

Application of PRA to Ecological Risk Assessment

Barriers & Bridges

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Barrier: Novelty and Complexity

- Limited expertise for doing and evaluating PRA
- Distrust of black box solutions

*“If PRA can’t be made simple,
it’s not suitable for regulatory use”*



Bridge: Guidance, Training and User-friendly Tools

- Enable non-specialists to do “routine” PRAs

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Barrier: Conflict between Experts

- Rich diversity should be a strength
- Squabbling experts make it a weakness



“Your method lacks a mathematical rationale!”

“Yours requires unjustifiable assumptions!”

“Yours is too new!!”



Bridge: Build an inclusive toolbox

- Menu of alternative approaches
- Identify and address real weaknesses



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Barrier: Perception that large datasets are essential

- Restricts PRA to a handful of cases
- Pointless arguments about “minimum sample size”

“Do we need 8, 10 or 40 LD50s for an SSD?”

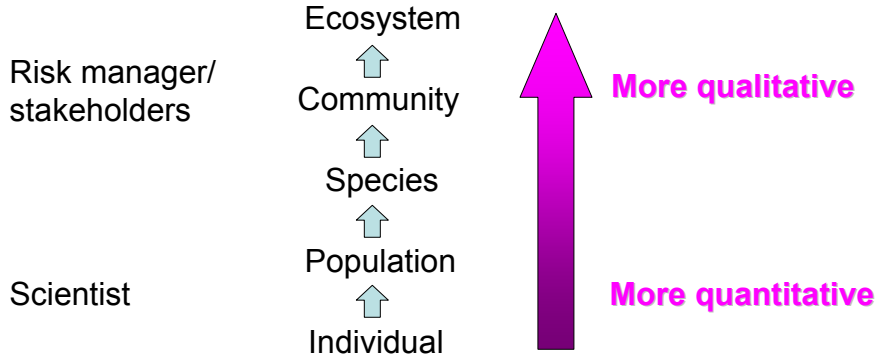
You’ll be lucky to get 2!

Bridge: Develop strategies for real-world datasets

- The size of your dataset is less important than your ability to characterise its contribution to uncertainty

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Barrier: Difficulty choosing PRA endpoints



Bridge: Answer the risk manager's question!

- An uncertain answer to the right question is better than a precise answer to a different question

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Risk assessment (probabilistic exposure, probabilistic effects)

Barrier: Communication

- Too much choice!
- Un-intuitive endpoints
- Practitioners ≠ communicators
- Poor format and labelling
- Cognitive barriers

Determine vs. probabilistic

Joint probability curve

Bridge: Concerted research/development effort

- Standardise on a few effective approaches
- Build on successes
- Optimise with input from social sciences

Frequency that the exposure concentration exceeds the effect endpoint

Distribution of TERs

0% years have PEC > 1st tier invert LC50

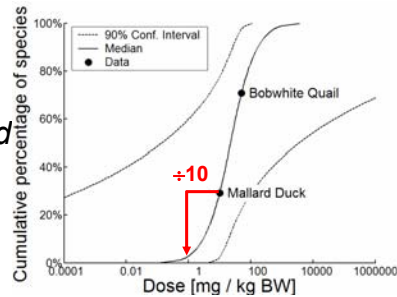
species have TER < 10
species with TER < 1

Central estimate 99% of skylarks have TER > 10

Barrier: Denial of uncertainty

- Scientists don't like to admit it
- Decision-makers don't want to deal with it

"If the confidence bounds are that wide I'll go back to deterministic"

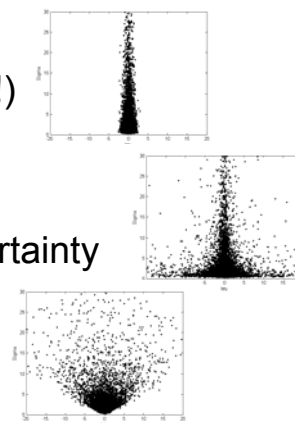


Bridge: Risk analysis is ABOUT uncertainty!

- "It is ~~still~~ worse still to be ignorant of your ignorance"

Barrier: Immaturity of methods

- Sampling uncertainty for Normal (!)
- Distribution shape
- Dependencies
- Expert judgement/subjective uncertainty
- Disagreement between experts

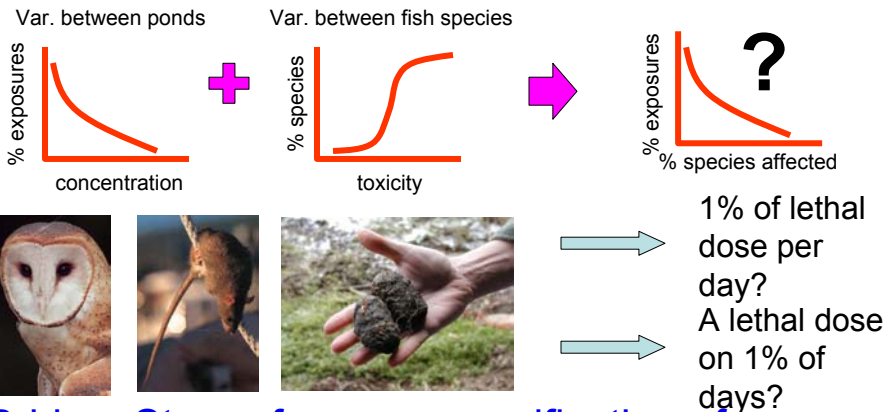


Bridge: Develop, implement and publicise

- Mix of PRA and other approaches

Barrier: Misspecification of ensembles

- Inappropriate input distributions → meaningless output



Bridge: Strong focus on specification of ensembles

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Barrier: Separation of exposure & effects assessment

- Bridge: Integrated analysis

Barrier: Limitations on access to data

- Bridge: Promote access and characterise uncertainties

Barrier: Cost

- Guidance, Training & User-friendly Tools

Barrier: Premature standardisation of PRA

- Bridge: Phased implementation strategy

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Barrier: Too narrow a focus on PRA?

- Can never quantify more than a fraction of uncertainty

Bridge: Integrated strategy, mix of approaches

Lower tiers

Higher tiers



**More qualitative
Generic uncertainty
factors**

**More quantitative
Case-specific
analysis**

- Combine with approaches from social sciences?
–Deliberation, decision heuristics, scenarios, mapping etc.