



**biodiversa+**

European Biodiversity Partnership

## **Biodiversa+ Final conference for the research projects under BiodivHealth Call**

**“Biodiversity and its influence on  
animal, human and plant health”**

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Online, public – 28 November 2024

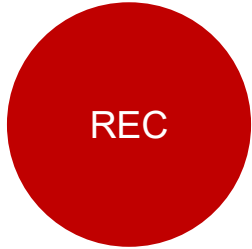
<https://www.biodiversa.eu/2019/10/07/2018-2019-joint-call/>



# Welcome words & presentation of the objectives of the meeting

*by Sophie Germann, ANR, BiodivHealth Call Secretariat & Biodiversa+ operational manager for biodiversity monitoring and research*

# Some general information



- This meeting is being recorded  
→ The recording and slides will be shared on the Biodiversa+ website  [biodiversa.eu](https://biodiversa.eu)

- We expect...



- Coordinators & consortia members of the BiodivHealth funded projects
- Biodiversa Partners (incl. funding organisations)
- Representatives from the European Commission
- Representatives of the Biodiversa+ Advisory Board & Enlarged Stakeholder Board
- Scientists, experts & policy makers interested in this field
- Etc.

## Objectives of this conference

- To **give a flavour** of what is going on within Biodiversa(+), this Call & this topic
- To **discover** the major research results of the 10 research projects funded under this Biodiversa Call
- To **learn** more on the developed products (video, policy briefs) to transfer knowledge and disseminate their results
- To **discuss** around this important topic: biodiversity & health!



# Agenda

- **09:00 – 10:00 INTRODUCTION SESSION**
- **10:00 – 10:40 FUNDED PROJECTS PRESENTATION SESSION 1**

*10:40 – 10:55 Virtual break*

- **10:55 – 11:35 FUNDED PROJECTS PRESENTATION SESSION 2**
- **11:35 – 12:10 FUNDED PROJECTS PRESENTATION SESSION 3 - TWO COVID-RELATED PROJECTS**
- **12:10 – 12:55 FOSTERING POLICY IMPACT**

# Introduction

## **Biodiversa+ general objectives and specificities to support research & BiodivHealth Call Overview**

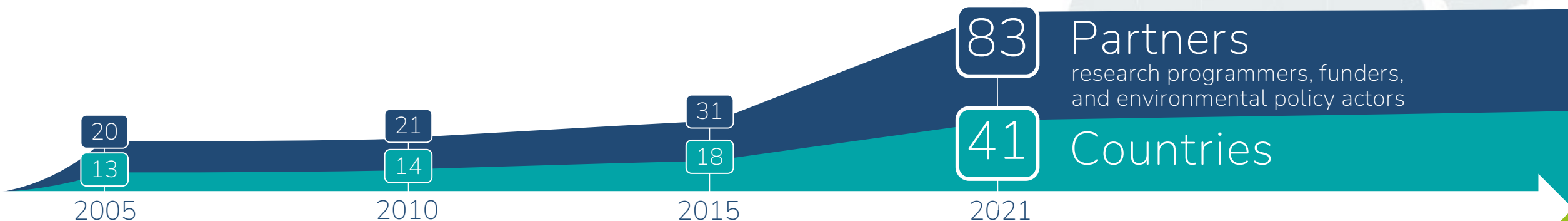
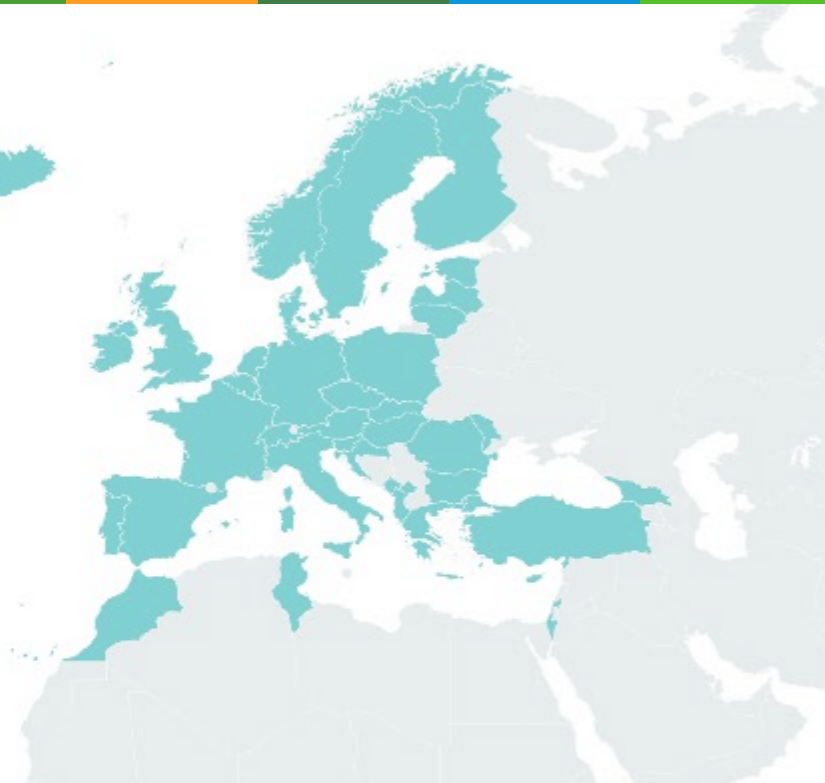
*by Magnus Tannerfeldt, FORMAS, Biodiversa+ co-Chair*



