

# **Ecological Risk assessment: BERISP-DSS: spatially explicit assessment of risks of contaminants to higher organisms.**

Nico van den Brink<sup>1</sup>, Lieven Bervoets<sup>2</sup>, Hans Baveco<sup>1</sup>

1: Alterra, Wageningen UR, Wageningen, The Netherlands

2: University of Antwerp, Antwerp, Belgium

Environmental contaminant can pose serious risks to wildlife. Especially contaminants that accumulate may cause concerns for effects on predators. Environmental managers have to deal with risks of local contamination when they want to reach objectives that are defined for the areas of concern. They have a sweep of possibilities to mitigate such risks, ranging from digging out and replacing the contaminated soil, to restructuring the landscape with less sensitive objectives. In natural areas, the option to deal with contaminants are limited, due to limiting resources but also to the fact that mitigation by for instance digging and replacing the soil is destructive to the ecosystem and may therefore do more harm to the ecosystem than the occurrence of contaminants.

In order to facilitate environmental managers in dealing with contaminants in natural areas the project Breaking Ecotoxicological Restraints in Spatial Planning (BERISP) was developed by a consortium of an university, research institutions and stakeholders from the Netherlands, Belgium and the UK. In this project, new concept are made operational to assess the risks of contaminants to wildlife in a spatially explicit way. One of the main objectives of the project is to provide new solutions to solve problems of contaminants in natural areas. The approach in BERISP is to assess risks spatially explicit, based on spatially explicit foraging and accumulation models. In this way, results of such risk assessment can be used in spatial planning processes and can help environmental managers to deal with problem with contaminants. The BERISP-DSS has a specific place in the decision process concerning spatial planning processes in natural areas (figure 1). The DSS can be used to assess risks of contaminants for wildlife for different scenarios in landscape planning, prior to the actual implementation of the plans. Such a prospective risk assessment allows to judge different planning scenarios in relation to both ecotoxicological as well as other relevant aspects.

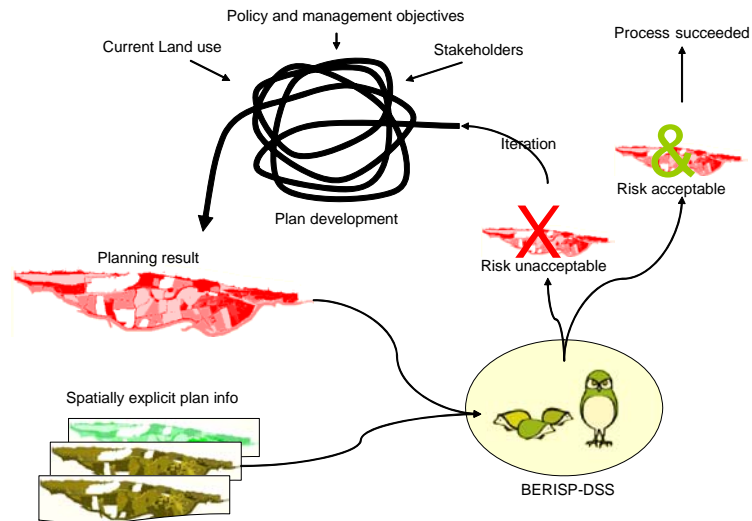


Figure 1. Position of BERISP-DSS in relation to the process of spatial planning.

The models developed in the BERISP project are the basis for a DSS, which can be used by environmental managers and spatial planners. The interface of the DSS is developed in cooperation with several stakeholders in the consortium, which resulted in a user friendly DSS (Fig 2.). User friendliness was a prerequisite for a successful DSS.

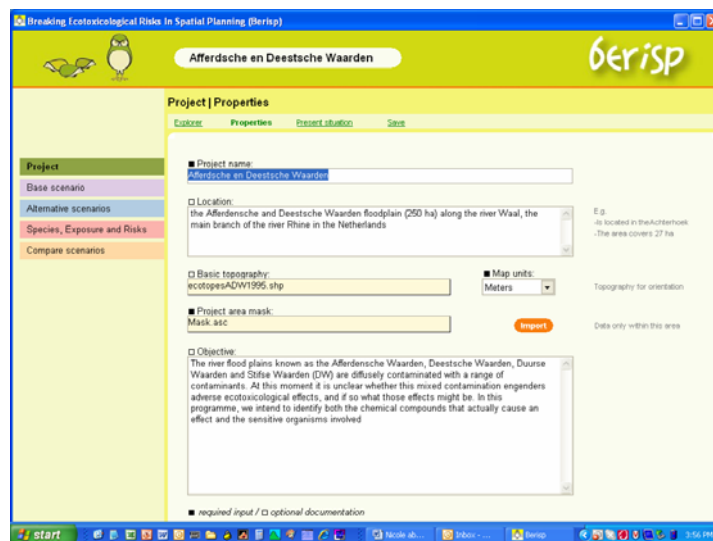


Figure 2. Opening window of the BERISP-DSS.

The models can be separated in models that define 1) the relationships between habitat and the occurrence of prey items, 2) the spatially explicit foraging behaviour of the predator and 3) the accumulation patterns of the different contaminants in the food webs.

