Environmental Science Colloquium Series (ECo-Series) 28-4-2022
Prospects of the precautionary principle in circular economy and chemicals policy in the EU
Stockholm University Department of Environmental Science

Precaution for Responsible Innovation

Guidance on the application of the precautionary principle in the EU

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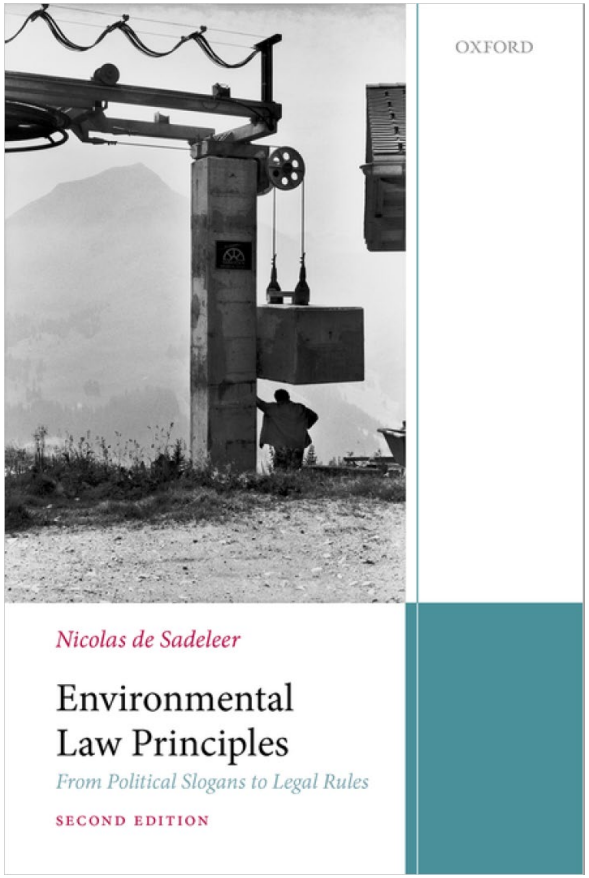
Senter for vitenskapsteori

RECIPES
Precaution • Innovation • Science

Principles in Environmental Policy

- *curative* model
  Polluter Pays Principle
- 'prevention is better than cure' model
  Prevention Principle
- 'better safe than sorry' model
  Precautionary Principle

paradigmatic shift from ***a posteriori*** control (civil liability as a curative tool) to the level of ***a priori*** control (anticipatory measures) of risks



The RECIPES-Project

The objective

The RECIPES project aims to reconcile innovation and precaution by developing tools and guidelines to ensure the precautionary principle is applied while still encouraging innovation.

The RECIPES project will work closely with different stakeholders through interviews, workshop and webinars.

To this end, RECIPES will

1. Analyse legal and policy initiatives on the precautionary principle at the international, European and national level and describe the emergence of an 'innovation principle'
2. Examine the application of the precautionary principle in eight specific cases
3. Develop scenarios for the future of the precautionary principle taking into account innovation
4. Introduce mechanisms for public involvement in scientific and technological decision-making
5. Create tools and guidelines to the precautionary principle to help policymakers and other stakeholders to assess risks and take into account innovation.

Case studies

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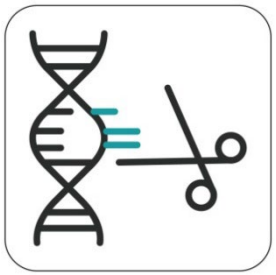

CRISPR gene drives
Rathenau Institute

GMOs
ARC

Financial risks
HU Berlin

Neonicotinoid insecticides
University of Bergen

Nanotechnologies
(OEAW)