# biodiversa+

European Biodiversity Partnership

*Supporting excellent biodiversity research  
with an impact for policy and society*



BiodivERsA 1

BiodivERsA 2

BiodivERsA 3

Biodiversa+

# Biodiversa+ is a network of national partners



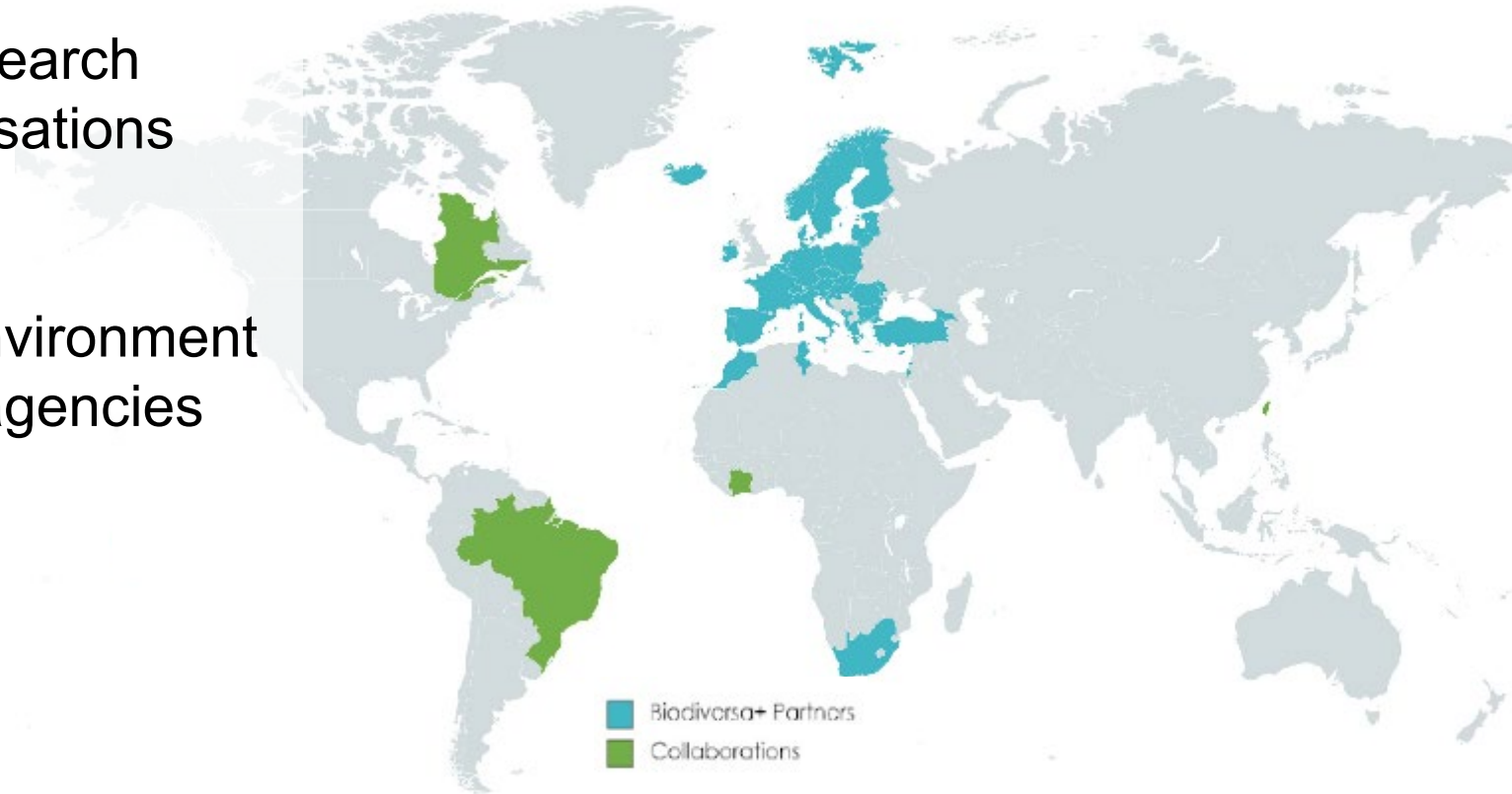
## Research actors

- Ministries in charge of research
- Research funding organisations



## Policy actors

- Ministries in charge of environment
- Environment protection agencies



Support Research & Innovation

6

CALLS PLANNED  
OVER 7 YEARS

CA. 30

PROJECTS  
FUNDED PER  
CALL

>40  
MIO€  
EACH



