



Assessment of pesticides on a landscape level – What is basically needed?

Andreas Toschki, Monika Hammers-Wirtz | Research Institute gaiac
Björn Scholz-Starke, Martina Roß-Nickoll | RWTH Aachen University

17.05.2018 SETAC Rome



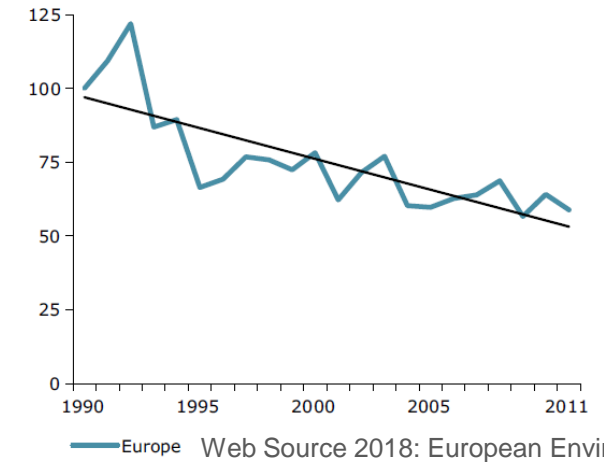
Background

Biodiversity is the basic resource for maintaining and supporting ecosystem services and functions

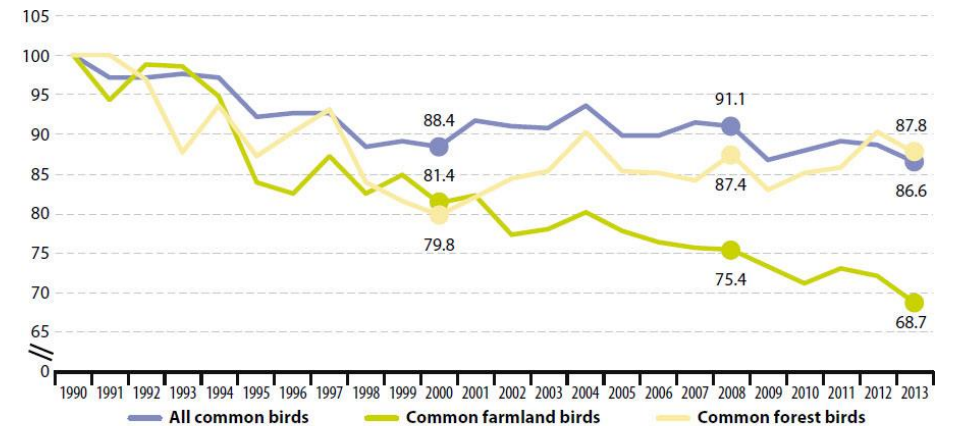
- Species diversity and habitat quality has dramatically decreased in the last decades due to the increasing intensity of agricultural land use
- Leading to a marked decrease in the various species groups, soil arthropods, insects, butterflies, birds etc.
- With the loss of species, also a variety of benefits and ecosystem services that have been provided by the species are falling away

European grassland butterfly indicator

Butterfly Conservation Europe/Statistics Netherlands



European bird indicator



(¹) EU aggregate changes depending on countries joining the Pan-European Common Birds Monitoring Scheme.

Web Source 2018: Eurostat, European Commission's science and knowledge service

Background

The reasons for this **inacceptable loss of biodiversity** cannot be easily assigned to one single factor and is more due to a **multifactorial complex** of influences which are responsible as a whole



PPP

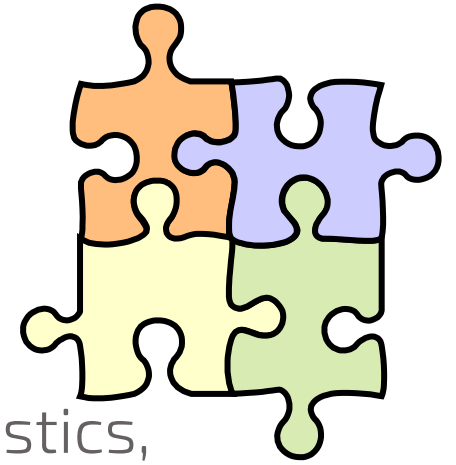
The intensive use of pesticides can be cited as one decisive factor



Current gaps in biodiversity protection

Multifactorial complex mainly comprises:

- nitrogen fertilisation and deposition
- technical intensification e.g. tillage
- drainage, monocultures, decrease in landscape structures
- pesticides, pharmaceuticals, biocides, nanoparticles, microplastics,
- other chemicals...



