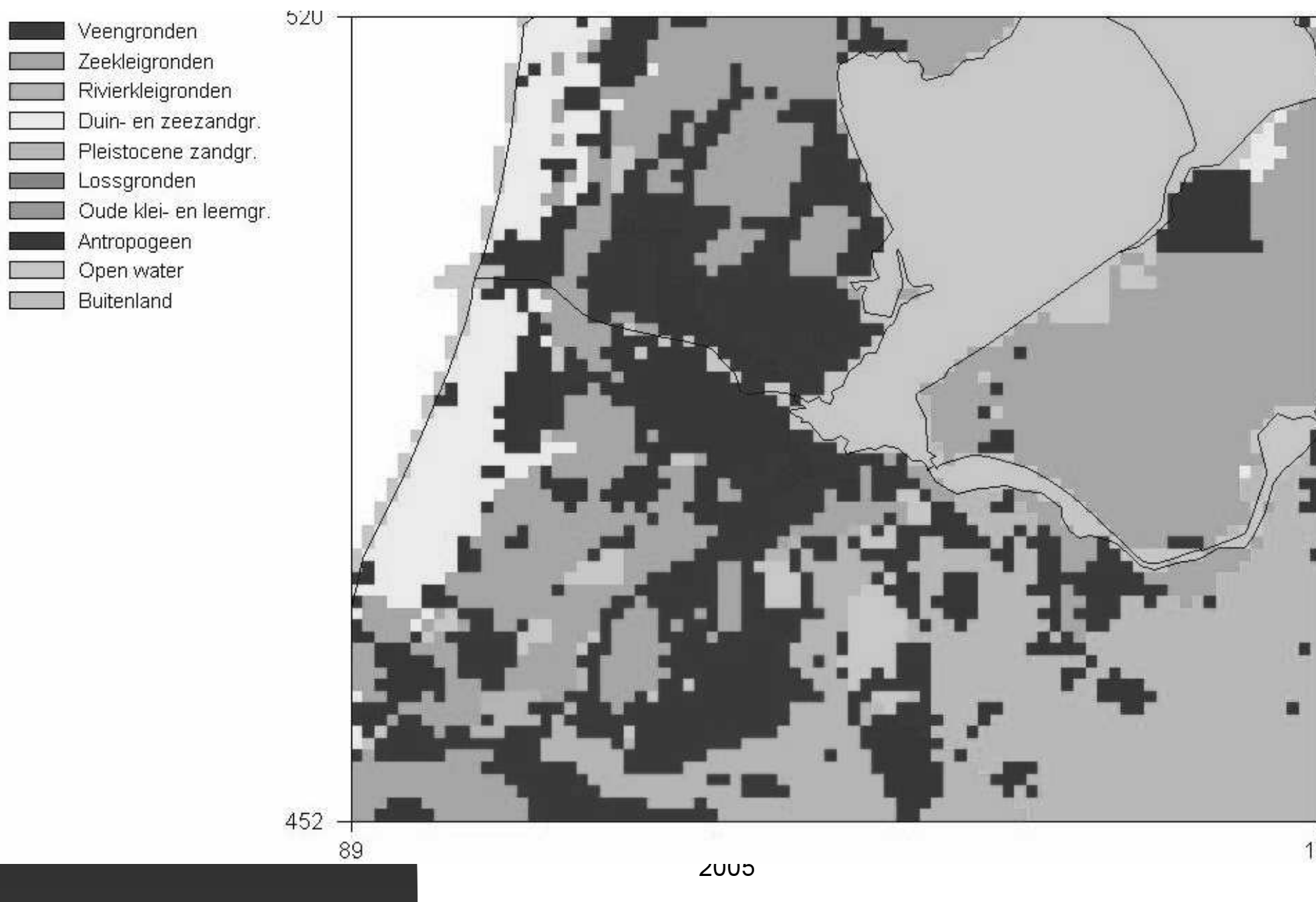
Size of area with vulnerability

<u>Klasse</u>	<u>Kwetsbaarheid</u>	<u>Oppervlakteverdeling</u>
4	zeer groot	>10 ha. zeer kwetsbaar
3	groot	>1-10 ha. zeer kwetsbaar of >10 ha. matig kwetsbaar
2	matig groot	0-1 ha. zeer kwetsbaar of >1-10 ha. matig kwetsbaar of >10 ha. weinig kwetsbaar
1	klein of afwezig	overig

