

# Statistical Eco(-toxico)logy

Improving the Utilisation of Data for  
Environmental Risk Assessment

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Eduard Szöcs

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# Environmental Risk Assessment and Monitoring

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# Environmental Risk Assessment and Monitoring

EC 1107/2009

EU-WFD

Environmental  
Risk  
Assessment

Environmental  
Monitoring

# Environmental Risk Assessment and Monitoring

EC 1107/2009

EU-WFD

Effects

Exposure

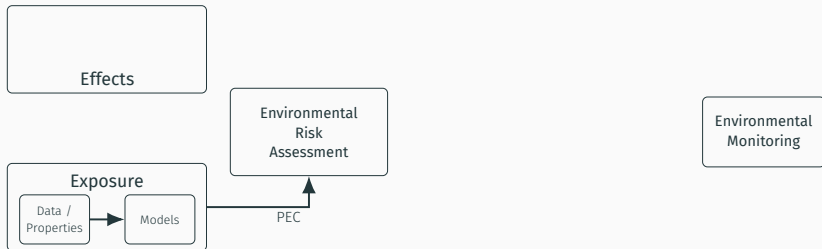
Environmental  
Risk  
Assessment

Environmental  
Monitoring

# Environmental Risk Assessment and Monitoring

EC 1107/2009

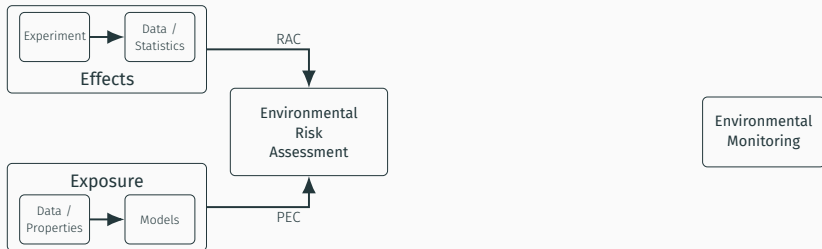
EU-WFD



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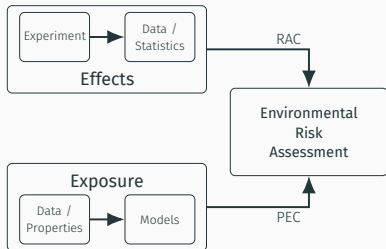
EC 1107/2009

EU-WFD

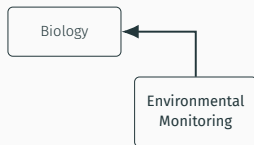


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EC 1107/2009



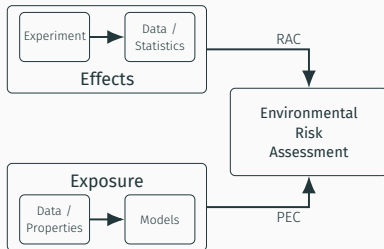
EU-WFD



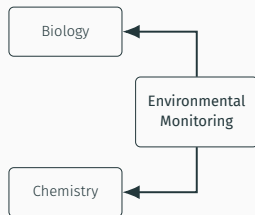


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EC 1107/2009



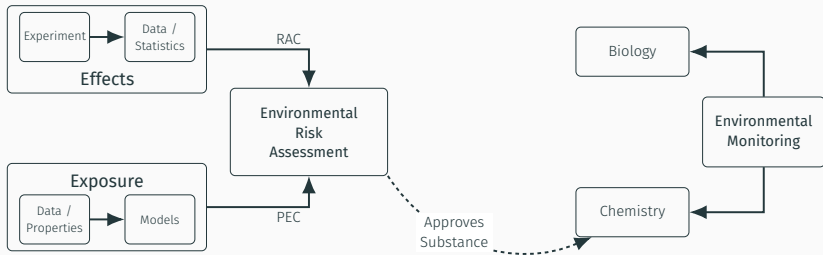
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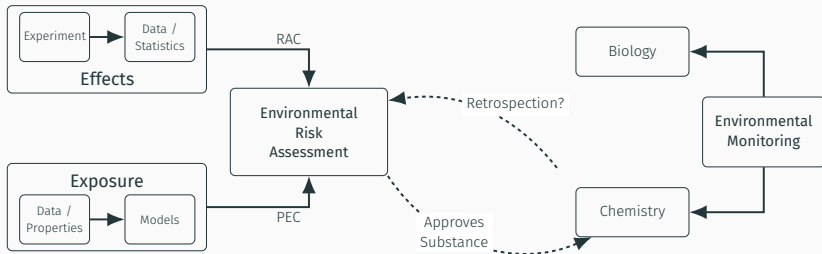
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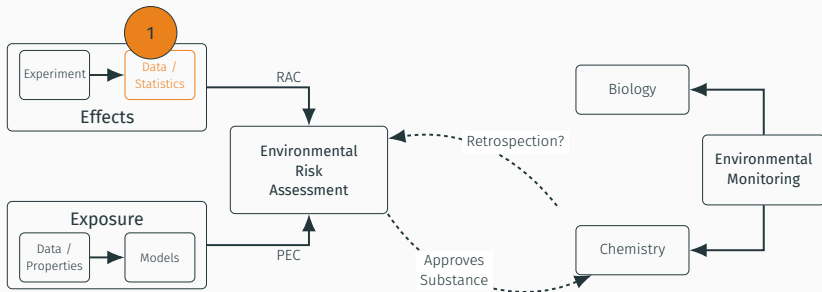
EU-WFD



