Changing context for Environmental Risk Assessment

Related JRC thoughts and activities

Aude Kienzler, Stephanie Bopp, Joachim Maes

EFSA Advisory Forum, 2 April 2020

Setting the scene: pressures & impacts

- Chemicals - *Single vs Multiple chemicals*

- Level of organisation - *individuals / populations / ecosystems*

- Habitat - *Connectivity, loss,* Food - *limitation, web interactions*

- Temporal & spatial variation

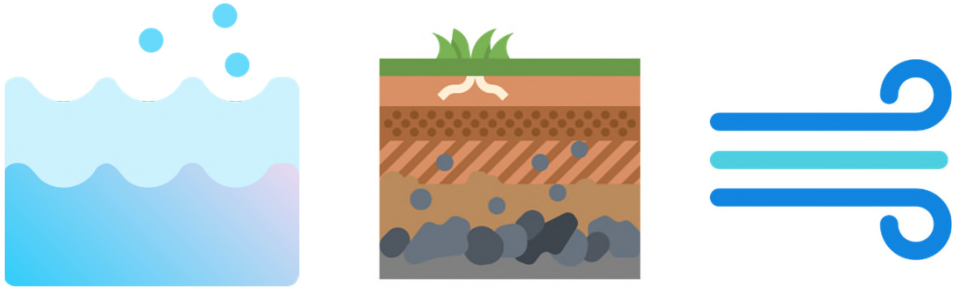
- Susceptibility to parasites, diseases…

- Toxicological effects
- Structural and functional changes
- Biodiversity

Setting the scene: sectorial legal framework

Prospective assessment

Retrospective media related assessment



Icons from www.flaticon.com

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Bridging the human health - environment divide

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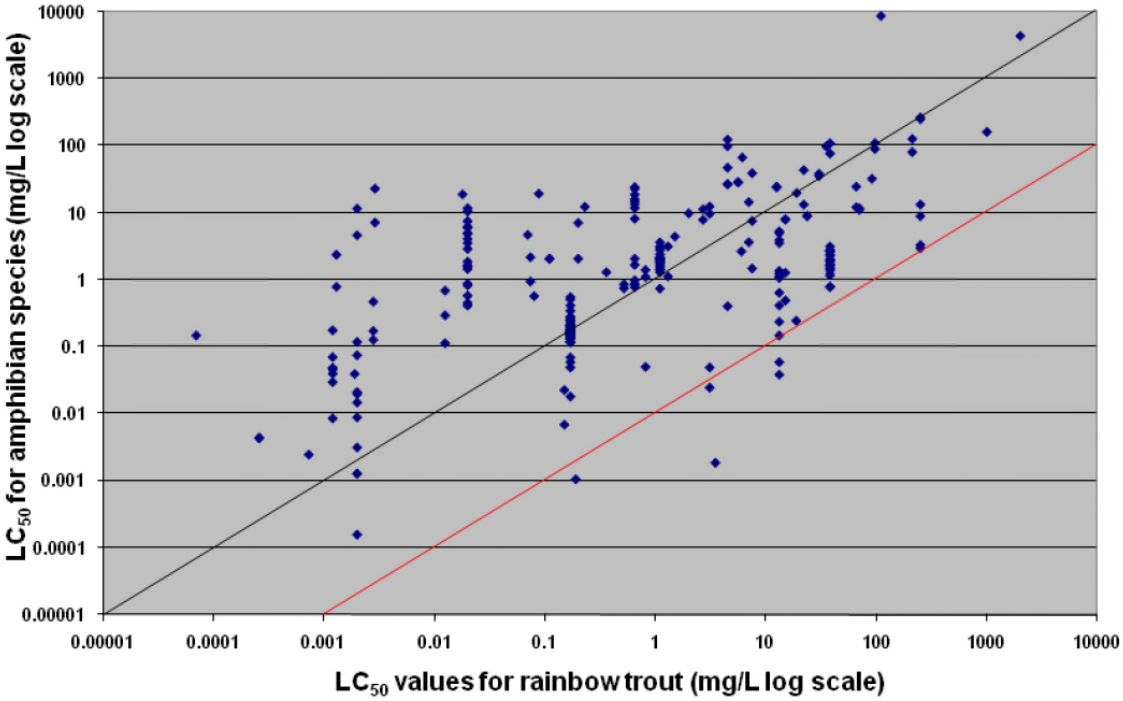
Breaking down the silos: human vs environment

- ERA: we use representative species and safety factors to protect a large variety of species



…Species sensitivity

EFSA PPR Panel, 2013. EFSA Journal 2013;11(7):3290, 268 pp. doi:10.2903/j.efsa.2013.3290.

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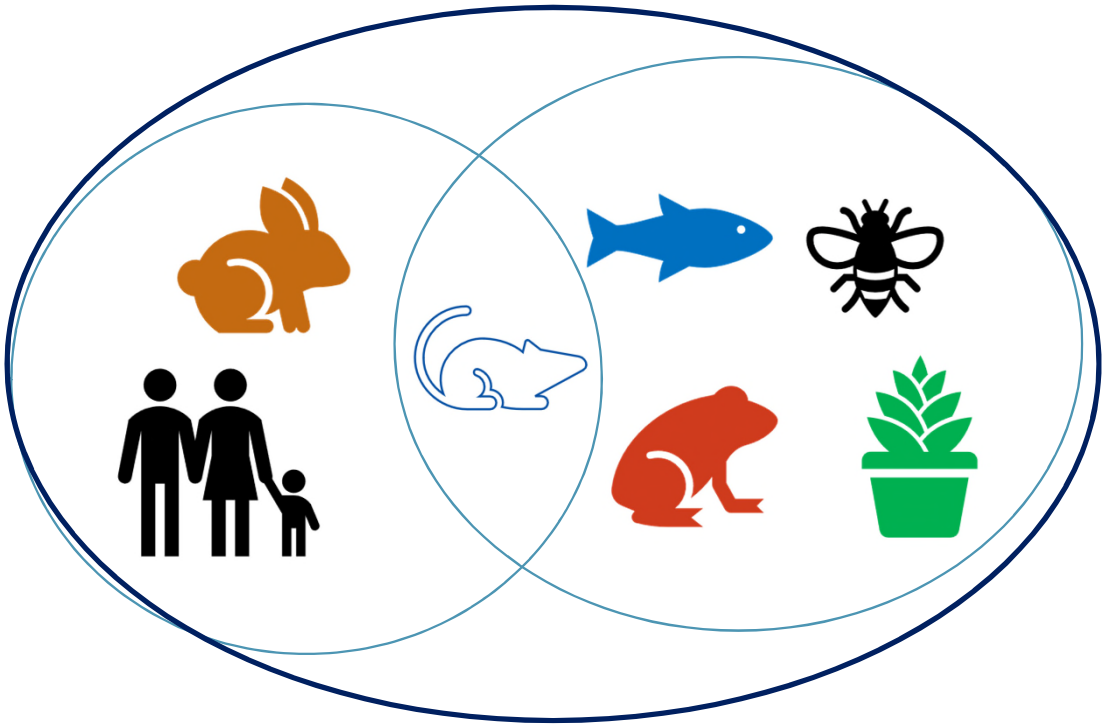
Move from the apical space to the mechanistic space



