computer program

HABITAT

A Spatial Analysis Tool for Ecological Assessments

More than just a tool

Habitat analyses are important for studies of ecological impacts on local, regional and (inter-) national environments. Proper understanding of the functioning of these environments and the species therein is essential, especially now that awareness of the negative human impacts on the natural environment has increased over the last three decades. Predictions of impact of human interventions in the natural environment on the development of the ecosystem are required for appropriate management responses. Also, the effects of rehabilitation, mitigation or conservation strategies need to be quantified in a clear and understandable way, to be of use in spatial planning and ecosystem management.
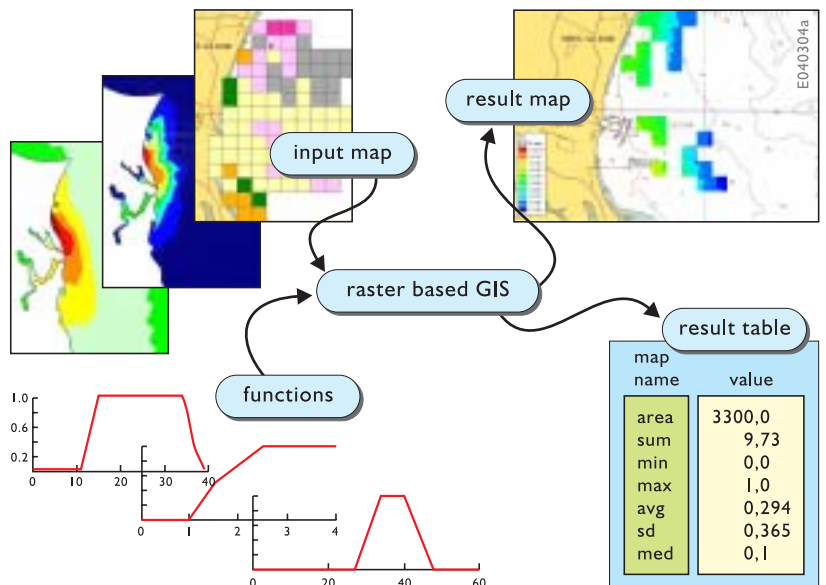
HABITAT is a GIS-based framework application that allows for the analysis of ecological functioning of study areas in an integrated and flexible way. GIS maps and environmental information, for example resulting from models (Delft3D, SOBEK) or field observations, are combined to generate spatial (maps) and quantitative (tables) results. HABITAT can be applied to analyze the availability and quality of habitats for individual species. Moreover, it can be used to map spatial ecological units (e.g. ecotopes) and predict spatial changes in habitat suitability for example due to human interventions. Users can use predefined habitat evaluation modules for individual species, or can define new modules to suit their needs for specific applications. Therefore, HABITAT is a flexible tool and strong predictive instrument which can be of great advantage in the case of specific long term planning projects and decision support systems.

A flexible system

HABITAT has been developed in the range of Delft tools and conforms to the same input and output format. It can therefore be linked to other modelling software such as SOBEK and Delft3D. Its structure is based on a user-friendly graphically oriented interface. HABITAT further offers a case management tool, the set-up of an ecological model library, a quick visualization of maps and the possibility of reporting meta-information with projects, cases and models. HABITAT offers the possibility to design user-defined area specific models for a wide application area.

HABITAT is being developed by WL | Delft Hydraulics and three research institutes within the Ministry of Public Works, Transport and Water Management: RIZA, RIKZ and DWW.

Schematic representation of an application of HABITAT in an outfall study. Input maps are combined using knowledge rules within a GIS. The results are presented in maps and quantative tables

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map name	value
area	3300,0
sum	9,73
min	0,0
max	1,0
avg	0,294
sd	0,365
med	0,1

Habitat suitability (0=unsuitable; 1 = optimal suitable) for pond weed in Lake IJsselmeer.

Case Management Tool

The Case Management Tool manages four databases:
- Projects
- Ecological Models (HSI models)
- Ecotope Classifications
- Maps

The projects, which comprise one or more cases each, are defined and results are stored in the project database. Within each case, ecological models or classifications are combined with maps, which can be stored and retrieved from the corresponding databases. Output maps can be exported to the map database for application in other projects.

Computational Core

The GIS computation core implemented in HABITAT is PCRaster (PCRaster Environmental Software/ Faculty of Geographical Sciences, Utrecht University). PCRaster offers an extensive list of arithmetic operators i.e. natural logarithms, minimum and maximum functions, which can be used by HABITAT with great flexibility. PCRaster is available through www.pcraster.nl.
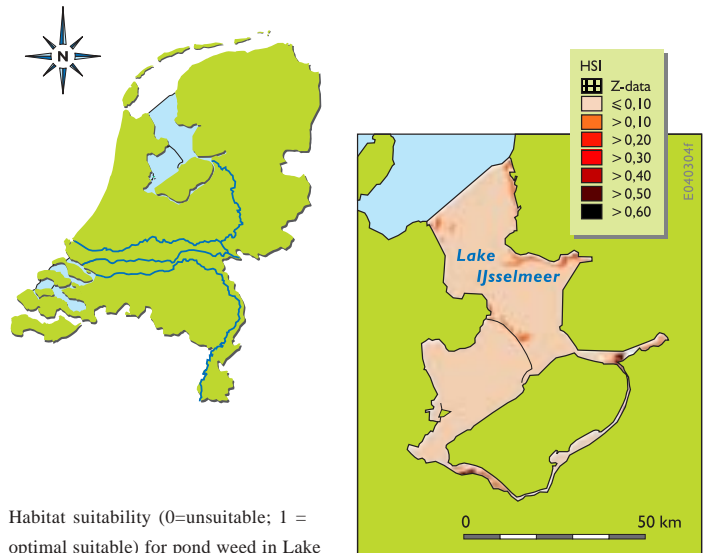
Visualisation

The Delft Tools visualisation module is used for the visualisation of input and output maps. These maps can be combined with GIS information. Rules are visualized with graphs to enable a visual check on the correctness of the defined functions.

Input and output formats

HABITAT uses binary grid maps of the industrial BIL format. HABITAT has a stand alone conversion module for a quick conversion of maps of other formats, sizes and resolution. HABITAT also produces output tables with a (statistical) summary of map data.

Extensions

HABITAT will continuously be expanded in cooperation with its end-users. Expected extensions include a functionality dealing with temporal and spatial variations in habitat requirements of individual species and an uncertainty analysis module.

System requirements

HABITAT runs on stand-alone computers as well as in a network system. HABITAT is designed to run on all currently available MS WINDOWS platforms. For common analyses, only a few seconds of calculation time on a modern PC are needed.

Availability

As of April 2004, HABITAT is being used as a developer's tool, but it will be commercially available before the end of 2004.

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