Glyphosate
Maastricht

Endocrine disruptors
Maastricht University

Artificial Inteligence
Rathenau Institute

Micro plastic
Maastricht University

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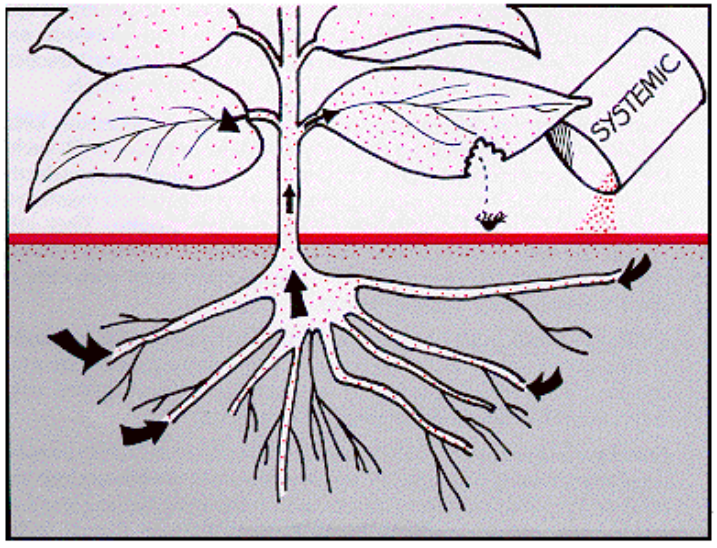
Systemic insecticides (neonicotinoids) & bees