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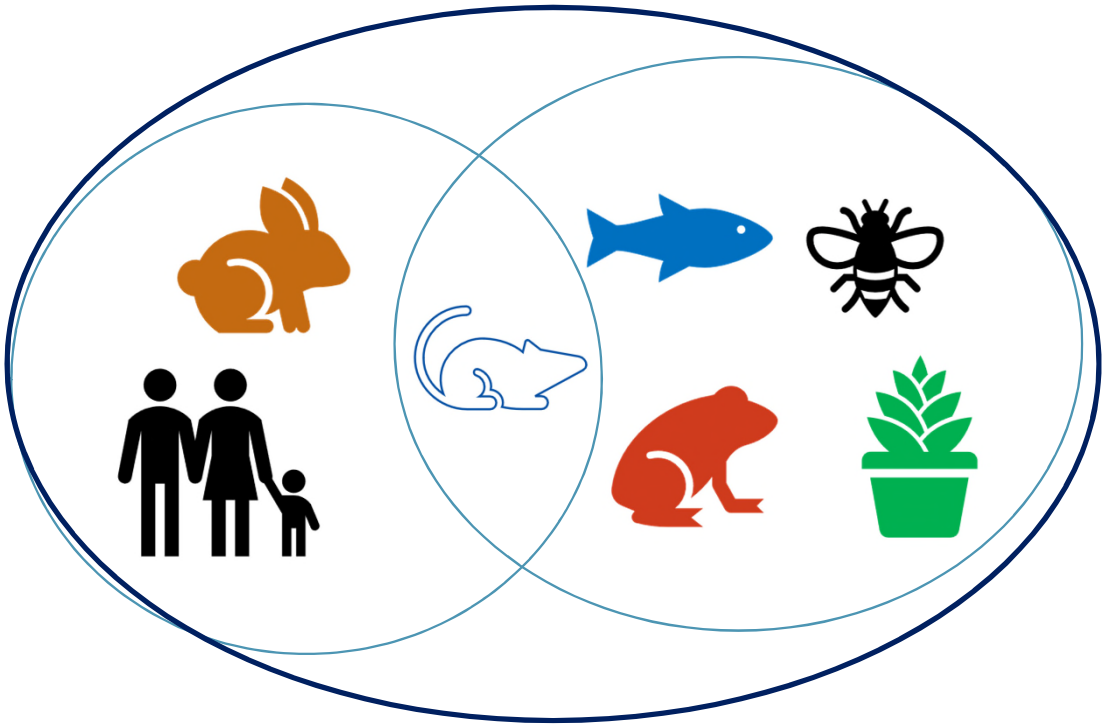

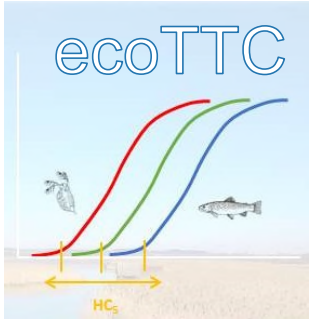

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Maximise the use of existing data: ecoTTC

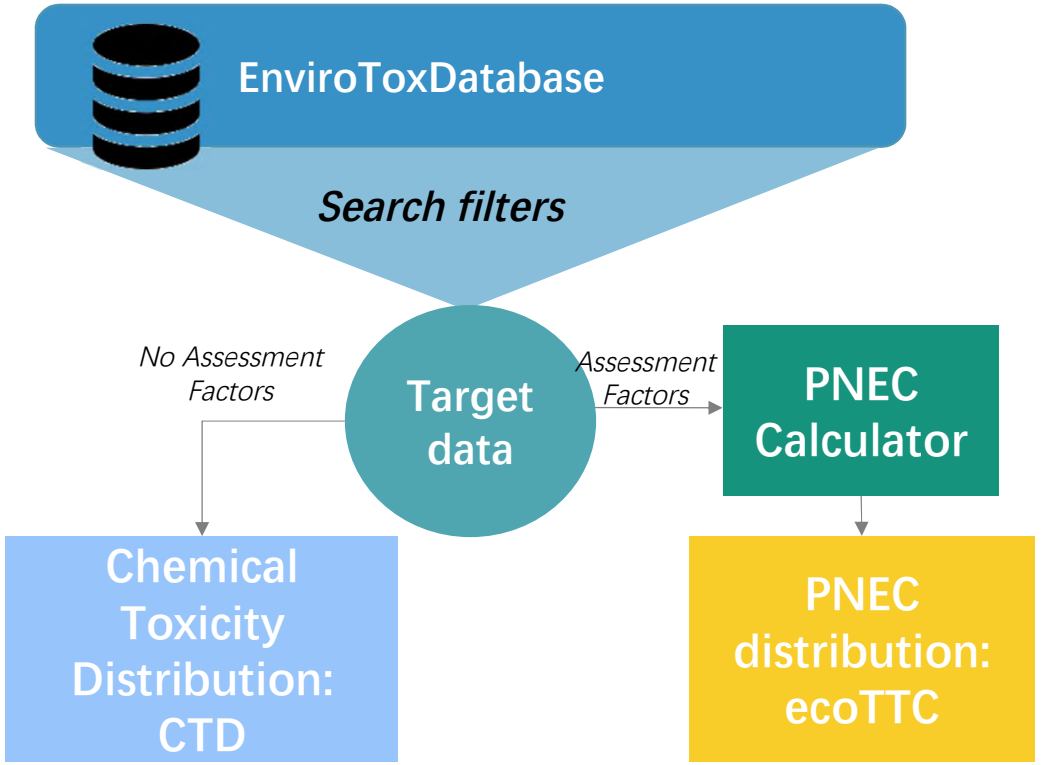
EnviroTox Database & Tools

Database of ~91K curated aquatic toxicity records; ~3,9K substances

User-friendly database filtering interface

Freely available analysis tools:

- **PNEC calculator** (US & Europe)
- **PNEC distribution tool (ecoTTC*)**
- **Chemical Toxicity Distribution (CTD) tool**



www.EnviroToxDatabase.org

Connors et al., 2019 ET&C 38(5): 1062–1073

* 5th percentile value of PNECs' distribution

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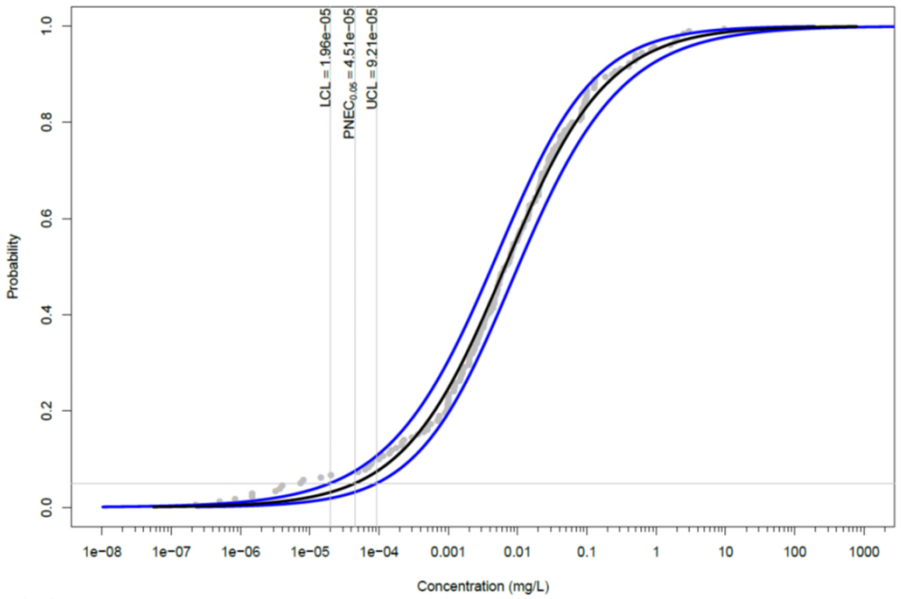
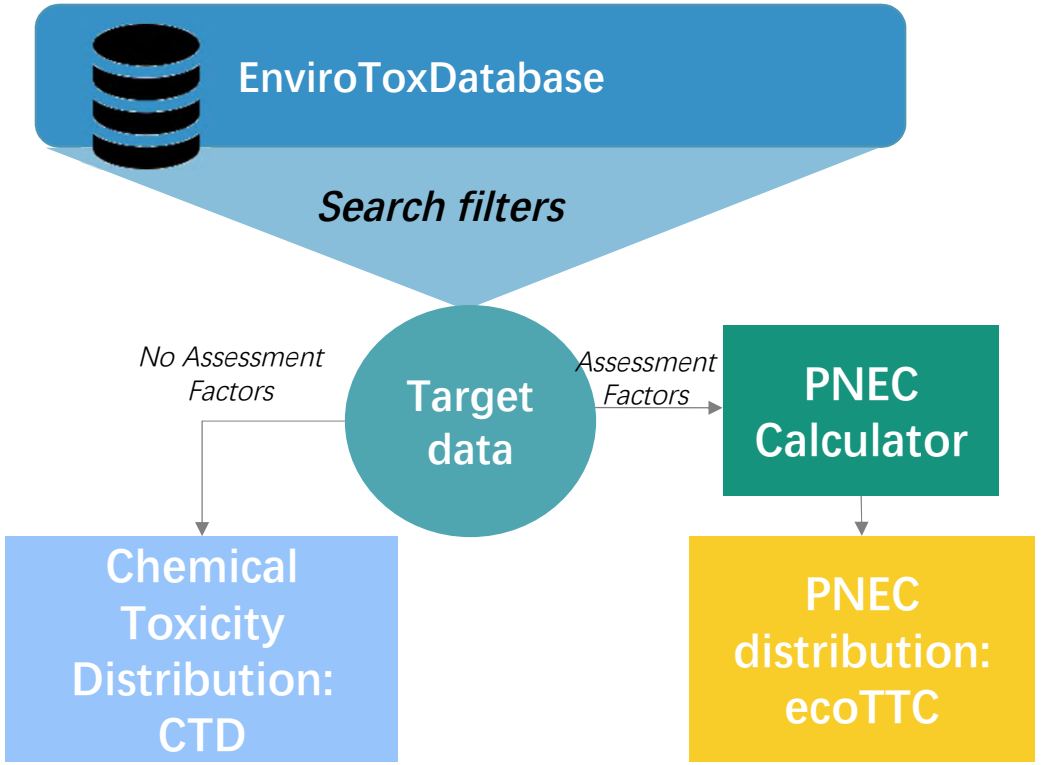
Maximise the use of existing data: ecoTTC