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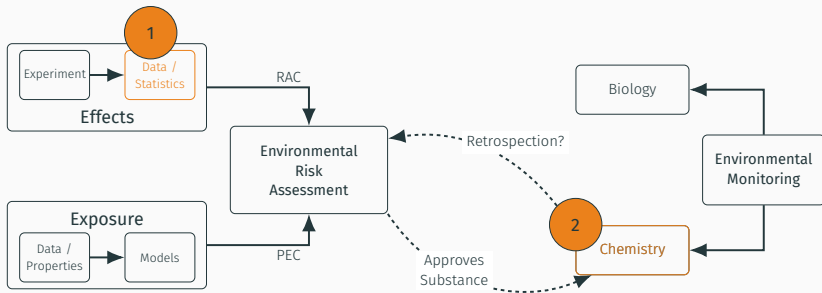
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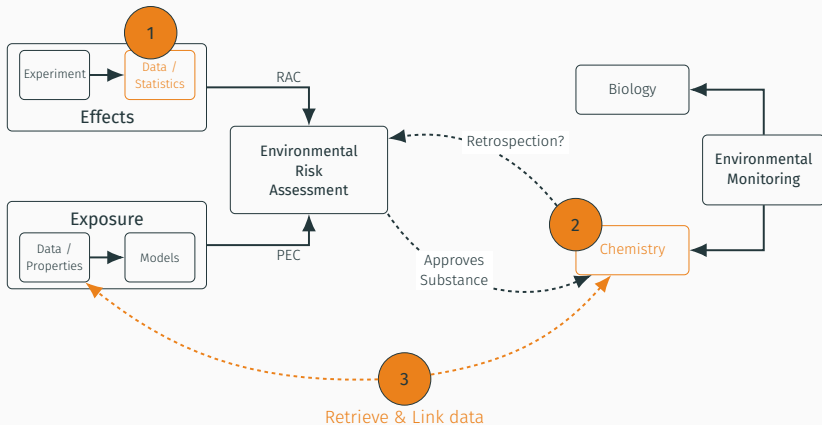
EU-WFD



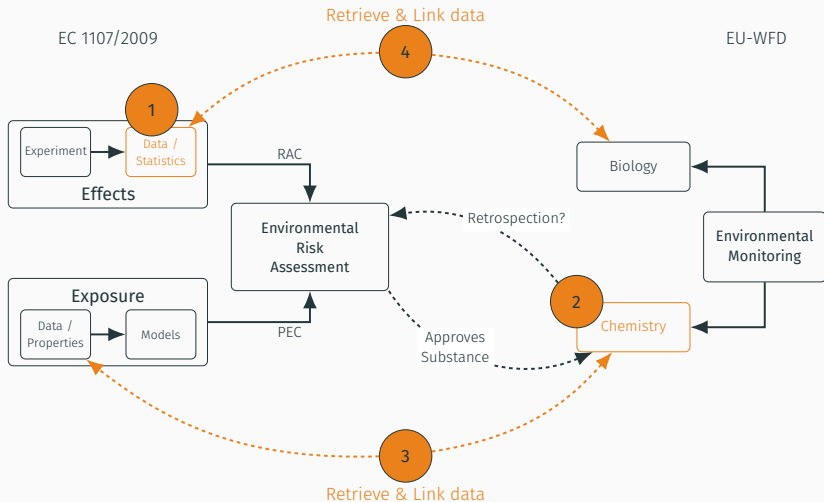
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EU-WFD



# Environmental Risk Assessment and Monitoring



# Improving Statistics in ERA

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# Ecotoxicology is not normal