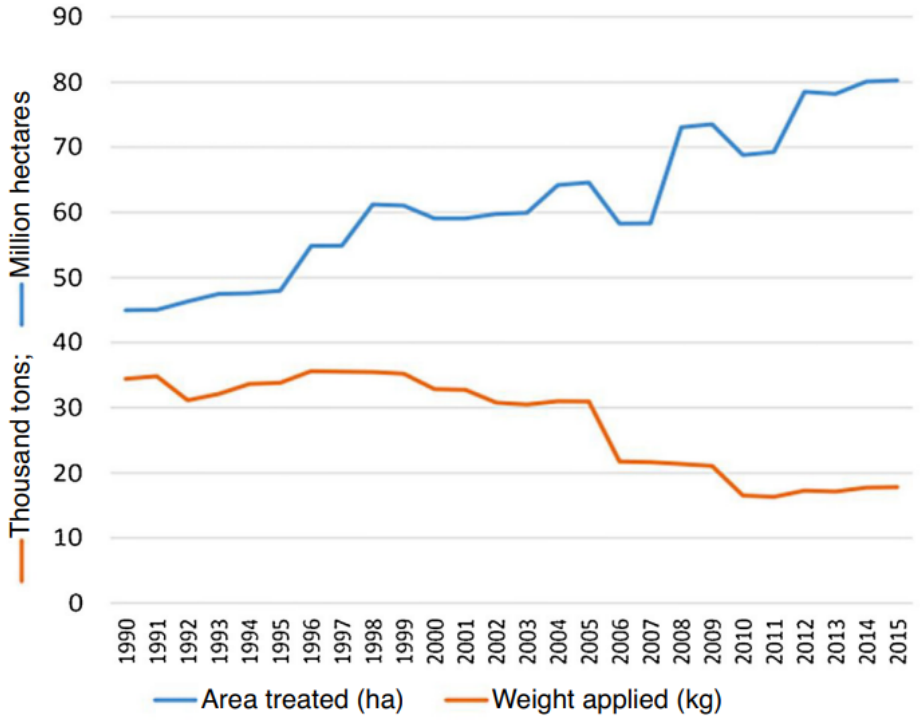
Toxicity of neonicotinoids

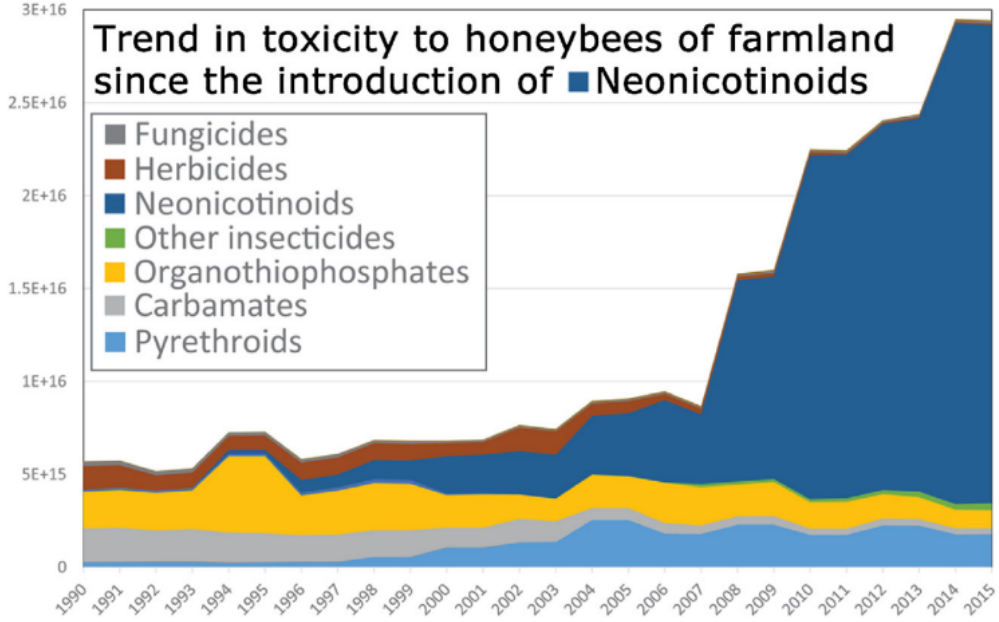
Pesticide	®	Use	LD50 (ng/honeybee)	Toxicity index relative to DDT
DDT	Dinocide	insecticide	27000	1
Amitraz	Apivar	insecticide / acaricide	12000	2
Coumaphos	Perizin	insecticide / acaricide	3000	9
Tau-fluvalinate	Apistan	insecticide / acaricide	2000	13.5
Methiocarb	Mesurol	insecticide	230	117
Carbofuran	Curater	insecticide	160	169
λ-cyhalothrin	Karate	insecticide	38	711
Deltamethrine	Decis	insecticide	10	2700
Thiamethoxam	Cruise	insecticide	5	5400
Fipronil	Regent	Insecticide	4.2	6475
Clothianidine	Poncho	Insecticide	4.0	6750
Imidacloprid	Gaucho	Insecticide	3.7	7297

Toxicity of insecticides to honeybees compared to DDT. The final column expresses the toxicity relative to DDT. (Source: Bonmatin, 2009)



Systemic = crop takes it up into its plantsap: chemical makes plant toxic from inside





DOI:10.7717/peerj.5255/fig-2 Current Opinion in Insect Science

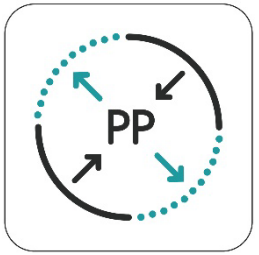
Systemic pesticides (neonics):

- **Used prophylactically**
- **Convenience pesticides**
- **Pollutants with no emission ceiling…**

# of honeybee lethal doses (LD_{50}) in pesticides applied to UK farmland 1990-2015

Three parts:

- Scope of application



- Organisation of expertise

- Participation

https://recipes-project.eu/results/guidance-future-application-precautionary-principle

two-way use of the precautionary principle

- **Compass:**
  - Guide innovation towards more societally acceptable, clean and safe directions.
  - Responsible innovation: Anticipation, reflexivity, inclusion, responsiveness (Stilgoe e.a).
- **Legal safeguard:**
  - Justify early policy or regulatory action to manage uncertain risks.
  - Appeal to prudence.

Scope of application of PP

- Precautionary action requires scientifically underpinned grounds for concern, not certainty, nor an exhaustive risk assessment.
- The use of cost-benefit analysis is of limited value in cases that require the precautionary principle
- The choice who or what gets the benefit of the doubt is a policy issue and should be made explicitly

PP not only in risk management!