EnviroTox Database & Tools





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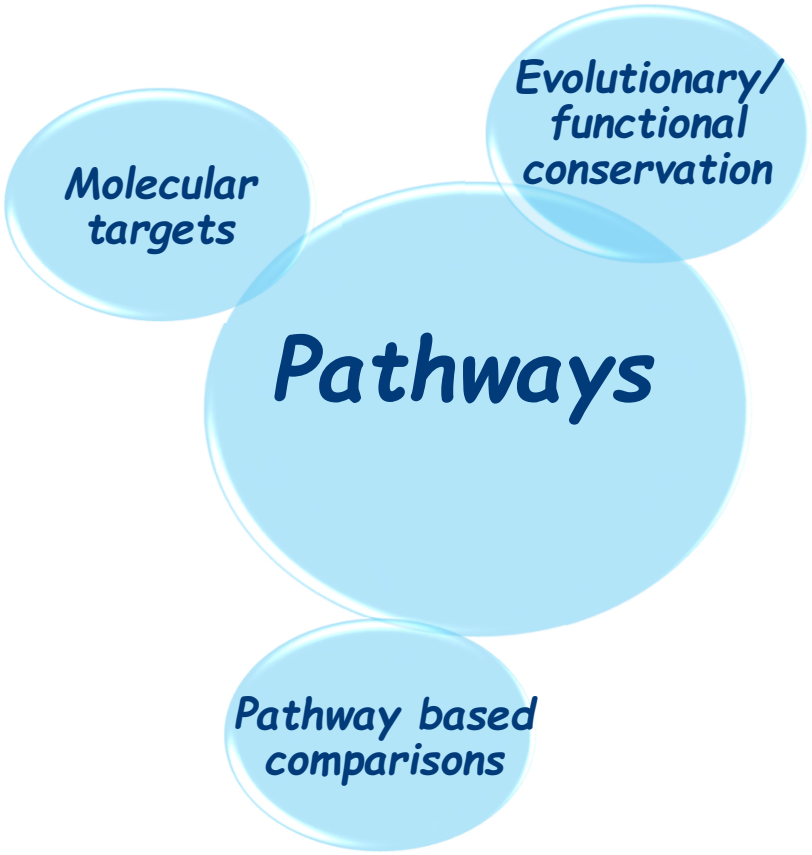
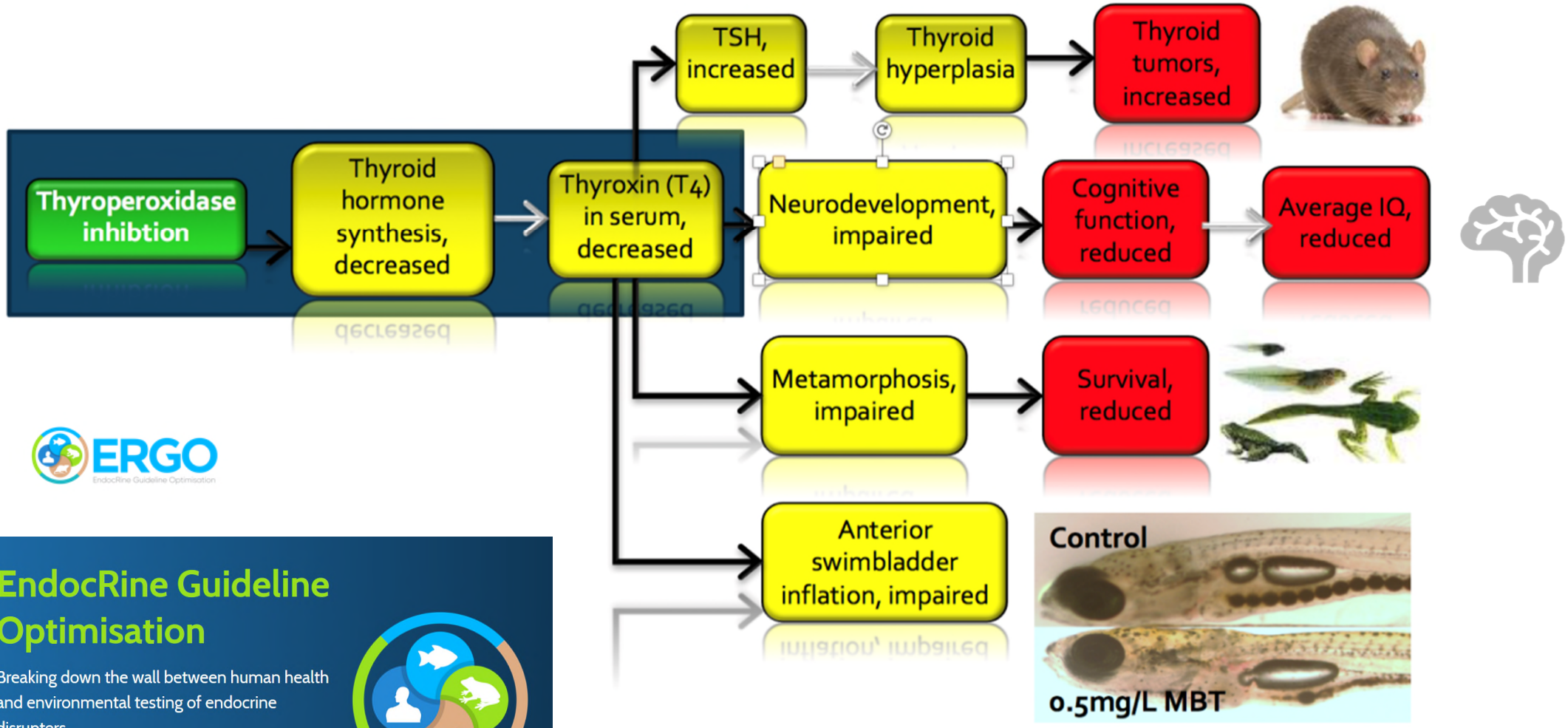


Example in the new guidance for identifying EDs; *EFSA/ECHA 2018*

"However, it should be highlighted that **there may be data available on non-target organisms relevant for the assessment of the ED properties with regard to humans**. Furthermore, because of the high level of **conservation of the endocrine system** across taxonomic groups, the mammalian data may also be relevant for other vertebrates (…) "



ERGO
EndocRine Guideline Optimisation

EndocRine Guideline Optimisation

Breaking down the wall between human health and environmental testing of endocrine disrupters

ABOUT THE PROJECT

Slide (adapted): courtesy of Jonathan Haselman, US EPA

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Combined exposure to multiple chemicals

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Mixture Environmental Risk Assessment and Management – current obstacles

Limited understanding of real co-exposure

Limitation in testing real combinations, understanding interactions

Need to prioritise mixtures of greatest concern

How to regulate combined exposure across chemical sectors?