The input for the BERISP-DSS is based in three types of information: 1) information on the species and compound which is provided by the DSS, 2) spatially explicit results from the planning process, 3) additional (spatially explicit) information on the case (figure 3). The planning results are maps containing different planning scenarios, for instance on habitat configuration in the area of concern. The additional

information on the case is for instance on soil characteristics, contaminant levels in the soil etc. i.e. information that may affect the accumulation of the contaminants.

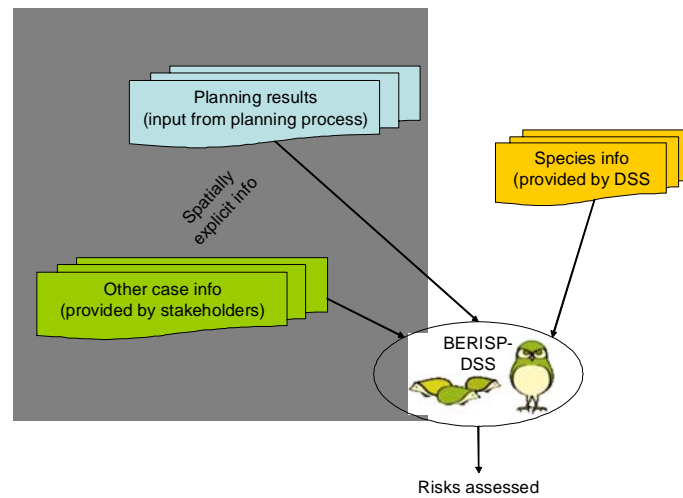


Figure 3. Types of information needed as input for BERISP-DSS

Results of the BERISP-DSS are generally reported in maps, that can be exported to other programs for further communication. In figure 4 an example of a risk map with the underlying maps is provided for illustration. In this case the habitat map results from the spatial planning process, and the maps on soil properties and contamination are case specific information. From this case it is clear that the highest risks on effect for the predator (in this case the little owl) is not located in the areas with the highest cadmium concentrations, but this is an interaction between habitat, cadmium concentrations and soil properties. The DSS also provides detailed intermediate model results, which can be used to elucidate the observed patterns, and to use this information to optimise the habitat configuration to minimise the risks of cadmium.

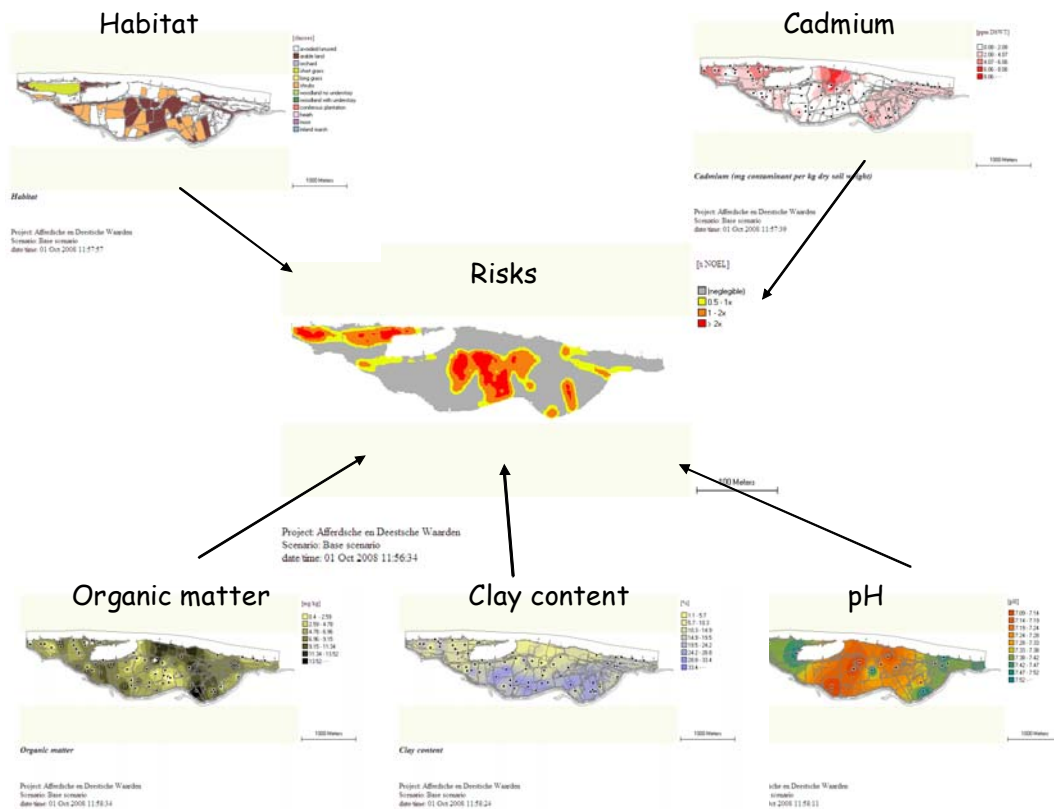


Figure 3: Different types of input maps, and the resulting risk map.

For more information see [www.berisp.org](http://www.berisp.org), where the BERISP-DSS is freely downloadable.

This project is co-funded by INTERREG IIIB program ([www.nweurope.org](http://www.nweurope.org)). NvdB and HB were also funded by the strategic research program "Sustainable spatial development of ecosystems, landscapes, seas and regions" which is funded by the Dutch Ministry of Agriculture, Nature Conservation and Food Quality, and carried out by Wageningen University Research centre.

