Towards developing validated, ecology-based diagnostic and prognostic tools to assess ecological status in aquatic and terrestrial ecosystems

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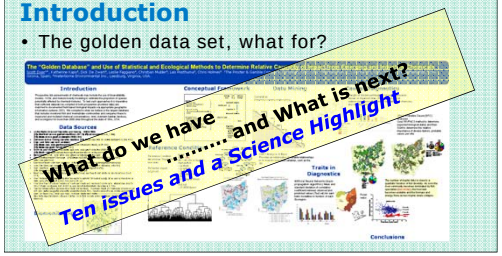
Introduction

- The golden data set, what for?



(1) Relevance and use

- There is a need for realistic assessments
- Validation! (see "Science")
- Method must fit Regulatory framework

→ Recommendation: design framework!

(2) On data (poorness?)

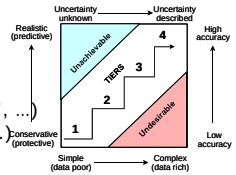
- More data are available than commonly thought
  Mulder C (2010) World Wide Food Webs: Power to Feed Ecologists. Ambio. DOI: 10.1007/s13280-010-0069-5
- Data can be combined and expanded

→ Recommendation: just do it!

(3) On simplification

- Methods considered as complex
- Simplification to be tried: "simple-trait"
- Consider tiering
  - Tier I: major descriptors ("land use", ...)
  - Tier II: scientific descriptors ("pH"....)

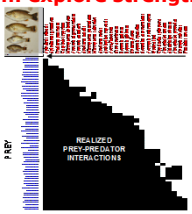
→ Recommendation: compare I and II!



(4) On data mining

- Ecologists and others have data too → merge!
  - Geochemistry and human enrichment
  - Autecology (size, body mass, traits)
  - Synecology
    (Food web mass laws, see other poster)
- Diagnose with merged, enriched (!) data

→ Recommendation: explore strengths!



(5) On preliminary data analyses

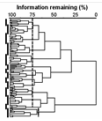
- Predictors may co-vary
- Check on that to avoid mis-interpretation

→ Recommendation: explore data structure!

(6) On reference concept

- Major issues to be solved in data-driven reference concept (→ other poster)

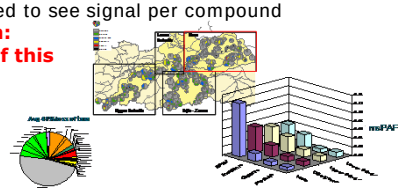
→ Recommendation: take care!



(7) On diagnosis

- Toxic pressure is crucial (statistical power)
- It can disaggregated to see signal per compound

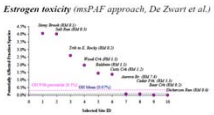
→Recommendation: note the power of this



(8) On emerging chemicals

- Explorative option

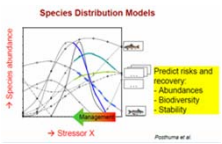
→Recommendation: explore!



(9) On prognosis

- Habitat-response models are derived
- Useful to explore impacts of policies / management
- But think also broader, e.g., refugia

→Recommendation: develop!
→Also look wider



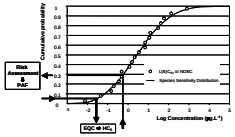
(10) But .... Be realistic

- Characteristic of field data is: "associative", not causal-analytical
- Consider output as basis for next step:
  - Act (policy), or Investigate (when action is expensive

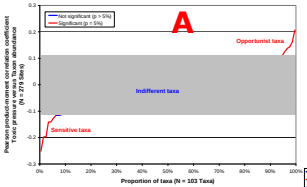
→Recommendation: *don't do anything stupid!*

Highlight: Science! *Validation ecotoxicological models*

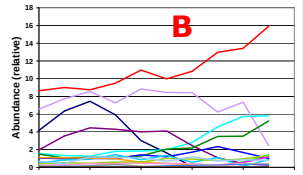
- SSDs are historically used to set Water Quality Criteria → compound decision
- SSDs are also used to quantify impacts of mixtures at sites → site decision



- **A** (Bio)monitoring data do *not* show direct Pearson correlation between Predicted toxic stress and Observed abundance for many species (NL data)

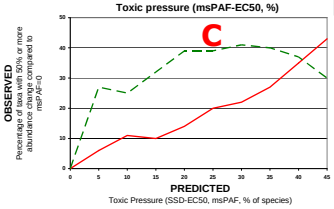


- GLM analyses shows relevance of toxic pressure (msPAF) for > 60% of species (various data sets)
  - Response pattern complex
  - Direct + indirect effects likely



- **B:** Abundance changes ↑↓via GLM + Monte Carlo:

- **C:** Compare *Predicted* (msPAF, X) and *Observed* impact (**Δ** abundance >50% ↑↓, Y). There are sensitive- and opportunistic species.
- **!! Predicted ≅ Observed for sensitives !!**



- Scientifically, the (bio)monitoring data analyses help to improve understanding of fundamental models used in chemical regulation

Conclusions

1. Trigger for works is a Policy Concept adoption: Good Ecological Status
2. We have evidence that holistic view is needed, complementary to sectoral
3. The scientific analyses are just after the first round of explorations (all aspects)
4. Collecting and handling *Reference Concepts* is extremely key to diagnosis
5. We just start to understand how much *novel eco(toxico)logical data* are helpful
6. We intent to drive this beyond *Diagnostics → towards Prognostic and Practice*
7. We believe high relevance for complex problems, like emerging compounds
8. Tiered approach has been envisaged, needs be explored to match practicalities
9. Fundamental model in setting Water Quality Criteria:
   - Validation: Predicted ≅ Observed impact
   - Many species respond systematically tot toxic mixtures
   - Also "upward" abundance responses in many species (more)
10. Your contributions welcome !