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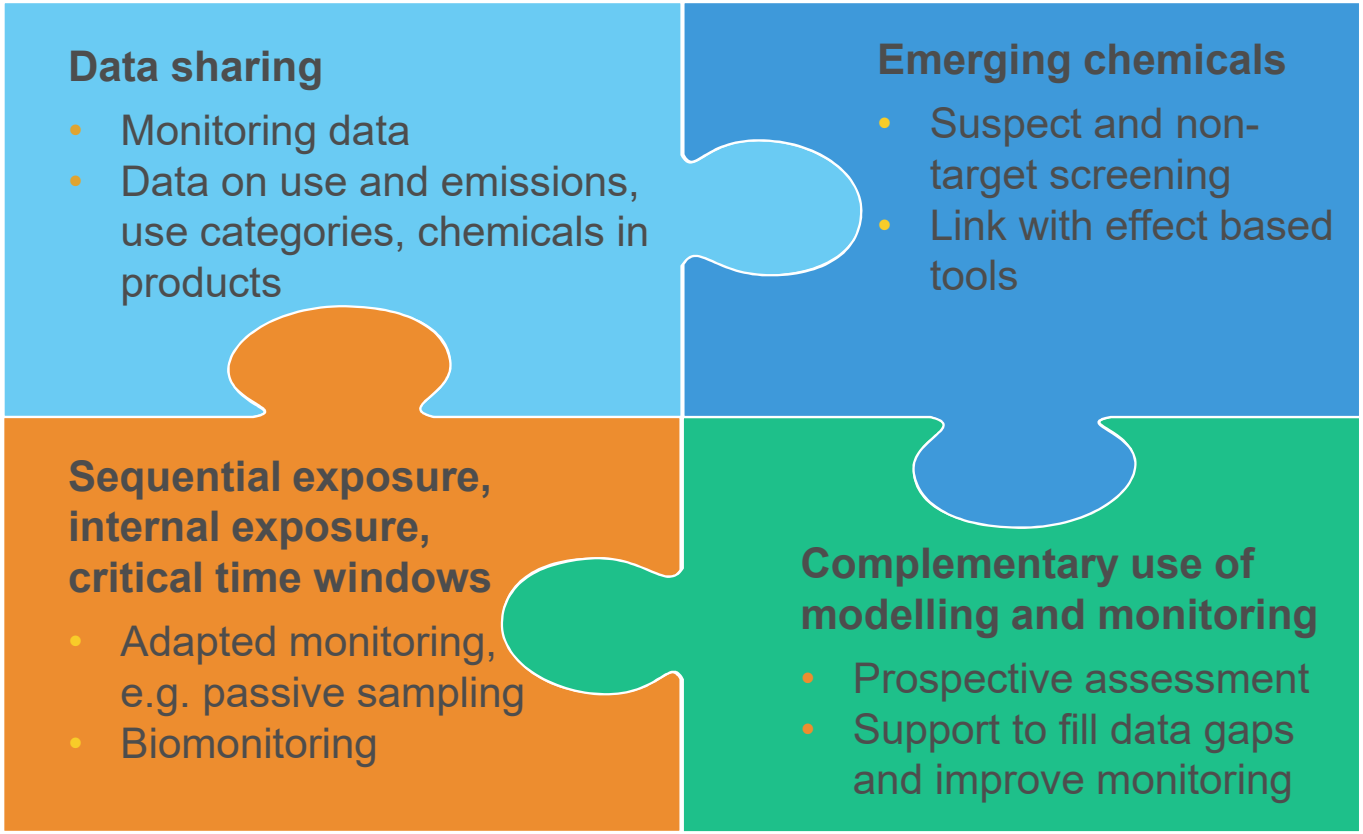
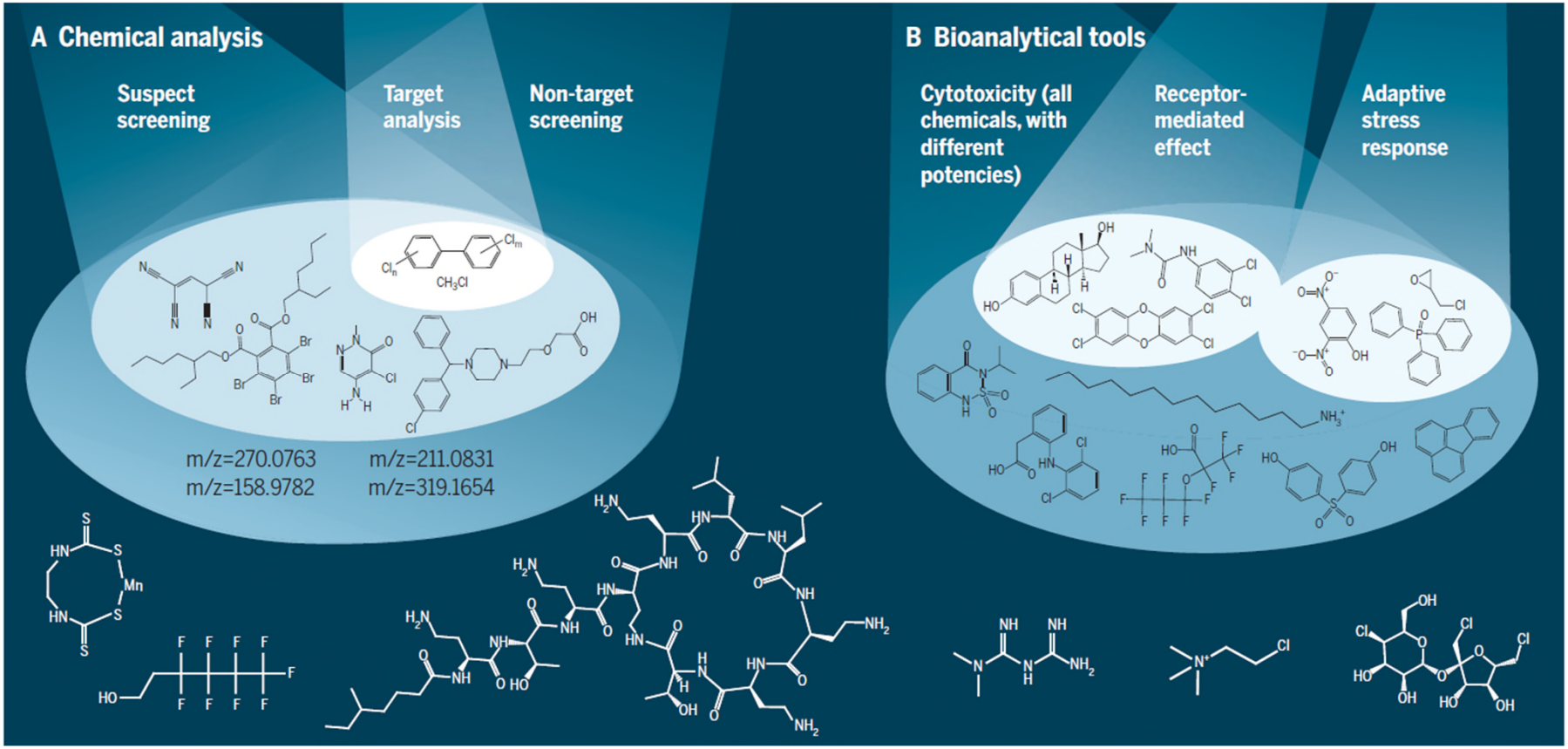
Improving our understanding of combined exposure



What can we see with chemical and bioanalytical analysis? (Figure 2 from Escher et al. 2020, Science 367, 388–392)



