



HAL
open science

Biodiversity and health as a framework for assessing pesticides in agriculture

Marc Deconchat, Fabrice H.F. Pierre

► **To cite this version:**

Marc Deconchat, Fabrice H.F. Pierre. Biodiversity and health as a framework for assessing pesticides in agriculture. Transformative Changes for Biodiversity and Health, Alternet, Jun 2022, Ghent (BE), Belgium. hal-04161518

HAL Id: hal-04161518

<https://hal.inrae.fr/hal-04161518>

Submitted on 13 Jul 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

➤ Biodiversity and health as a framework for assessing pesticides in agriculture

Marc Deconchat (INRAE Biosefair, France),
Fabrice Pierre (INRAE Syalsa, France)



INRAE

➤ Pesticides : useful and dangerous?

- The use of pesticides in agriculture is part of the agricultural practices that aim to ensure sufficient quantity and quality of food products.
- They influence organisms antagonistic to agricultural production, by reducing their populations and their impacts.
- They also disrupt populations of pest control organisms.
- Through their actions, pesticides can have direct and indirect unwanted effects on human health and the environment.
- The advantages and disadvantages of pesticides are assessed within the regulatory framework



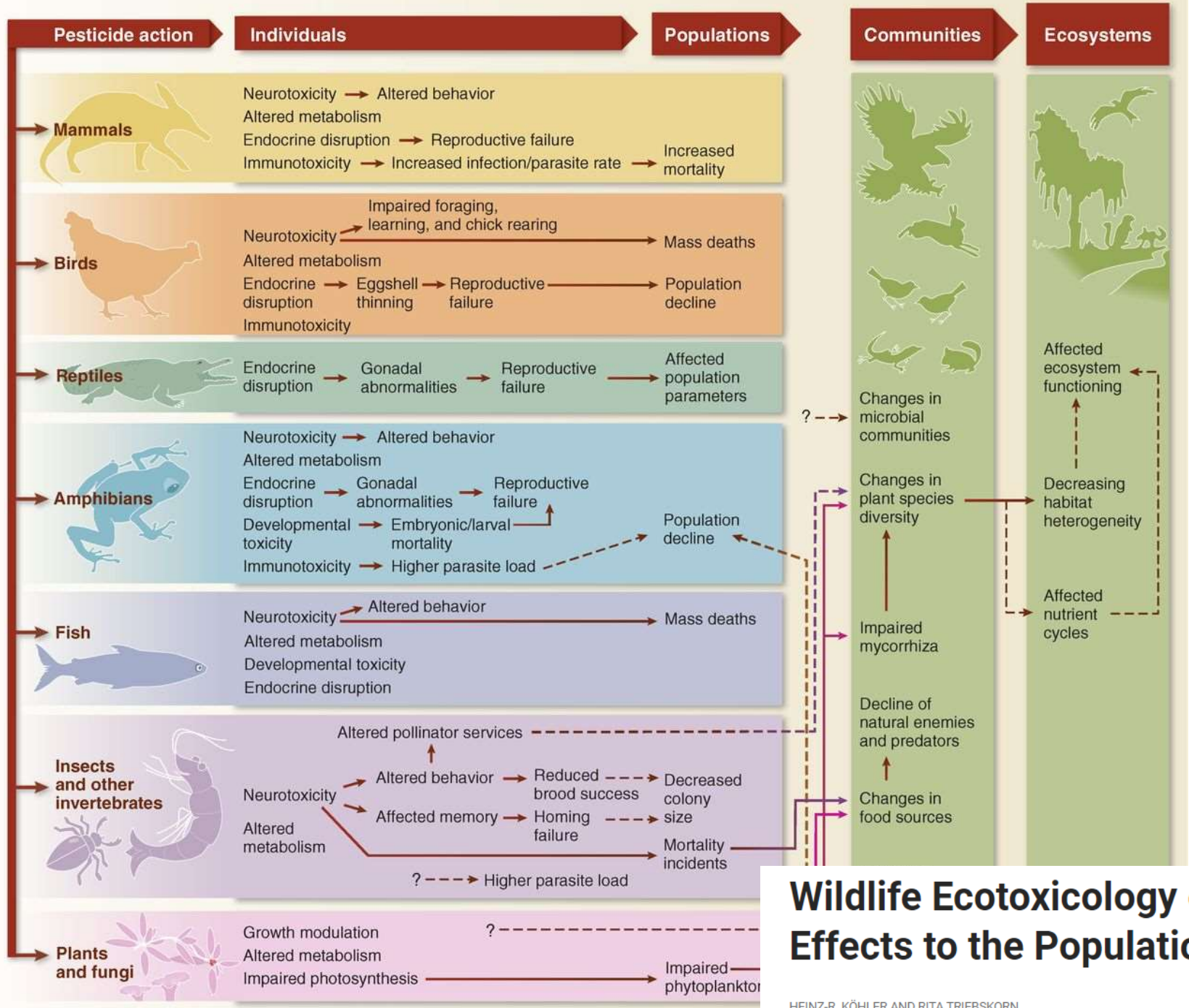
➤ Biodiversity under evaluated

But the effects on biodiversity are poorly assessed due to their complexity

- Direct effects linked to exposure (incidental contact with pesticides)
- Effects linked to 'cocktails' of different molecules
- Indirect effects related to population changes of other species, including pests

While biodiversity can also contribute to ensuring levels of agricultural production (via crop pest predators) and influence human health







Wildlife Ecotoxicology of Pesticides: Can We Track Effects to the Population Level and Beyond?

➤ How can we better assess the multiple effects of pesticides on biodiversity in order to adjust their use for a better agricultural production and a healthier environment?



Policy Brief | [Open Access](#) | [Published: 03 April 2019](#)

Future pesticide risk assessment: narrowing the gap between intention and reality

[Ralf B. Schäfer](#) , [Matthias Liess](#), [Rolf Altenburger](#), [Juliane Filser](#), [Henner Hollert](#), [Martina Roß-Nickoll](#), [Andreas Schäffer](#)  & [Martin Scheringer](#)



