

AIWW Workshop

Generating and Discussing Ideas for Incorporating Behavioral Endpoints in Environmental Risk Assessment and Water Quality Policies



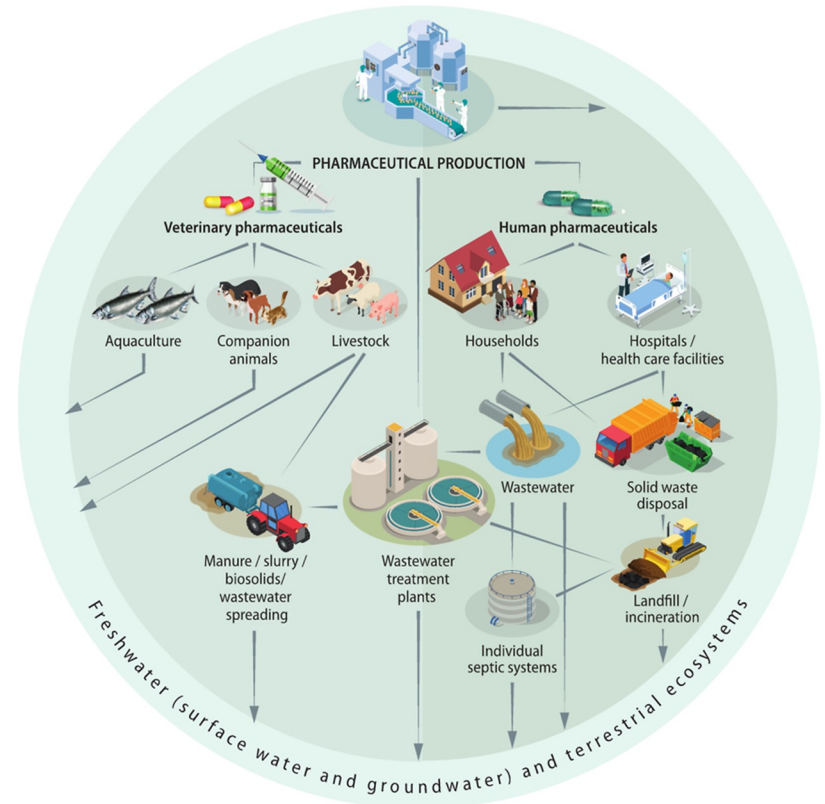
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Pharmaceuticals – The Numbers

- 4000 pharmaceuticals administered worldwide
- Use of pharmaceuticals is growing due to factors such as:
 - Wider availability
 - Wider range of treatments, more treatable diseases
 - Loss of attached stigma
 - Aging population
- Coupled with a growing population means higher loads in the sewage systems
 - Which is a major source of pharmaceutical pollution in the environment