biodiversa+  
European Biodiversity Partnership

Enhance  
global  
impact



Protecting &  
restoring  
biodiversity

Improving  
transnational  
monitoring



Harmonise  
monitoring  
schemes

Promoting  
Nature-based  
Solutions

Supporting  
transformative  
change

Interface  
with policy  
and practice



Promote  
Nature-based Solutions  
& business valuation

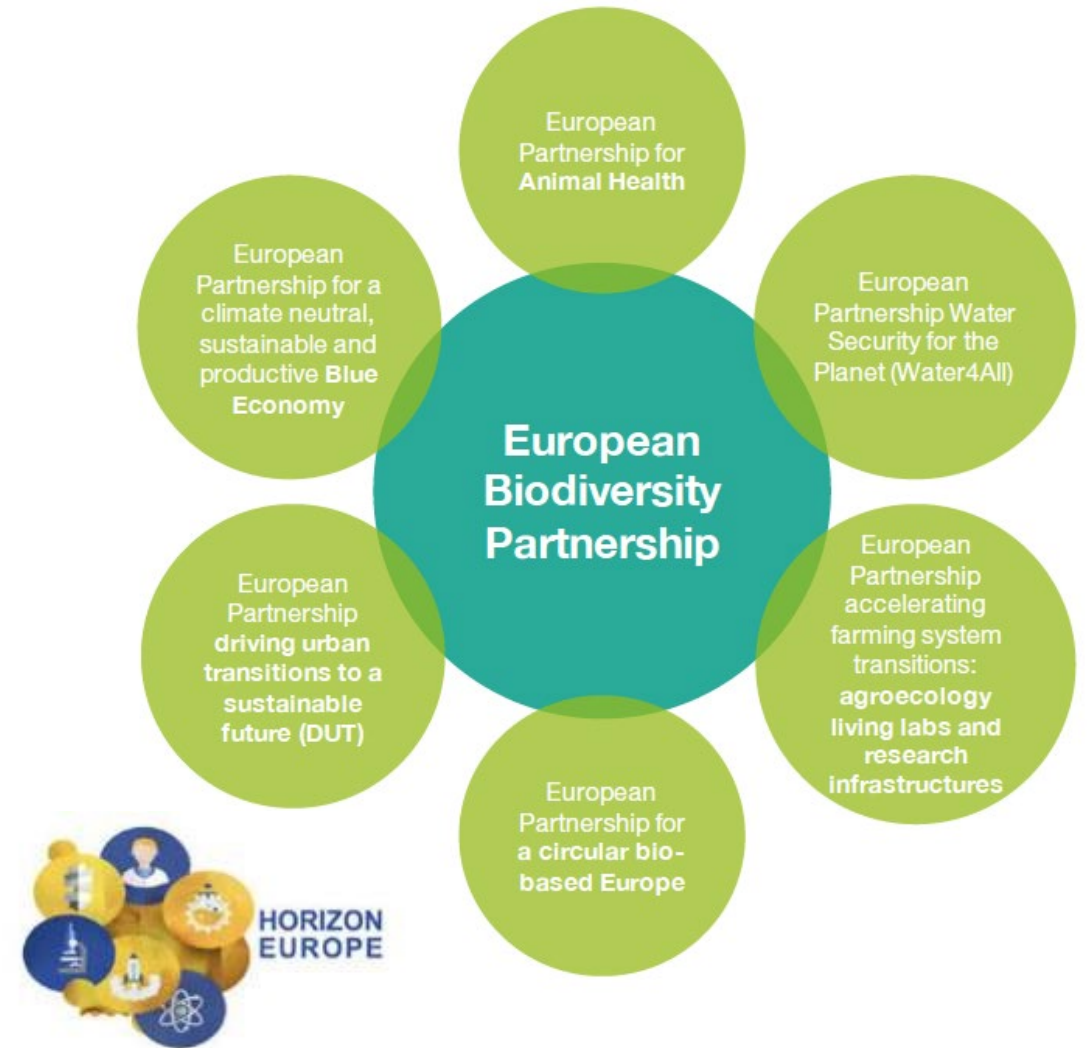




# Cooperating with European and global initiatives



... and many more!



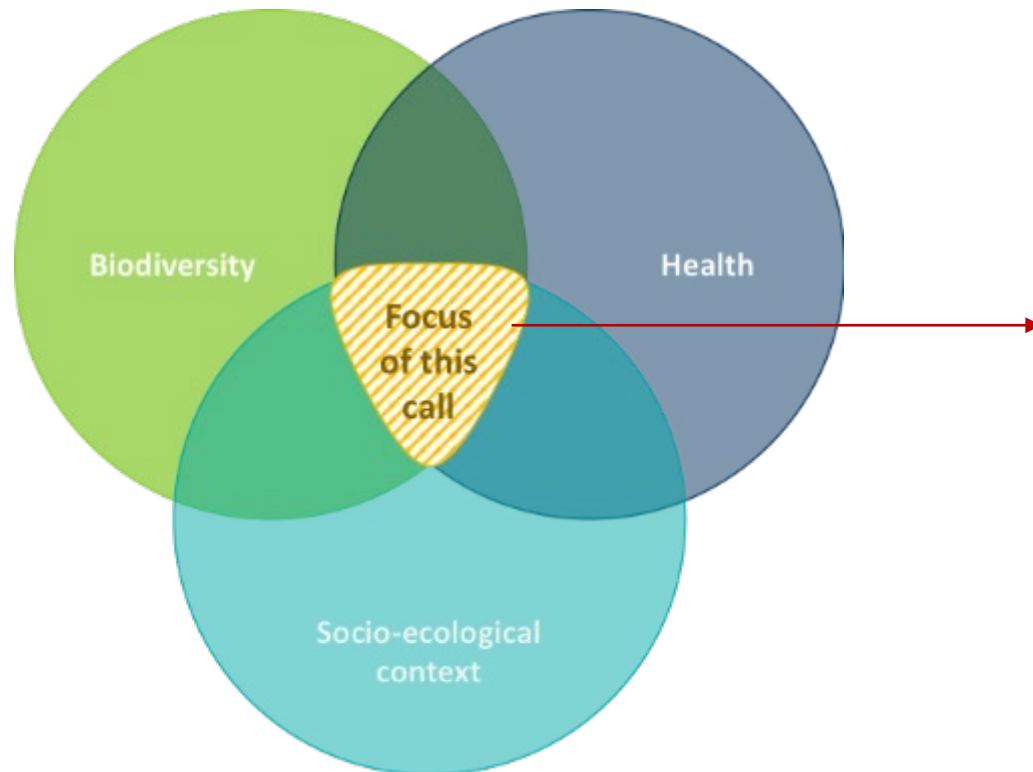
# BiodivHealth 2018-2019 Call

- Important topic identified by Biodiversa Partners a long time ago, as biodiversity underpins human's physical, mental and emotional health and provides medical resources
- From our side a fairly new & challenging topic: studying the **nexus between biodiversity and health**
- Included new action to support **synthesis research projects** (in addition to classic collaborative research projects)
- A **timely call** as the pandemic reminded us of the need to better understand the emergence of zoonoses and to develop science-driven policies in the field to move health strategies from reaction to more anticipation