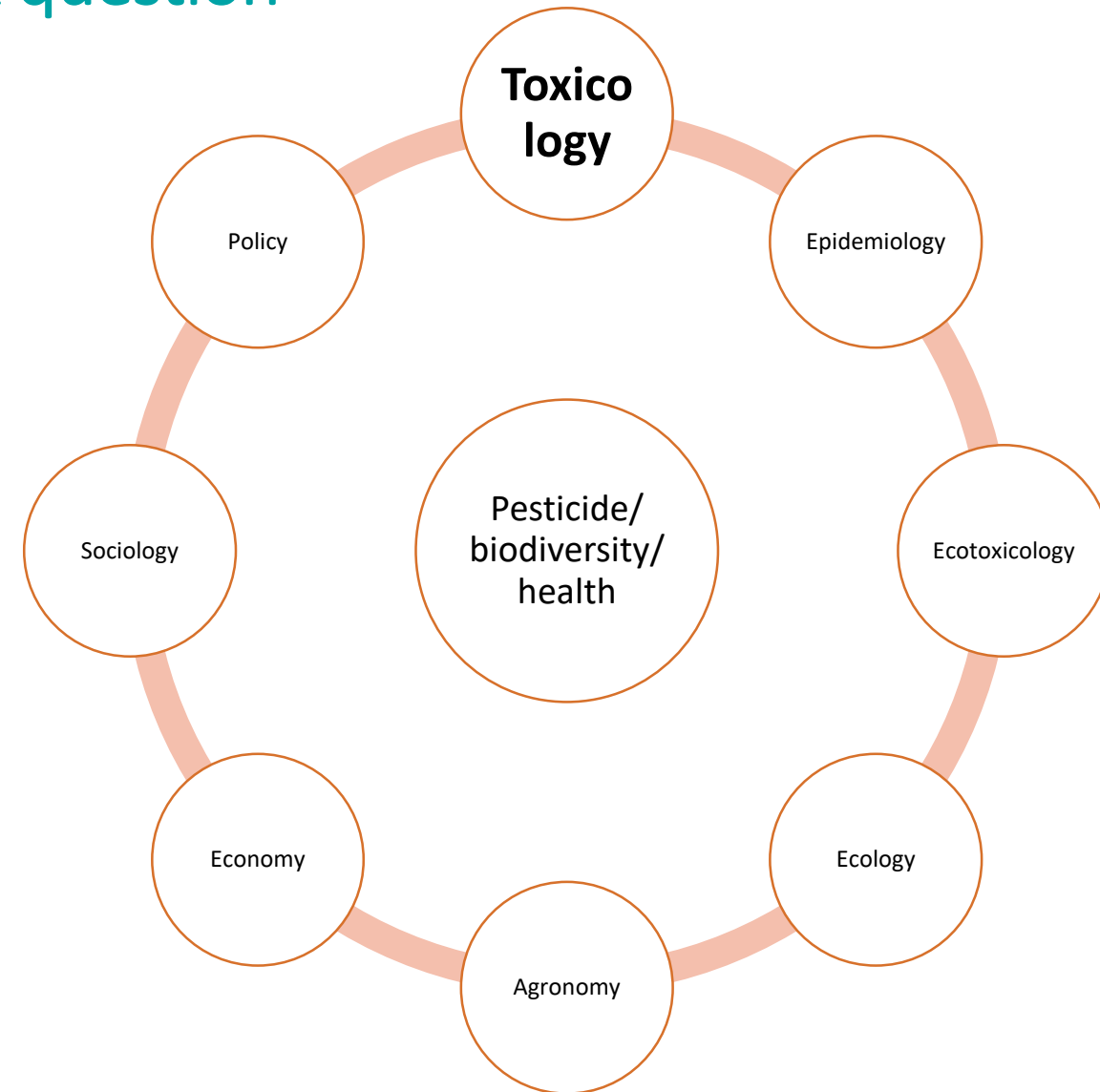
INRAE

Biodiversity and health as a framework for assessing pesticide
14-06-2022 / Alternet (Gent) / Deconchat Marc & Pierre Fab

➤ Difficulties to tackle such a complex question

- A complex and wide-ranging issue with compartmentalised approaches
 - Toxicology: effect of pesticides on human beings
 - Mostly in controlled conditions
 - Epidemiology: effect of pesticides on human health in real conditions
 - Few spatialised information
 - Ecotoxicology : effect of pesticides on non-human populations
 - Little information mobilised on the links between species and their own dynamics
 - Ecology: Dynamics of biodiversity
 - Little consideration given to the diversity and level of exposure to pesticides
 - Agronomy: practices and production
 - Homogeneity rather than diversity
 - Economy: incomes, costs and benefits
 - Difficulty to estimate indirect effects
 - Sociology: how people think
 - A matter of ethics

How can we get the scientific communities to work together?



➤ Science design



- INRAE has all the necessary skills
- But they are not used to work together: how to promote a high level interdisciplinarity?
 - More than another « 4 years multidisciplinary research project »
- To build an internal research program able to open new perspectives
 1. To gather scientific communities
 2. To share knowledge, methods, questions
 3. To build a (or several) shared **conceptual framework(s)**
 4. To identify key questions
 5. To propose new research projects



INRAE

➤ Our question for Alternet is:



Do you know any other similar program with similar objectives about pesticides/biodiversity/health relationships?