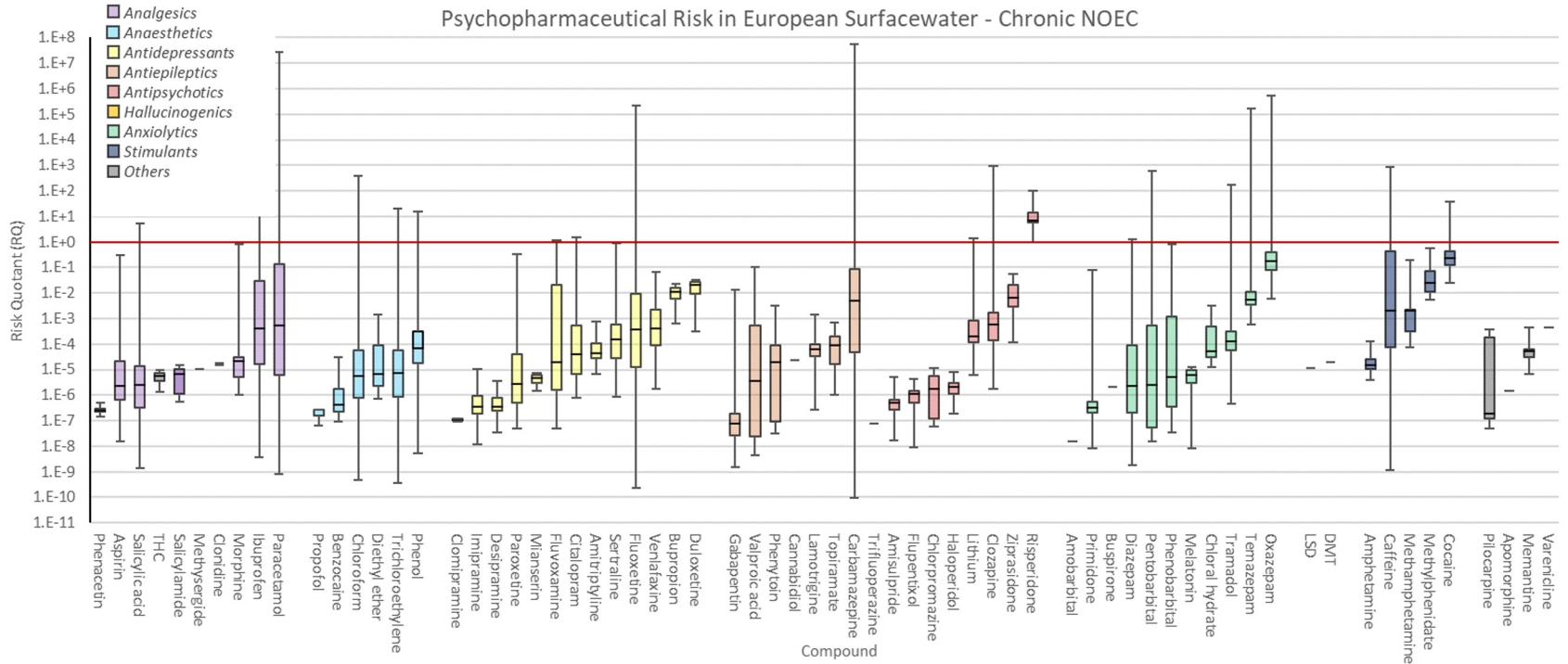


Psychoactive Pharmaceuticals (Psychopharmaceuticals)

- 502 pharmaceuticals designated by the WHO to ATC group N (Nervous System)
- 218 psychopharmaceuticals administered in NL
- Designed for stability
 - This makes them inherently hard to biodegrade
- Neural architecture is very ancient & not unique to humans
 - Therefore are 'compatible' with non target species
- Wide range of effects reported:
 - Activity (Cooperation)
 - Aggression (Dispersal/Migration)
 - Boldness (Feeding Rate)
 - Exploration (Mating Success)
 - Sociality (Parental Care/Predator Avoidance)
- Active at low concentrations:

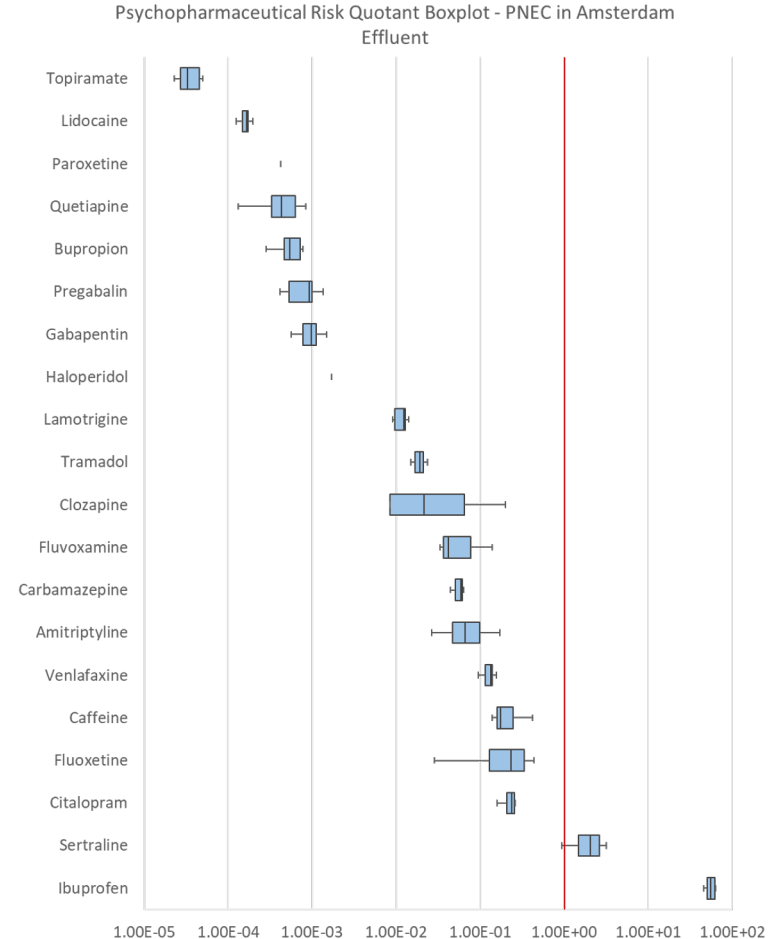


Psychopharmaceutical Risks



Psychopharmaceutical Risks

- Ecological risks may still be present in the environment even for modern wastewater treatment plants
 - Amsterdam RWZI was only built in 2008
- *It is clear that due to the high use and unique ecotoxicity of these chemicals, they potentially pose a risk to aquatic ecosystems*



Conventional methods for risk assessment

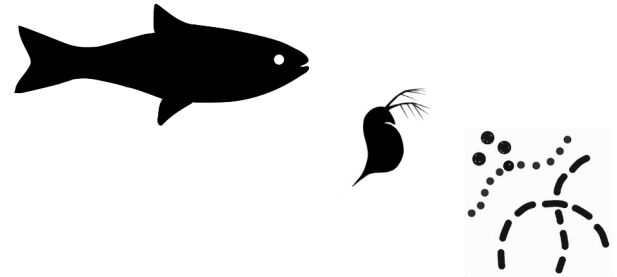
Predicted Environmental Concentration > Predicted No Effect Concentration

1. Fate and acute data

- acute toxicity to fish (normally a 96-hour test);
- acute toxicity to Daphnia (normally a 48-hour test); and
- toxicity to algae (normally a 72-hour test).

