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Introduction



Toxicity testing:
lab sample of
inherent species
sensitivities

extrapolation (e.g. SSD): derivation of
Hazardous Concentration
for 5% of tested species (HC_5)

associated hypothesis:
"species sensitivities are independent samples"

- current status of ecological science
- proof of indirect effects in large scale studies
- ecosystem modelling as an alternative



Field situation:
effects result
from both
inherent species
sensitivities
AND ecological
interactions

The research question:

SSD – based HC_5



model predictions

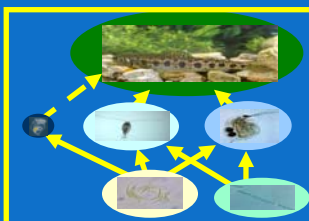


EC_x 's derived in large
scale studies

Methodology

Simulate community
dynamics at exposure
concentrations = $1 \times HC_5$,
 $2 \times HC_5$, ..., $5 \times HC_5$ and
compare with dynamics of
unexposed community

→ % biomass change

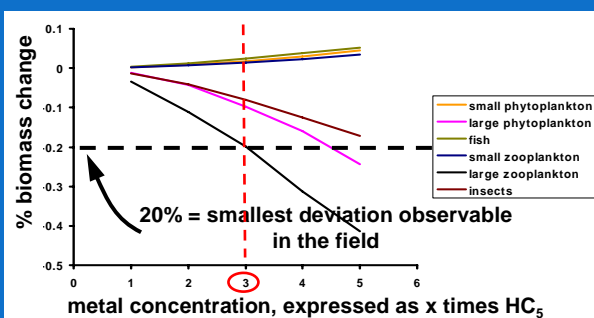


mechanistic
ecosystem model
simulates
community
dynamics exposed
to toxicant stress

Compare modelled
population effects
with those
observed in large-
scale studies

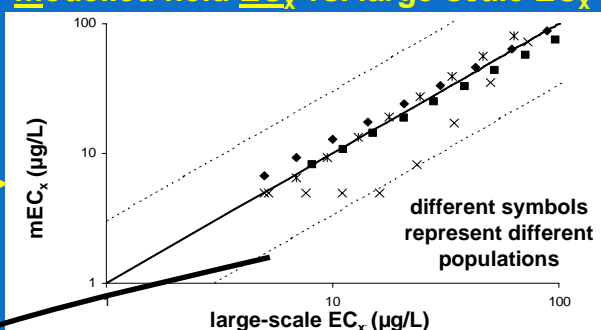
Quantify the factors difference between the different "protective" concentrations

Results



modelled Predicted No Effect
Concentration = 3 times HC_5

modelled field EC_x vs. large-scale EC_x



model = a factor 1.5 to 3 more
conservative

The research question answered:

SSD derived HC_5



model predictions



large-scale studies

a factor 4.5 to 9

- For the case of divalent metals, the use of ecosystem models can provide an uncertainty reducing approach in ecological effect assessment through accounting for ecological interactions
- What if applied to organic toxicants?