• If yes: contact us, please...



INRAE

➤ Innovation and collaborative design



https://www6.inrae.fr/ideas-agrifood_eng/

- IDEAS works on the creative and reasoning processes surrounding design, to simultaneously generate innovation-related knowledge and concepts
- A broad picture of the questions (2p)
- Information and call for interest
- Interdisciplinary workshop (INRAE and invited scientists)
 - Identify 3-5 groups (consortia) ready to investigate parts of the questions
- 3-5 workshops organized by consortia to share knowledge and to build concepts
- 1-2 research projects (2024)



INRAE

➤ Framing

- Address the diversity of organisms and their interactions with the diversity of pesticides and usage practices.
 - Develop a systemic approach taking into account these diversities
- In the conceptual framework of One health
 - Human health
 - Plant/crop health
 - Animal/livestock health
 - Health of the environment and its components (soil, water, air)



➤ Questions to fuel imagination/innovation

- Some ideas:

- How can we characterise (map) the exposure of biodiversity components to pesticides in and around crops?
- Which data are needed to study the direct and indirect effects of pesticides on biodiversity?
- How can health concepts help to better account for the overall effects of pesticides and their uses on biodiversity?
- How to account for joint effects on human health and biodiversity?
- How to account for Benefit/risk and cost/benefit assessment of pesticide use by integrating effects on biodiversity and effects on human health?



Comments, ideas, questions?

➤ Thank you