2. Chronic data

3. Field data

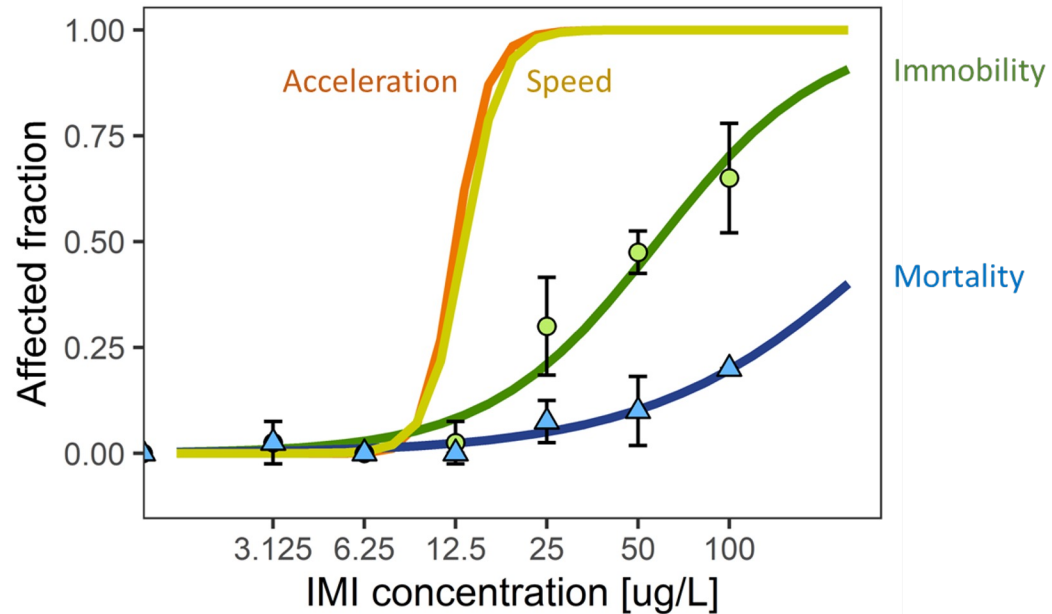


Depending on the type of contaminant extra tests can be executed

Behavioral endpoints in toxicity testing

Psychopharmaceuticals targets in humans are sometimes conserved among invertebrates.

Behaviour changes could influence other processes (indirect effects)

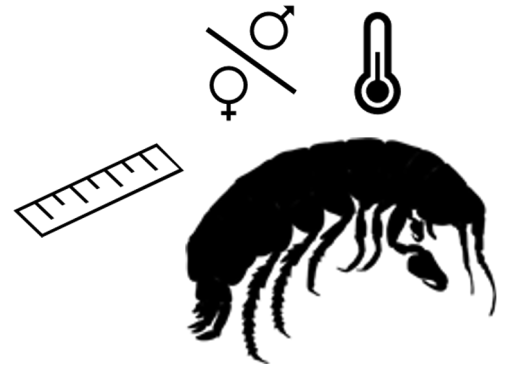


Importance of standardizing behavioral tests

Need for tests with high explanatory value

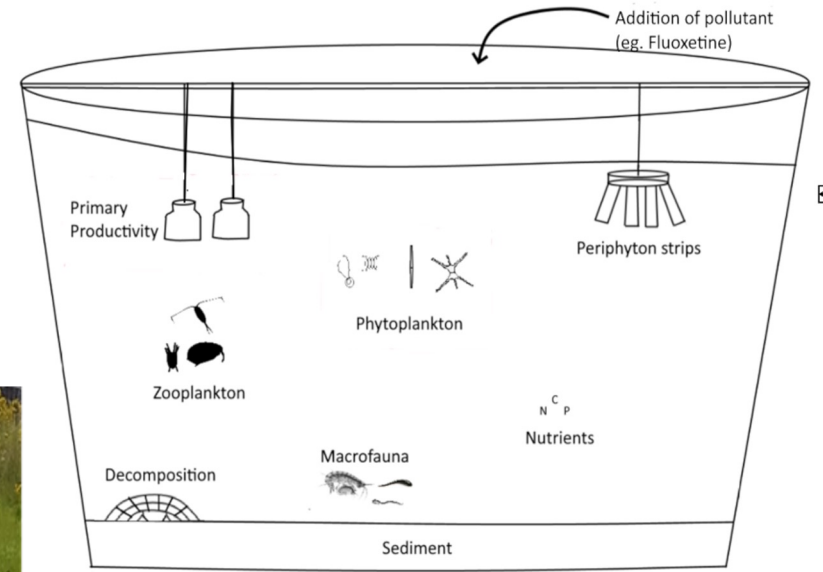
Reliability and reproducibility are key

- High variability in individuals
- Many influencing factors (life stage, size, sex, etc.)
- Different experimental setups



Effects on ecosystem

- Mesocosm studies
- Helps determine effects on the composition (algae, plankton) and functioning (primary productivity, decomposition)
- Behavioural effects can contribute at the ecosystem level