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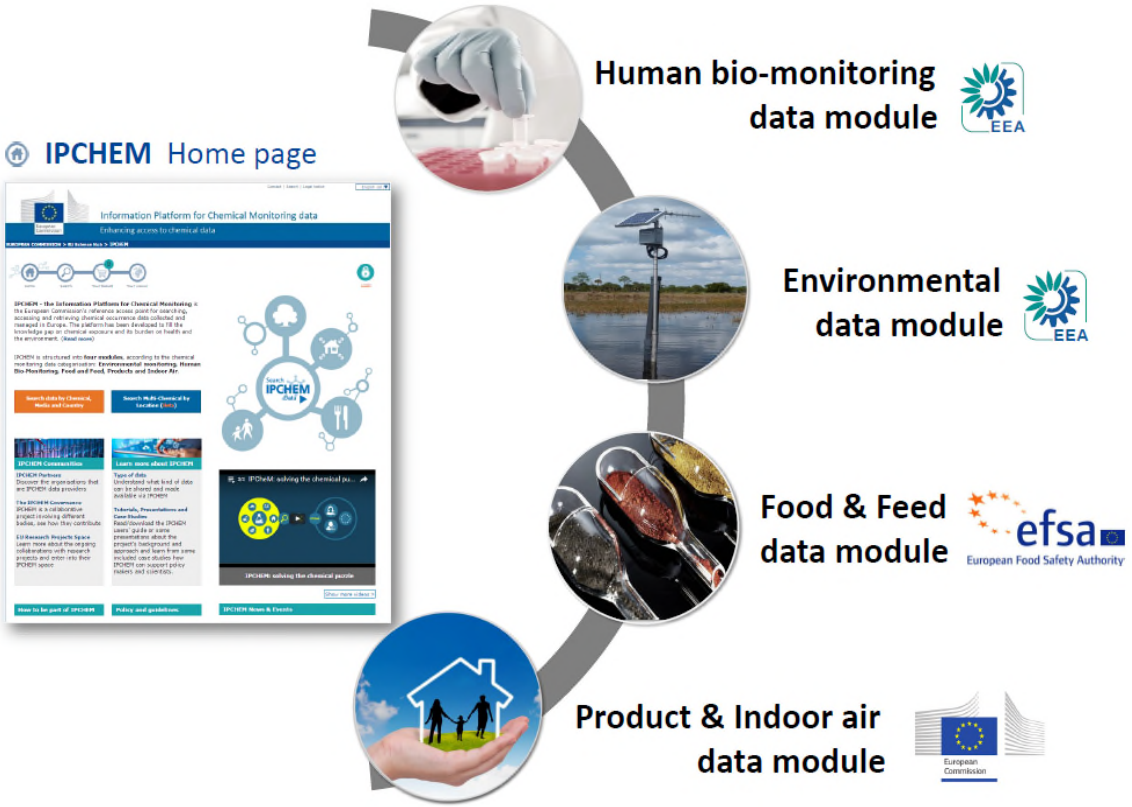
Information Platform for Chemical Monitoring IPCHEM



- European Commission DGs
  ENV, JRC, RTD, SANTE
- European Agencies:
  EEA, EFSA, ECHA
- EU Member States:
  National monitoring programmes/activities
- Research projects
- International organisations:
  OECD, Health Canada.

Improving our understanding of combined effects

Data sharing

- For regulatory reference values
- Endpoint specific toxicity

Use of effect based methods

- Effect based monitoring in the environment
- Biomarkers of effect in biomonitoring

Improved mechanistic understanding

- Use new approach methodologies to unravel mechanisms
- Use, map and integrate knowledge, e.g. for grouping

Interactions / synergisms

- Relevance
- Magnitude

Icons from www.flaticon.com

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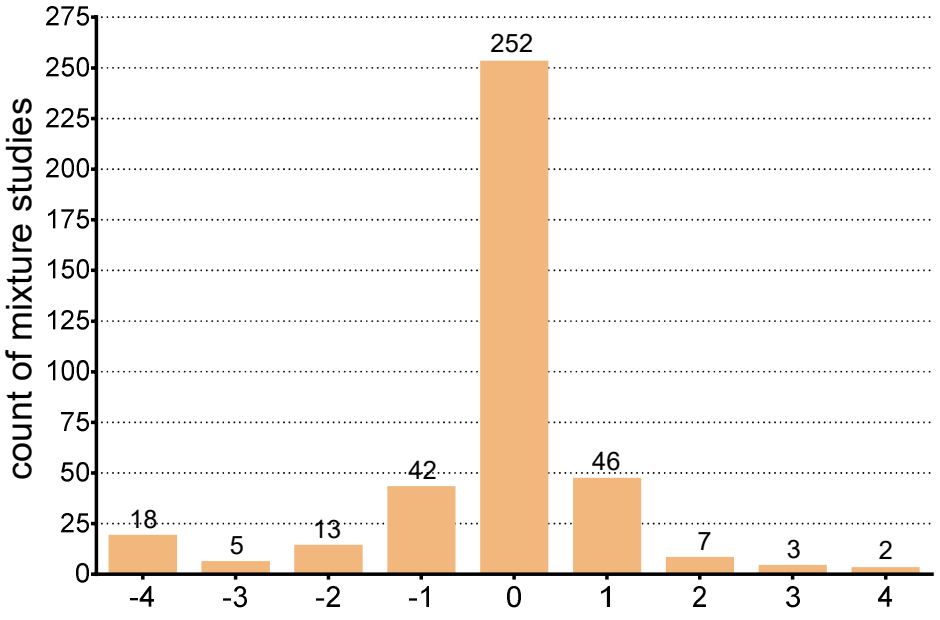
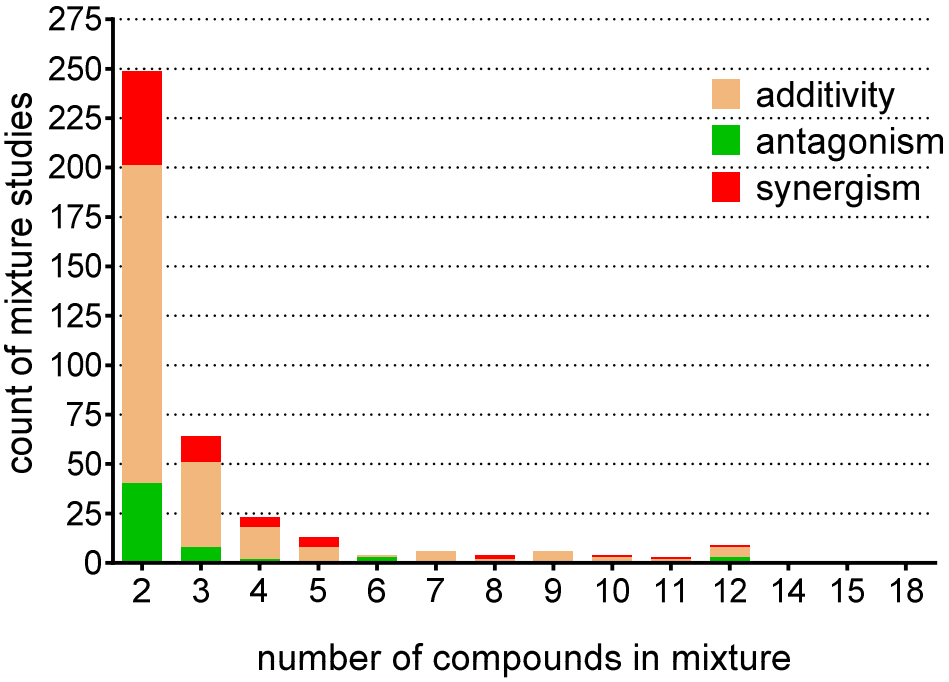
Do we need to worry about interactions?