Dominant geomorphological influences

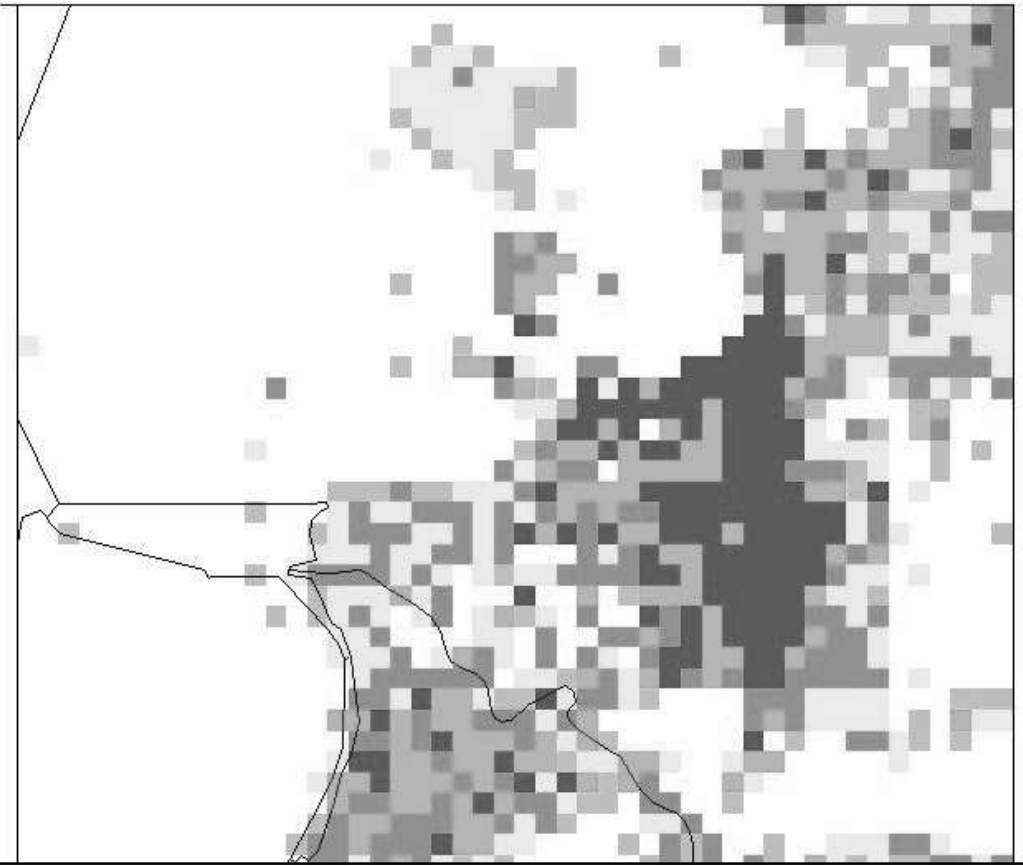
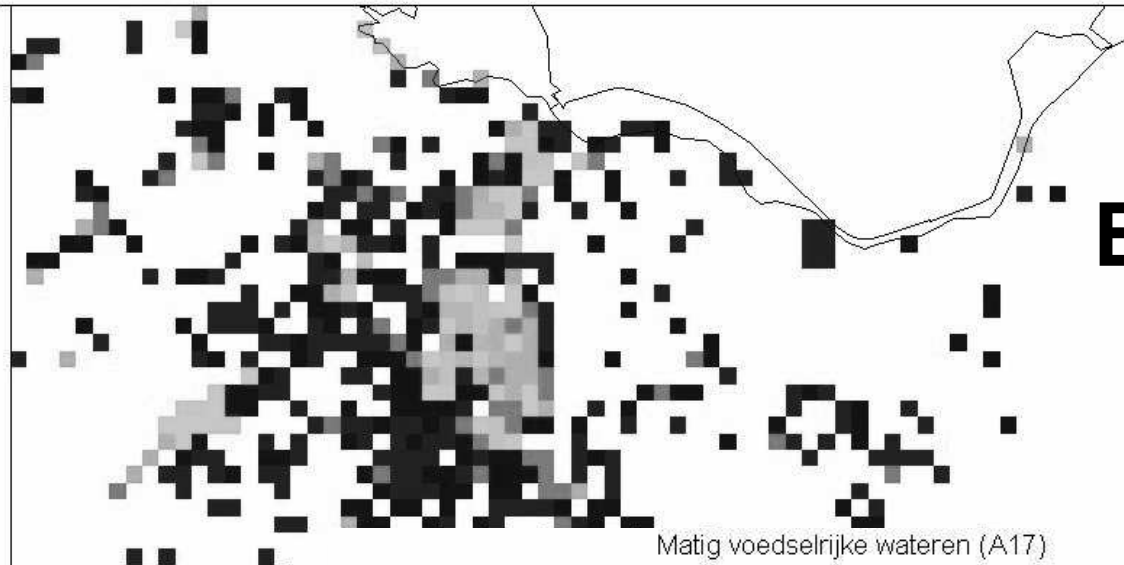
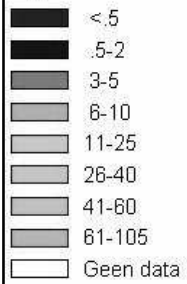