Uncertainties/ gaps in risk assessment

In current risk assessment procedures, pesticides have been authorized individually independent of the current status of biodiversity in the landscape

Exposure

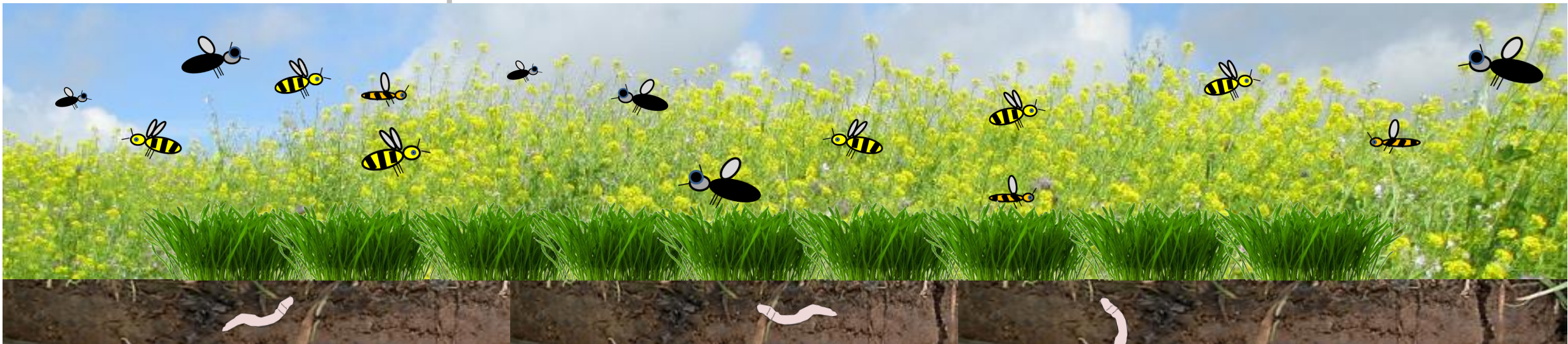
- PEC_{soil} calculation
- Mixture toxicity
- Application scenarios
- No documentation

Effects

- Species interaction
- Population dynamics
- Behaviour of species
- Spatial distribution

Protection level

- Undefined thresholds
- No reference status



Certainties /sometimes forgotten

PPP are produced as toxic substances:

e.g. Herbicides have been produced to control weeds assuming that 70->90 % of the area of arable landscapes are "in crop" fields, 70->90% of the area is certainly weedless, thus a natural source for the food chain i.e. humus, leaves, pollen, nectar, shoots, etc. is missing



- intensive arable land
- intensive grassland



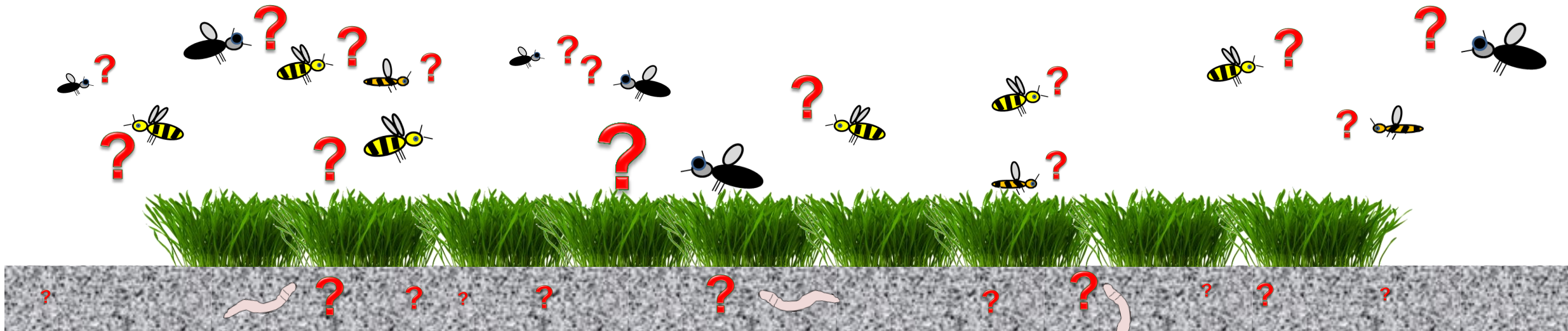
Certainties /sometimes forgotten

PPP are produced as toxic substances:

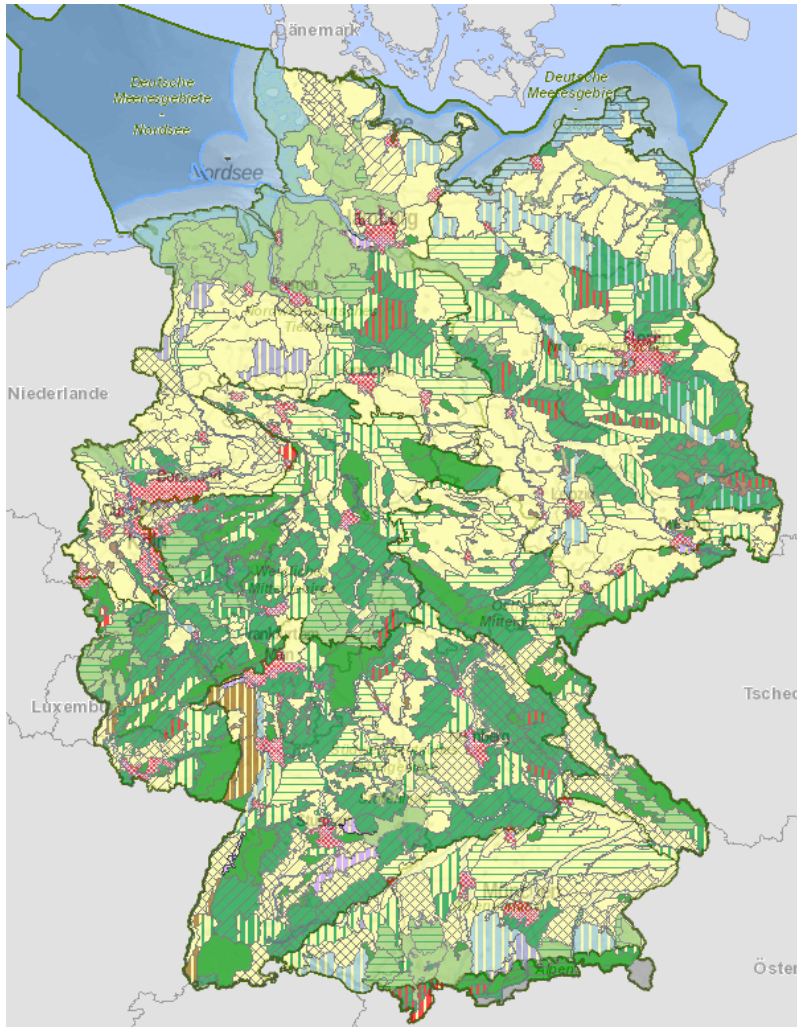
e.g. Herbicides have been produced to control weeds assuming that 70->90 % of the area of arable landscapes are "in crop" fields, 70->90% of the area is certainly weedless, thus a natural source for the food chain i.e. humus, leaves, pollen, nectar, shoots, etc. is missing



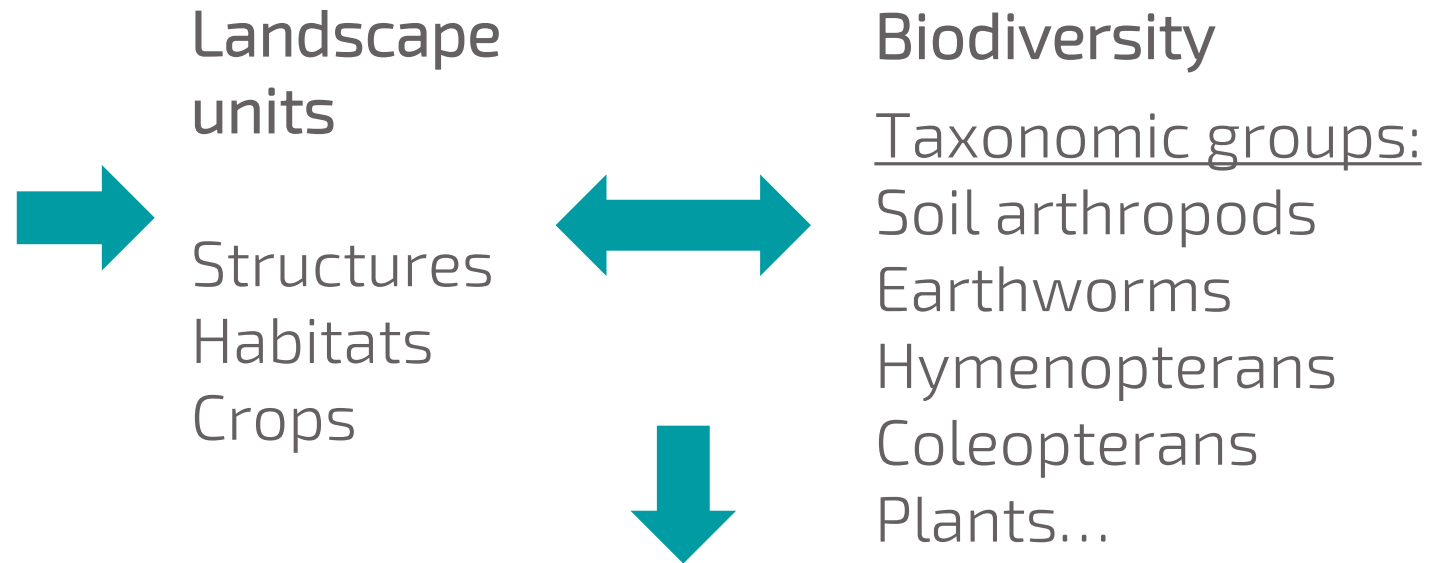
- intensive arable land
- intensive grassland