Class	-4	-3	-2	-1	0	1	2	3	4
IPQ range	<-700%	-700% - -500%	-500% - -300%	- 300% - -100%	-100% - 100%	100% - 300%	300% - 500%	500% - 700%	>700%
	synergisms				antagonism				



Olwenn Martin et al. 2019: Systematic Review of Ten Years of Research on Interactions in Chemical Mixtures of Environmental Pollutants - Final Report

Service Contract CCR.F.933992.X0

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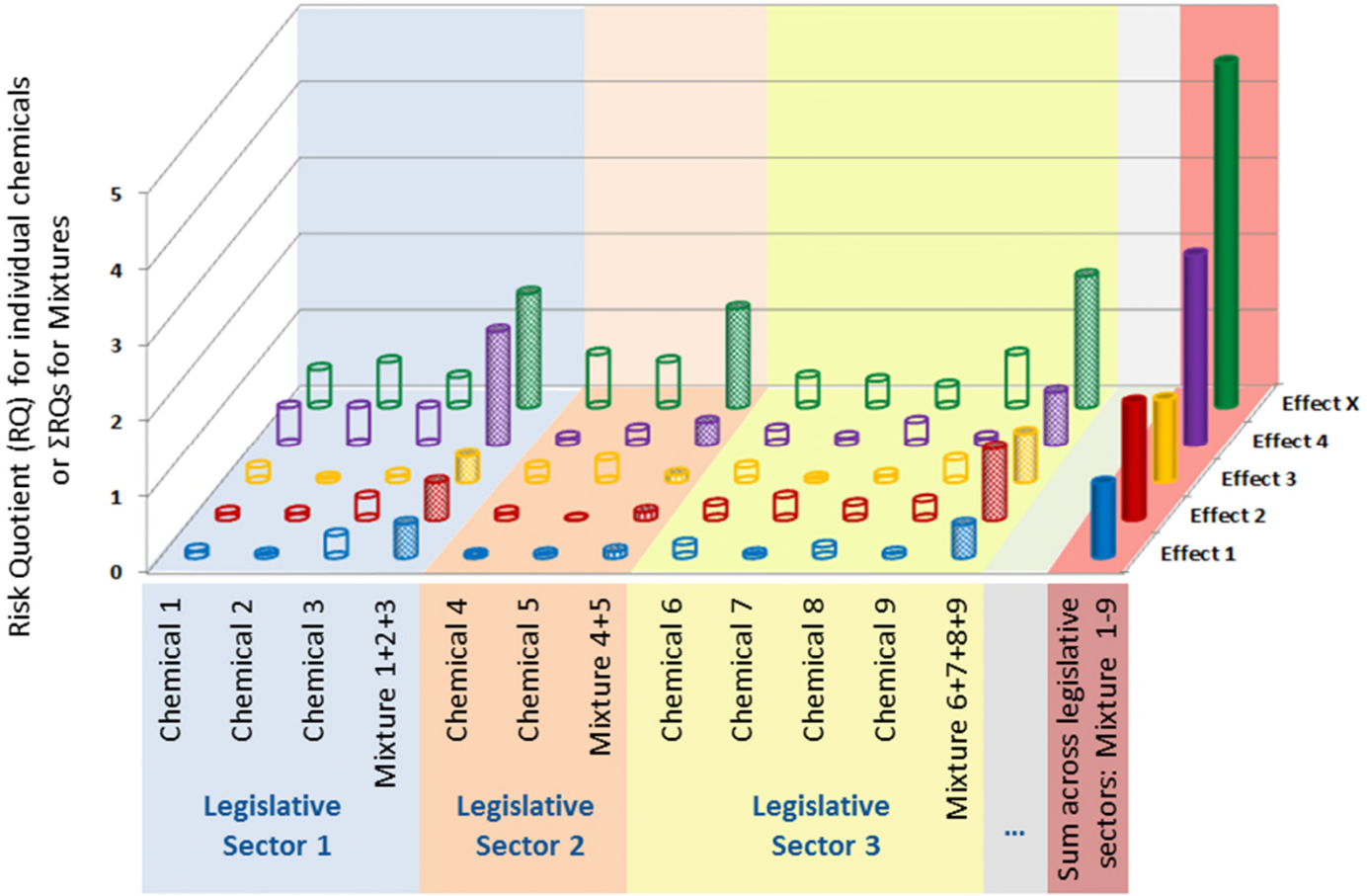
Regulation of combined exposure across regulatory sectors



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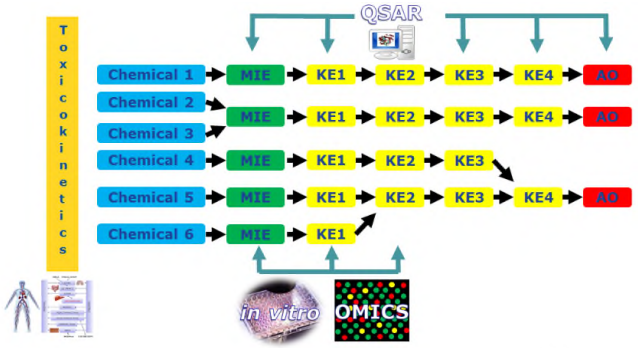
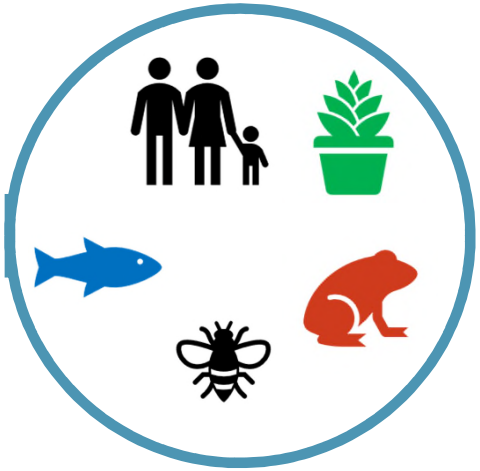
Conclusions (eco)toxicological perspective