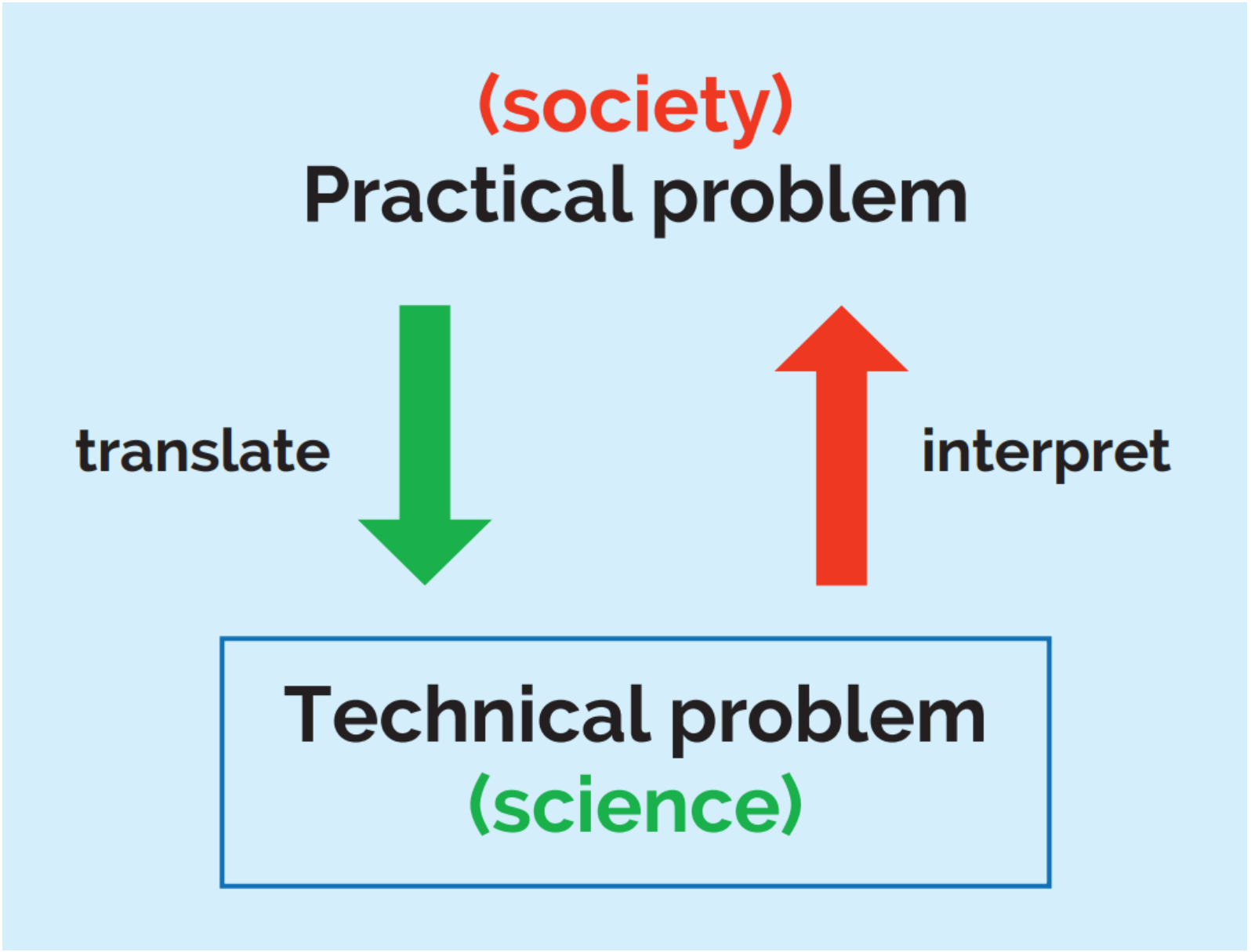
- Risk assessment needs to be well-informed by the precautionary principle
  - so that situations that require precautionary action can be detected more adequately and timely
  - well-organised and timely collection of ***actionable knowledge*** is key for dealing prudently with uncertain risks
    - Actionable knowledge for the PP includes knowledge on the **severity and nature** of potential adverse effects, the nature of the **uncertainties** on **risks and proclaimed benefits**, knowledge **gaps**, knowledge on **alternatives**.
  - Pluralization of expert knowledge in scientific assessment: **engage wider range of knowledge holders**