Dominant soil units



Opp aan ecotoopgroep A (VV in ha)

Oppervlak in ha 488



Euthropic water
27-4-2006

Overview of this Ecological evaluation

- On the basis of the soil map the potential vegetation can be determined (climax vegetation)
- On the basis of the vegetation map the actual vegetation can be determined
- By comparing the actual to the potential vegetation ecological values can be assigned (the lower the value the further away from climax vegetation)
- Bonus points can be added for occurrences of rare species
- But, if we want to protect our typical landscapes there is more than only natural aspects:

Evaluation of cultural artefacts

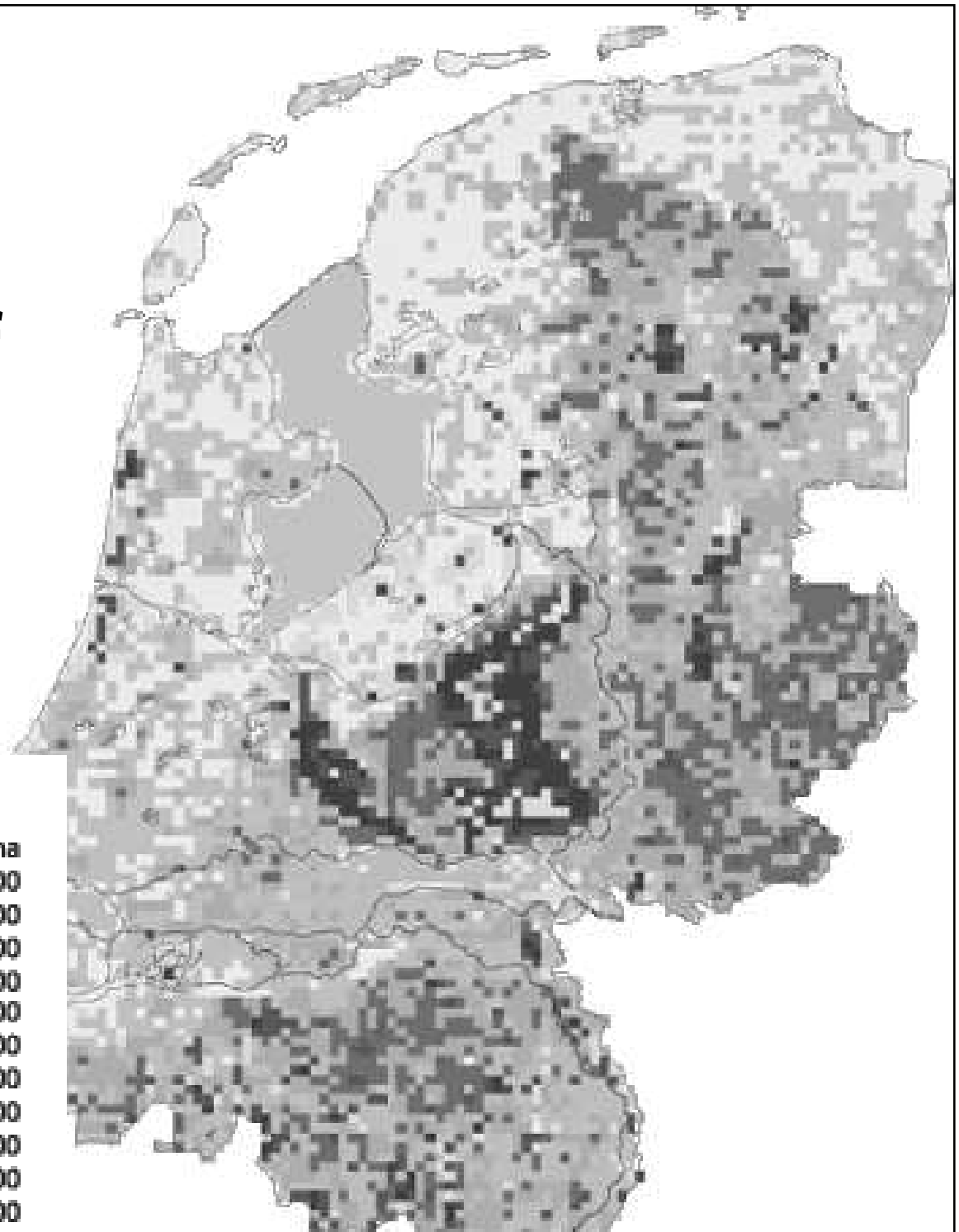
- Archeological monuments
- Farm types, important from a construction point of view
- Castles, historical fortifications
- Mills
- Special landscapes
 - parcellation type
 - relation of farm building to parcels
 - types of boundary structures

- lijst 2 delstoffen
- lijst 3 waterstaat
- lijst 4 verkeer
- lijst 5 defensie
- lijst 6 historische buitenplaatsen
- lijst 7 internationaal zeldzame elementen