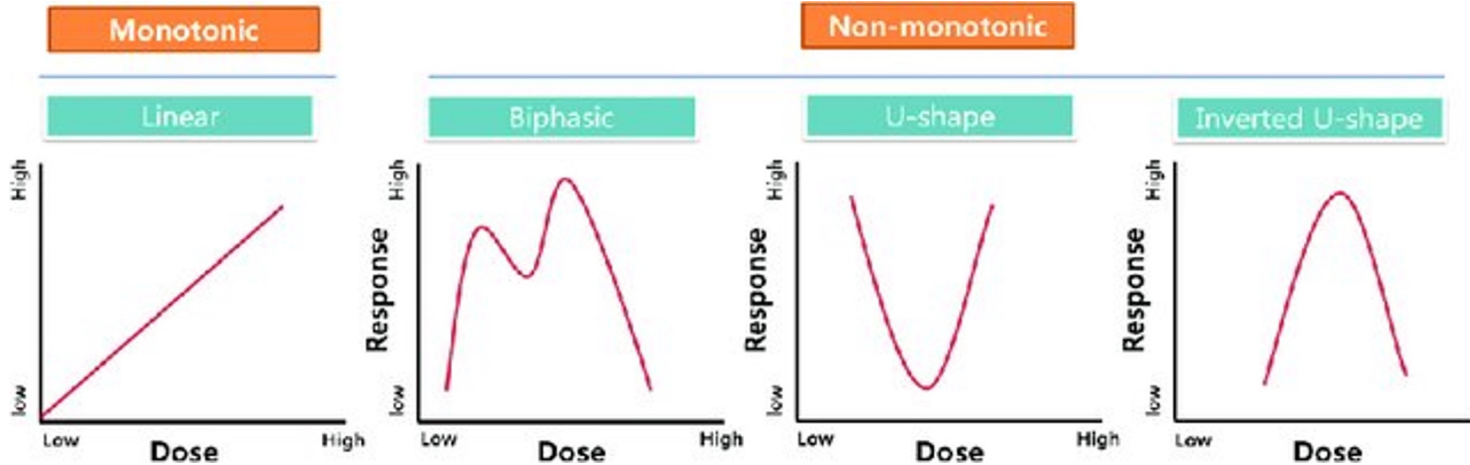
Dubey et al., (unpublished)



Non-monotonic dose response curves

‘the slope of the dose-response curve changes sign from positive to negative or vice versa at some point along the range of doses examined’.

Examples- Endocrine disruptors (BPA), antidepressants(Prozac/Fluoxetine)



Outline workshop

Introduction

Topic of this workshop and three keys:

1. Importance of lab behavior tests for real life aquatic ecosystems
2. Nonmonotonic dose-response relationships
3. Standardizing behavioral tests

Round 1 (individual) 15 min.

Go around the flipboards with these points and add post-its with thoughts, concerns, knowledge, etc

Top of board = positive

Bottom = negative

Middle = Neutral

Sign up for round 2 and 3, topics of interest

Key 1

positive
associations

negative
associations

Round 2 (small groups) 20 min.

Look at the notes on the flipboard and organize them

Now on a new flipboard try to answer these 4 questions:

1. What is your knowledge/knowledge gap on the key topic?
2. What directions could this topic go in the future and what are your concerns?
3. What is your influence on the key topic?
4. What strategic actions would be needed in your opinion to facilitate implementation in ERA?

Round 3 (small groups) 15 min.

Same as round 2

Wrapping up 10 min

Public discussion of the keys, one person per group will quickly summarize their thoughts and discussions. There is space for everyone to join in and add comments or reply.

Per key, try to answer these 4 questions:

1. What is your knowledge/knowledge gap on the key topic?
2. What directions could this topic go in the future and what are your concerns?
3. What is your influence on the key topic?
4. What strategic actions would be needed in your opinion to facilitate implementation in environmental risk assessment?

1. Importance of lab behavior tests for real life aquatic ecosystems
2. Nonmonotonic dose-response relationships
3. Standardizing behavioral tests

Would you like to receive the output report of this workshop?

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Any (last) remarks?

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