Landscape based risk assessment



source: Federal Agency for Nature Conservation, www.bfn.de



Overall concept

- Definition of reference state
- Derivation of indicators
- Definition of thresholds and minimum standards (capacity)

Retrospective monitoring

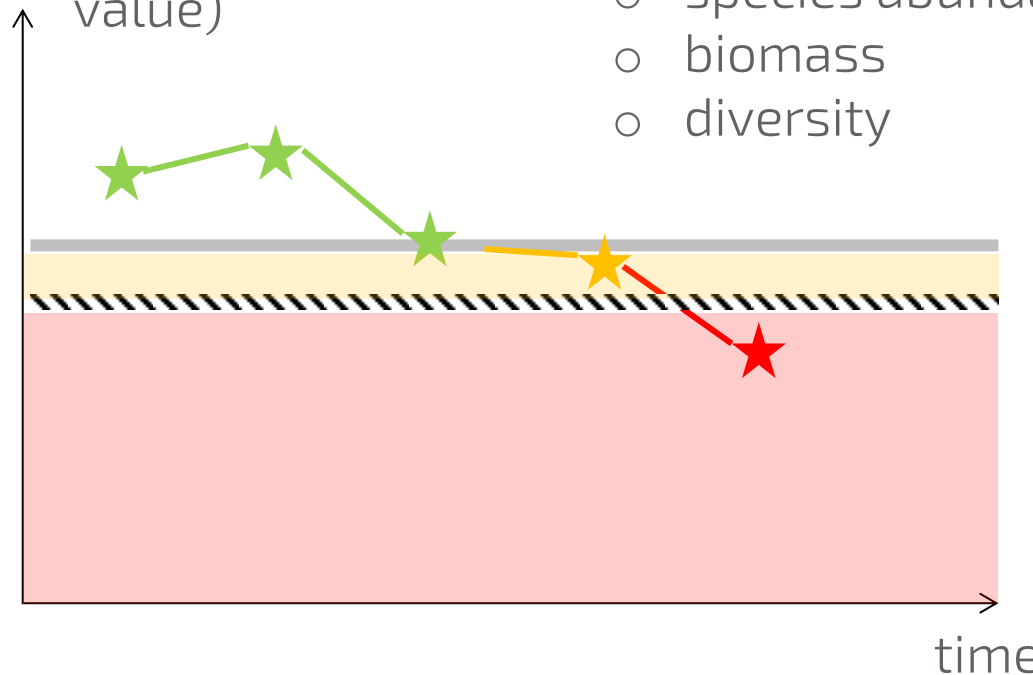


Landscape unit

Reference status

(good ecological value)

- species frequency
- species abundance
- biomass
- diversity



! Mitigation measures

Minimum standard
(below which requires immediate action)

! Restoration measures

time

Mitigation and restoration measures

Integrative approach:

Geo-spatial information is mandatory for Landscape structure, biodiversity, and...

Stressors

Fertiliser
Land use
Fragmentation
PPP use...

Where ?
What ?
When ?

Details of

- Habitats, Crops, Landscape structure
- Pesticide mixtures, Nitrogen levels, Sewage sludge
- Application scenarios

**Development of scenario based landscape models
for prediction of the ecological status**
Derivation of Risk mitigations for a sustainable land use

Summary

- Species diversity and habitat quality has dramatically decreased in the last decades
- The loss is due to a multifactorial complex of negative impacts
- intensive use of PPP can be cited as one decisive factor
- Several uncertainties can be identified in the current risk assessment for PPP
- The regulation on uncertainties for single PPP during the authorisation cannot solve the problem
- An integrative landscape based risk assessment is crucial
- Monitoring of biodiversity, and stressors in specific landscape units and habitats are imperative
- References for the 'good ecological status' and thresholds of unacceptable changes have to be defined



Thank you for your attention!



gaiac

Research Institute for Ecosystem Analysis and Assessment -
gaiac, Aachen, Germany

Kackertstr. 10
52072 Aachen

Fon: +49 241 80 27600

E-Mail: toschki@gaiac-eco.de

Web: www.gaiac-eco.de