Example: Historical- geographical values

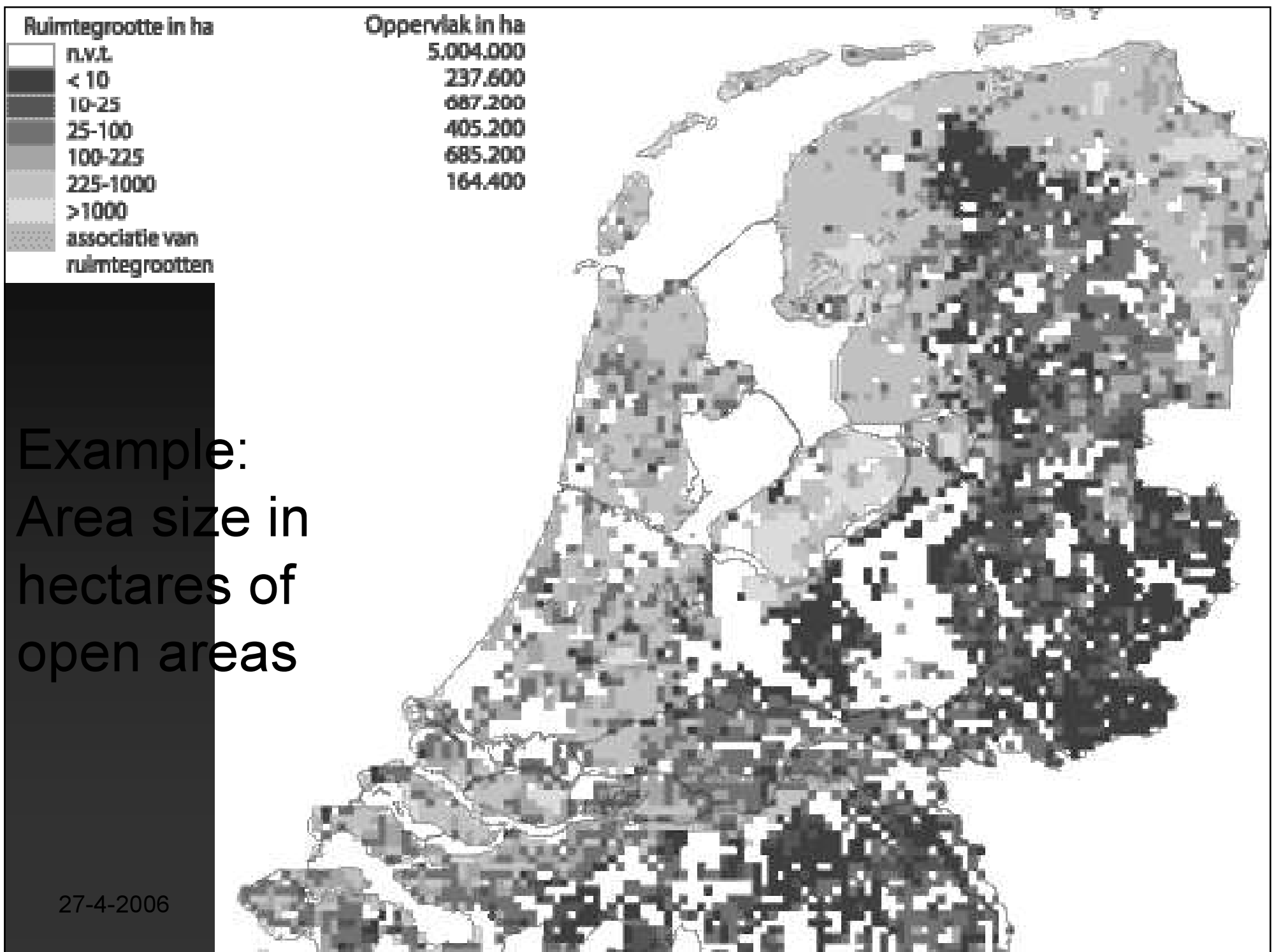


Example: Length of linear elements in km or surface of areal elements in ha



Opgaande begroeiing
 lengte lijnelementen in km
 resp. opp. vlakelementen in ha

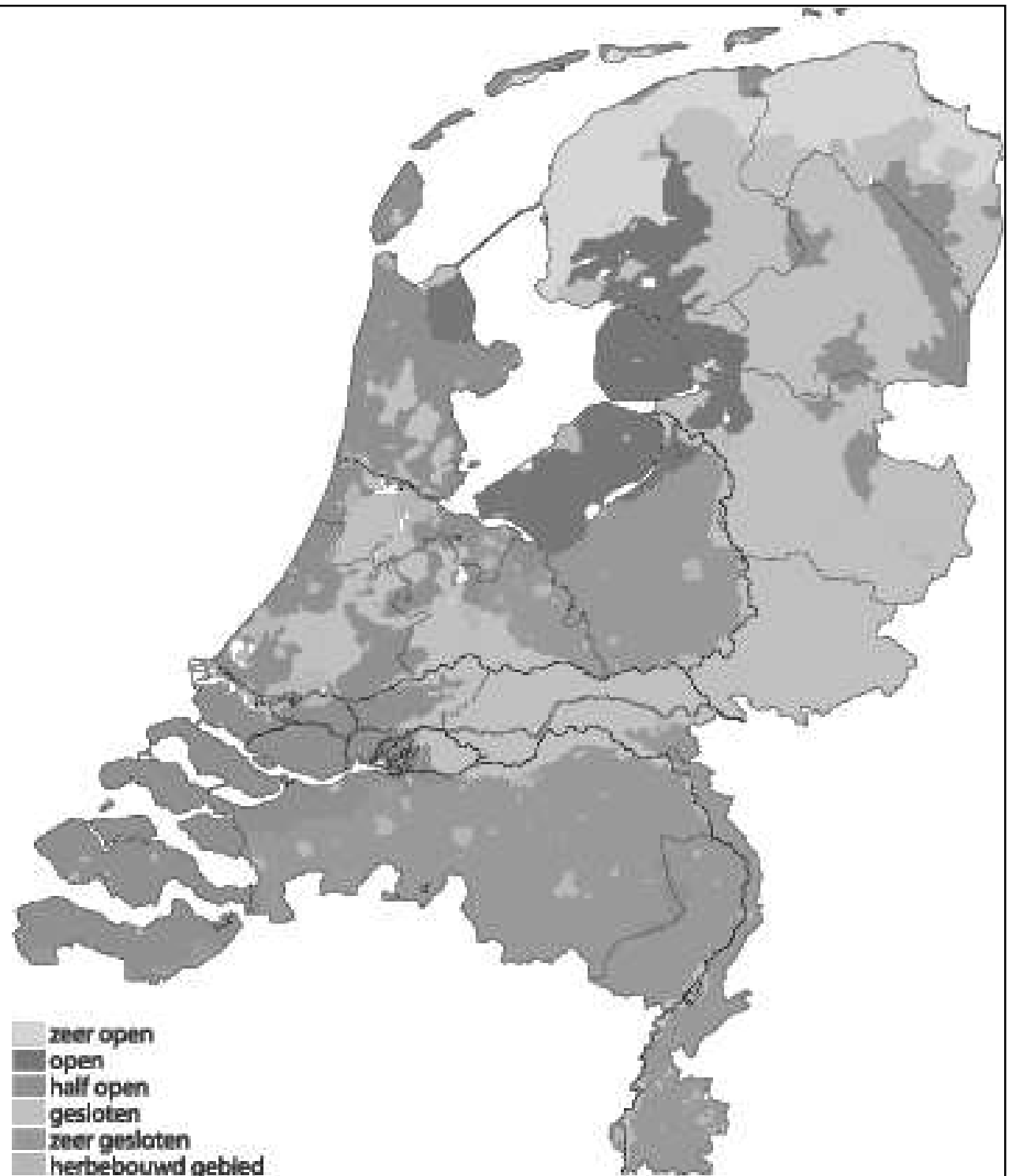
	Oppervlak in ha
0-0.25, 0-8	236.400
0-0.25, 8-40	801.600
0.25-4, 40-200	175.200
4-8, 0-40	893.200
4-8, 40-200	405.200
8-16, 0-40	636.800
8-16, 40-200	238.000
>16, 0-40	134.800
>16, 40-200	18.400
<8, 200-300	141.200
<4, 300-400	88.800



Example:
Area size in
hectares of
open areas

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Relative openness of landscapes



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Other projects/databases

- Cultural historic GIS
- Risk maps



Kies kaartlagen

Waardevolle historische gebouwen

- met foto
- molenbiotoop
- zonder foto

Waardevolle historisch gebieden



Historische zichtlijnen



Archeologische vindplaatsen



Historische geografie

- wonen
- waterstaat
- landbouw
- verkeer
- defensie
- delfstof winning
- foto

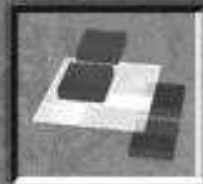
Verdedigingswerken

- NHVL
- verboden kringen
- Grebbelinie
- inundatiegebieden

Topografie

- bos
- provincie
- bebouwing
- water
- rijksweg
- doorgaande weg
- hoofdweg
- weg
- spoorweg
- sloot