Uncertainty

- Policy makers should require that risk assessment includes systematic and transparent appraisal of scientific uncertainties, knowledge gaps and ignorance.
- Explicit and transparent problem scoping
  - What are relevant aspects of the problem?
  - Set problem boundaries wide enough to include the concerns of those affected by the risks and the risk regulation.

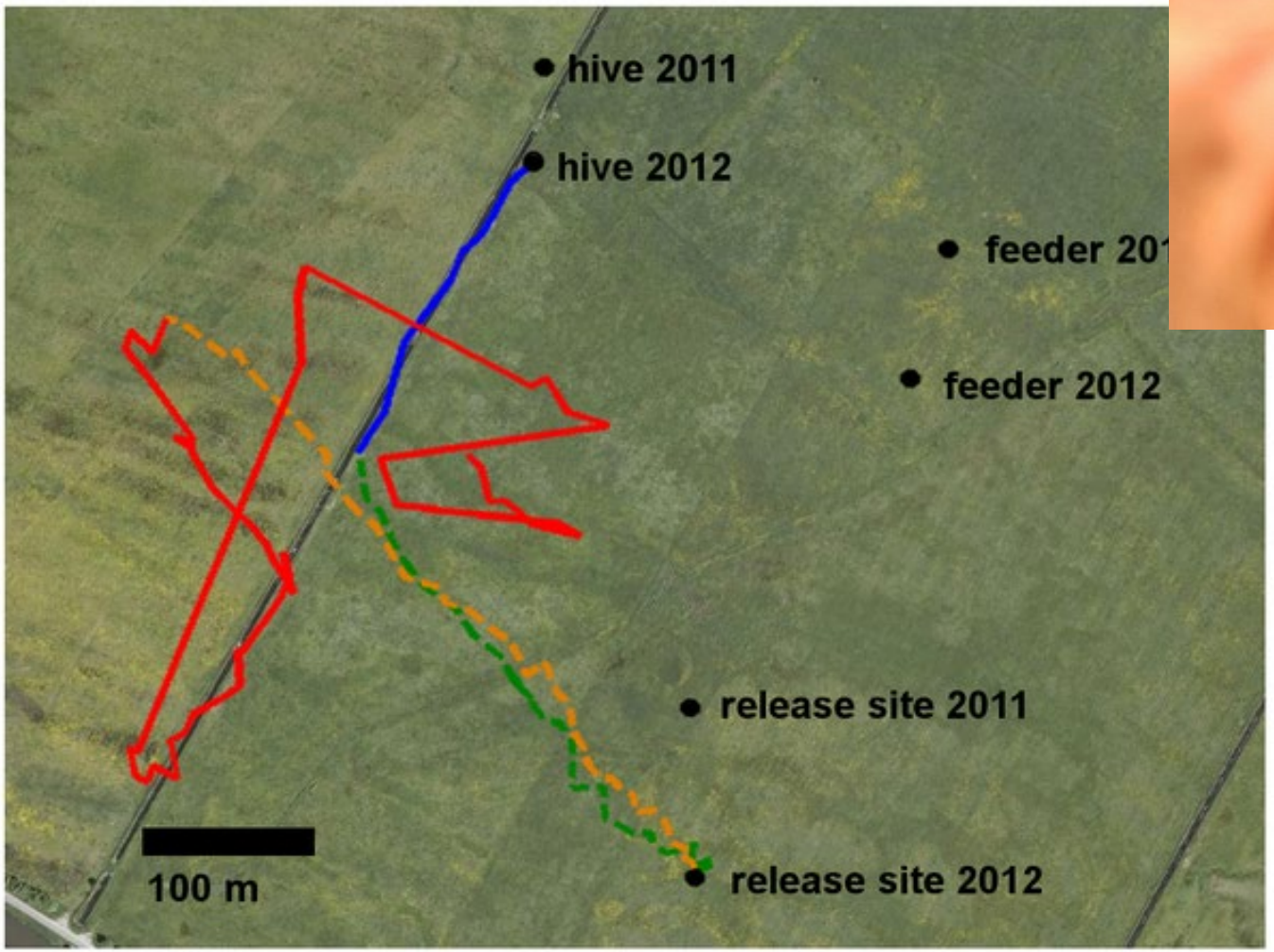
risk assessment must be open to ‘non-standard’ knowledge