Integrated frameworks: consider all the information

(toxicity, cross-endpoint, cross-species, mechanistic info, biokinetics, multiple chemicals, other stressors, exposure…)





more informative,
more relevant

→

better decisions +
risk management

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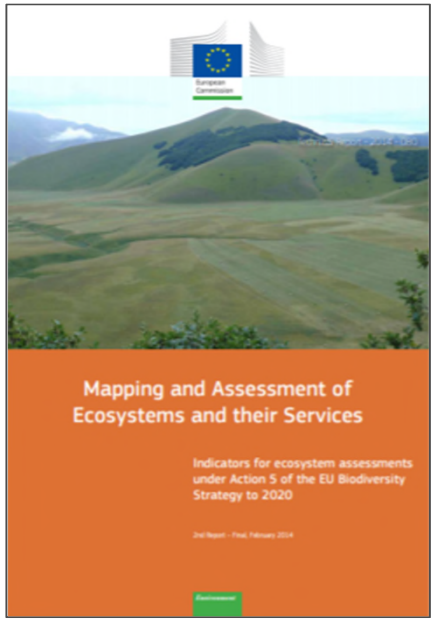
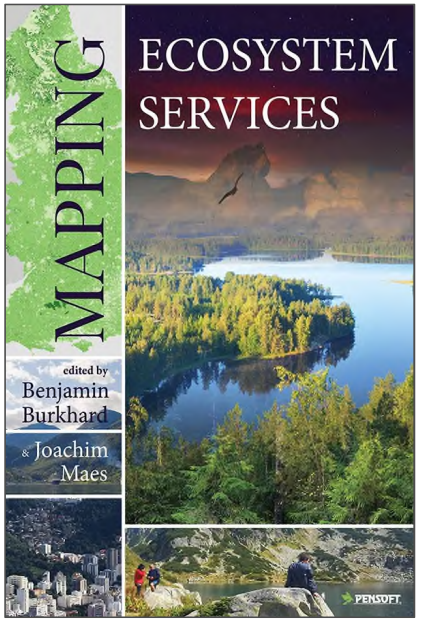
JRC's research on ecosystem services

- **Benefits of ecosystems to the people and the economy** (examples: crop pollination, nature-based recreation, provision of clean air and water, soil retention, carbon sequestration, …)
- **Legal basis: EU Biodiversity Strategy:** Mapping and Assessment of Ecosystems and their Services: standard, indicators and methods for mapping ecosystem services





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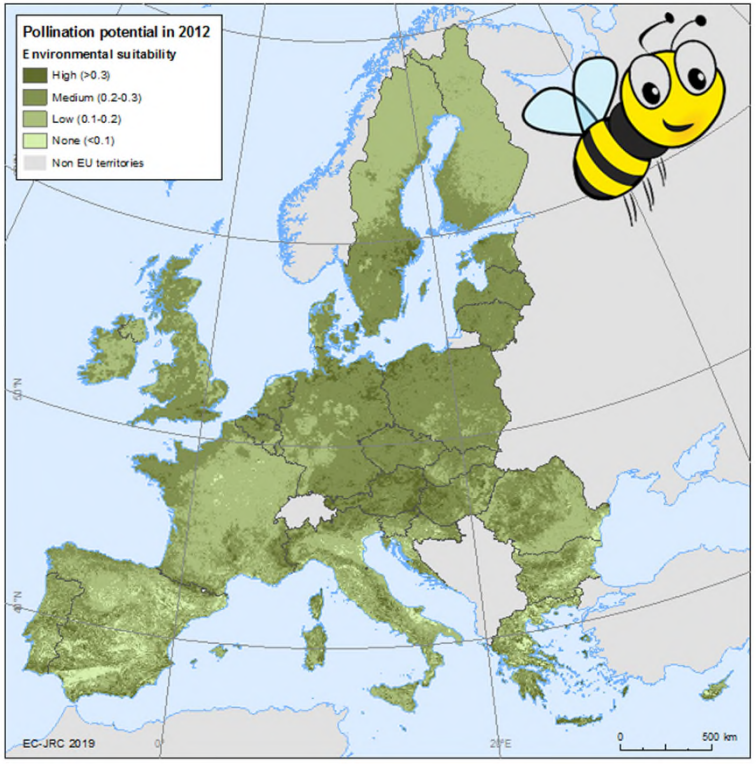
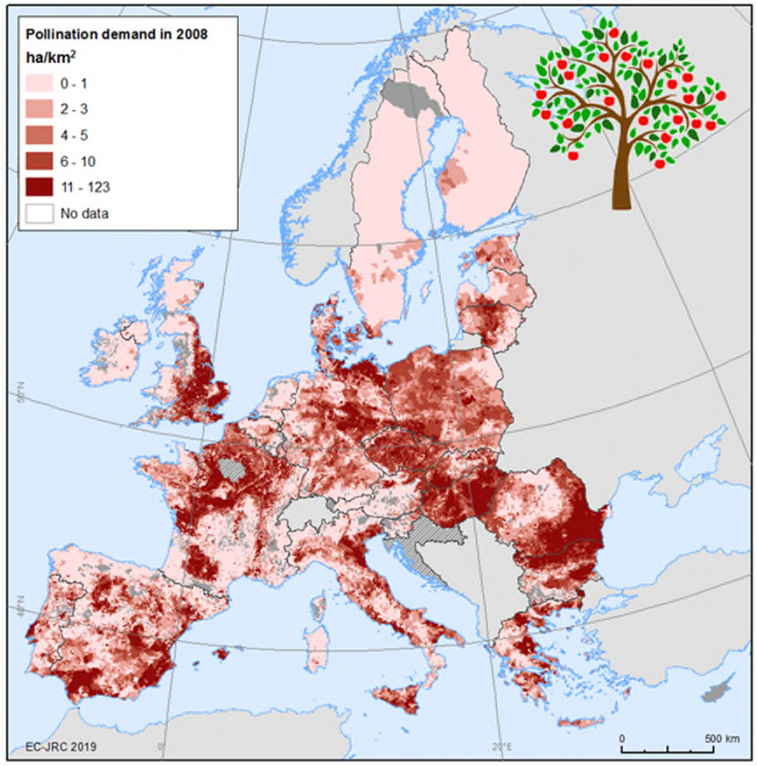
Example - crop pollination: insects that pollinate fruits and vegetable crops



JRC Model (ESTIMAP) maps the habitat suitability of the landscape for pollinating insects



Distribution of crops that are dependent on pollinating insects

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Application for risk assessment

- The value of pollination by wild insects is estimated at €10 billion annually.
- Data sets available on JRC data catalogue (MAES)
- Risk assessment of chemicals not yet integrated in the ecosystem services mapping approach
- DG SANTE: project on EFSA methodology to assess the impact of plant protection products on ecosystem services. JRC gives advise.

Thank you

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