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Kies kaartlagen

THEMA:
Waardevolle historische gebieden

TYPE:
verdedigingswerk

WAARDE:
van zeer hoge waarde

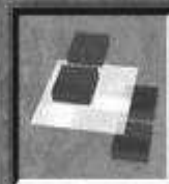
BESCHERMING:
geen

PERIODE:
nieuwste tijd

NAAM:
Fort Hoofddorp



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Kies kaartlagen



lege

Bebouwing



Archeologie



Landschap



Verdedigingslinie

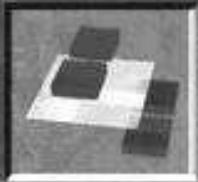


topografie

luchtfoto

kenmerken





kaart



Kies
kaartlagen

PRINT

INFO

HELP

TERUG

STOP



legenda

selecteer gemeente

selecteer postcode

Waardevolle historische ge

- met foto
- molenboot
- zonder foto

Waardevolle historisch geb



Historische zichtlijnen



Archeologische vindplaatsen



Historische geografie

- wonen
- watersta
- landbouw
- verkeer
- defensie
- ▲ foto
- delfstof winning

Verdedigingswerken

- NHVL
- verboden
- Grebbelinie
- inundatieg

Topografie

- bos
- rijksweg
- provincie
- doorgaan
- bebouwing
- hoofdwe
- water
- weg
- spoorwe
- sloot

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Bebouwing

Archeologie

Landschap

Verdedigingslinie

topografie

luchtfoto

kenmerken



Risk map recht

Risico-objekten - Microsoft Internet Explorer

risicobedrijven

Nadere informatie over 1 object.

Object 1:

Categorie	Diversen
Naam	ASM Europe b.v.

risicokaart

objecten
transport
natuurgeweld

zoek plaats, straat of postcode

help
home

Luchtfoto
risicokaart

Legenda

risicobedrijven

- A Afvalverwerking
- B Agrarisch
- C DHZ zaken
- D Diversen
- E Drukkerijen
- F Fabricage/productie
- G Garage/spuiterij
- H Gassenopslag
- I Houtbewerking
- J Koelinstallaties
- K Kunststoffen/Rubber
- L Lab/research

Risk map Utrecht

The screenshot shows a web browser window titled "Risico-objekten - Microsoft Internet Explorer". The main content area displays "risicobedrijven" and "Nadere informatie over 1 object." Below this is a table for "Object 1:" with the following data:

Categorie	Diversen
Naam	ASM Europe b.v.
Adres	Rembrandtlaan 9
Postcode en Plaats	3723 BG BILTHOVEN
Gemeente	De Bilt
Risico-afstand	
Giftig effect afstand	750 meter
Brand effect afstand	50 meter
Explosie effect afstand	50 meter
Vergunningverlener	Gemeente De Bilt
Telefoon vergunningverlener	(030) 2289411
Website vergunningverlener	www.debilt.nl
ID	2830

On the left side, there is a sidebar with a search bar labeled "zoek plaats, straat of postcode" and buttons for "objecten", "transport", and "natuur-geweld". A map is visible in the background. On the right side, there is a "Legenda" (Legend) with a list of risk categories: "risicobedrijven", "Afvalverwerking", "Agrarisch", "DHZ zaken", "Diversen", "Drukkerijen", "Fabricage/productie", "Garage/spuiterij", "Gassenopslag", "Houtbewerking", "Koelinstallaties", "Kunststoffen/Rubber", and "Lab/research". A scale bar at the bottom indicates a distance of 0.49 km.

Phases of Environmental mapping

- Local individual initiatives for single elements
- Building of monitoring systems
- Integration on a regional level, evaluation
- Going underground because of misuse
- Development of models
- Integrating measurement systems
- Development of automated checking systems (AHN, TDN, LGN)
- From national to Europe-wide level