# A brief history of GLM (uncomprehensive)

# Statistical Power is unacceptably low

# Generalized Linear Models (GLM) can do better

# What we learned

# Where are we now?

## Exploring Monitoring Data for ERA

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# What we learned

## Solutions for Linking Data in ERA

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# Biologists & Chemists face the same problems

## Names

*Osmia rufa*, *Osmia bicornis*, *Osmia ruffa*, *Osmia unilandaui*, *Osmia spec.*

Chlorpyrifos, Chlorpyrifos, Chlorpyrifos, Chlorpyrifos-ethyl, Chlorpyrifot

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Hymenoptera/ Apoidea/  
Megachilidae/ *Osmia*/ *rufa*

organophosphate, ester, insecticide



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Wing length, Mass, Season

Mass,  $K_{OW}$ ,  $LC_{50}$

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## Identifiers

NCBI, ITIS, EOL, ...

2921-88-2, Clc1c(OP(=S)[...],  
InChI=1S/C9H11C[...], SBPBAQFW[...],  
CSID,...

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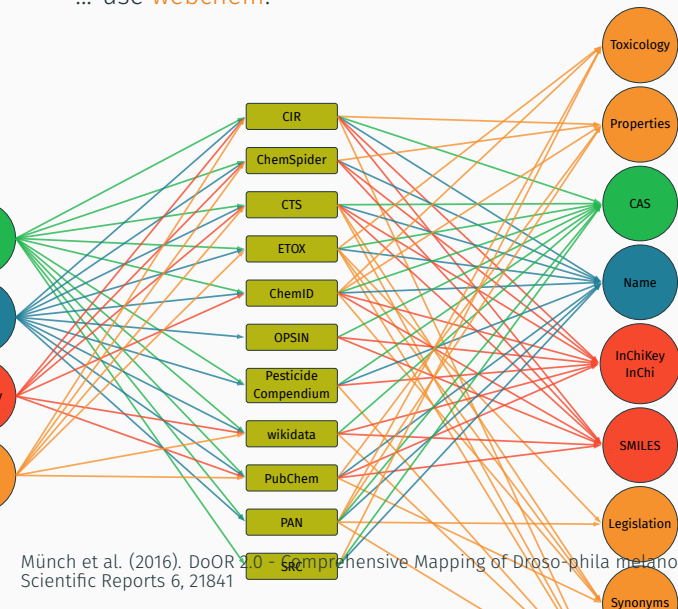
## Amount of data

2993 taxa

489 pesticides  
(+ 590 other organics)

# Instead of wasting time...

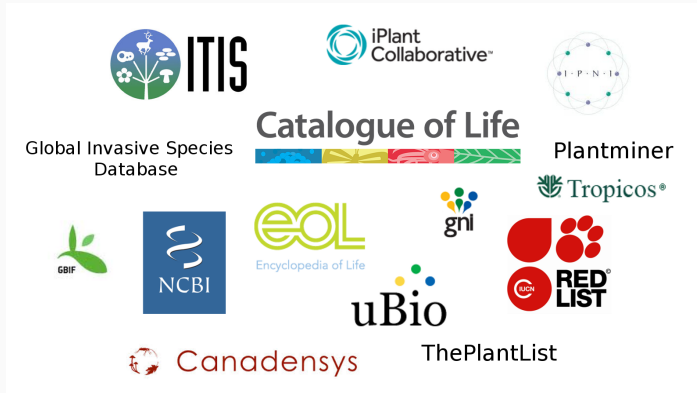
... use **webchem!**



Münch et al. (2016). DoOR 2.0 - Comprehensive Mapping of *Drosophila melanogaster* Odorant Responses. Scientific Reports 6, 21841

# Instead of wasting time...

... use **taxize!**



*"Days of searching done during my morning coffee. Amazing. **taxize.**"*

## Recap

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# What we learned

## ✓ Improving Statistics in ERA

- Change your model, not your data
- Ultimately ban NOEC
- Take LOQ into account

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## ✓ Exploring Monitoring Data for ERA

- Pesticide Dynamics
- Agricultural small streams at risk
- Neonicotinoids
- feedback for ERA



# What we learned

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## ✓ Exploring Monitoring Data for ERA

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## ✓ Solutions for Linking Data in ERA

- Handling big eco(toxico-)logical data not easy
- now easier


# Statistical Ecotoxicology

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Environmental Risk Assessment

Eduard Szöcs

 <http://edild.github.io/>

 @EduardSzoecs

 [https://github.com/edild/phd\\_defense](https://github.com/edild/phd_defense)



# Statistics?

ZAGA what...?

## Comparison with Stehle / Knauer?



taxize

ecology / biota?