- Blind spots in overly reductionist risk assessment protocols.
- Overly specific protection goals can undermine PP
- Knowledge that do not fit in such protocols (e.g. knowledge regarding end-points not covered by the protocols) is often downplayed, marginalised or ignored.
- Too often, it is necessary that coalitions of concerned scientists and societal actors step in and ‘break the script’ of routinised assessment and management processes in order to recognise key uncertainties and potential harm.



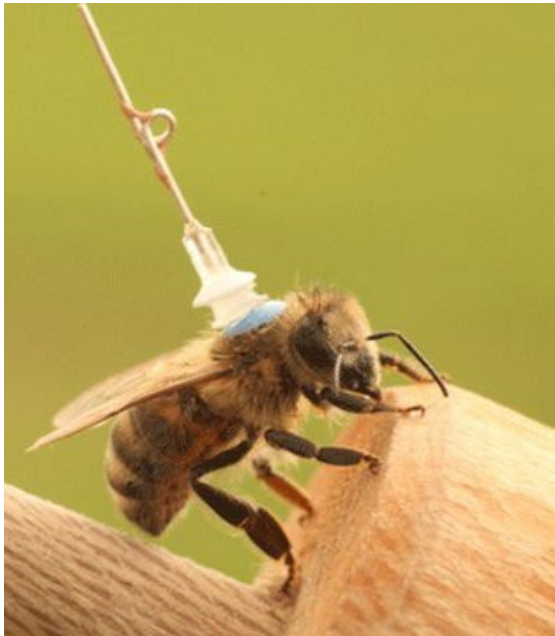
Ravetz, J., 1971, Scientific Knowledge and its Social Problems, Oxford University Press.

Radar-tracking experiment Randolf Menzel:
Bees exposed to neonicotinoids loose orientation



Yellow-Red
Thiacloprid-bees

Green-Blue
Control bees



Fischer J, Müller T, Spatz A-K, Greggers U, et al. (2014) Neonicotinoids Interfere with Specific Components of Navigation in Honeybees. PLoS ONE 9(3): e91364. doi:10.1371/journal.pone.0091364
http://www.plosone.org/article/info:doi/10.1371/journal.pone.0091364

PLOS | ONE

Application of PP requires participatory processes

- Rationales: Normative, Substantive, Instrumental
- Should aim for the meta-criteria of fairness and competence
- Conflicts of values, knowledge, and interests need to be managed better
- Transparency
- Power asymmetries should be addressed

RECIPES conference
11 May Brussels & Online

- **“Precaution for responsible innovation: New options to move forward”.**

https://recipes-project.eu/events/precaution-responsible-innovation-new-options-move-forward

- RECIPES Guidance:

https://recipes-project.eu/results/guidance-future-application-precautionary-principle

Further reading

- Pollinator conservation requires a stronger and broader application of the precautionary principle

https://doi.org/10.1016/j.cois.2021.04.005

- Halting the pollinator crisis requires entomologists to step up and assume their societal responsibilities

https://doi.org/10.1016/j.cois.2021.08.004