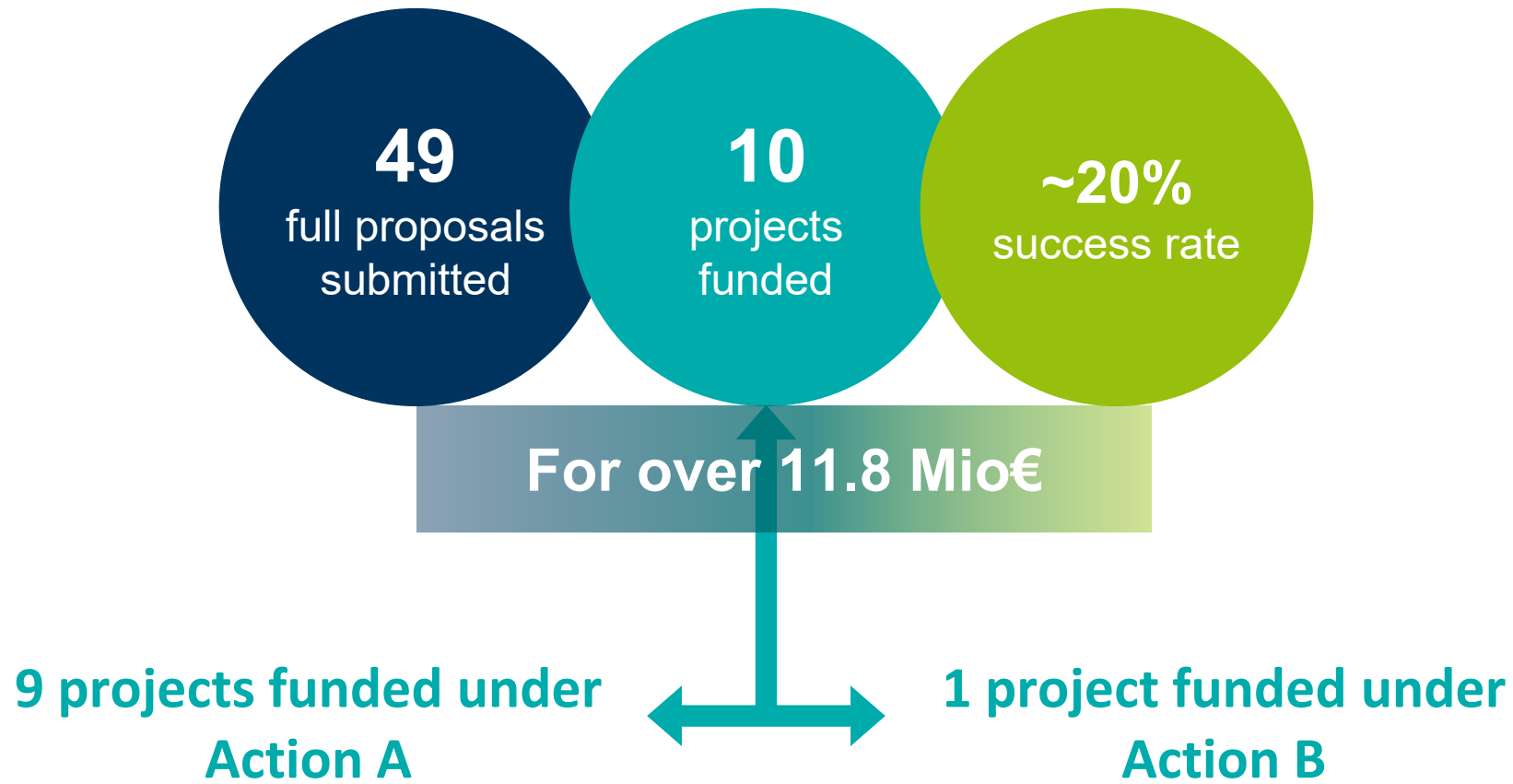
# A call to **support transnational research projects at the nexus of biodiversity and health** and properly taking into account socio-ecological contexts



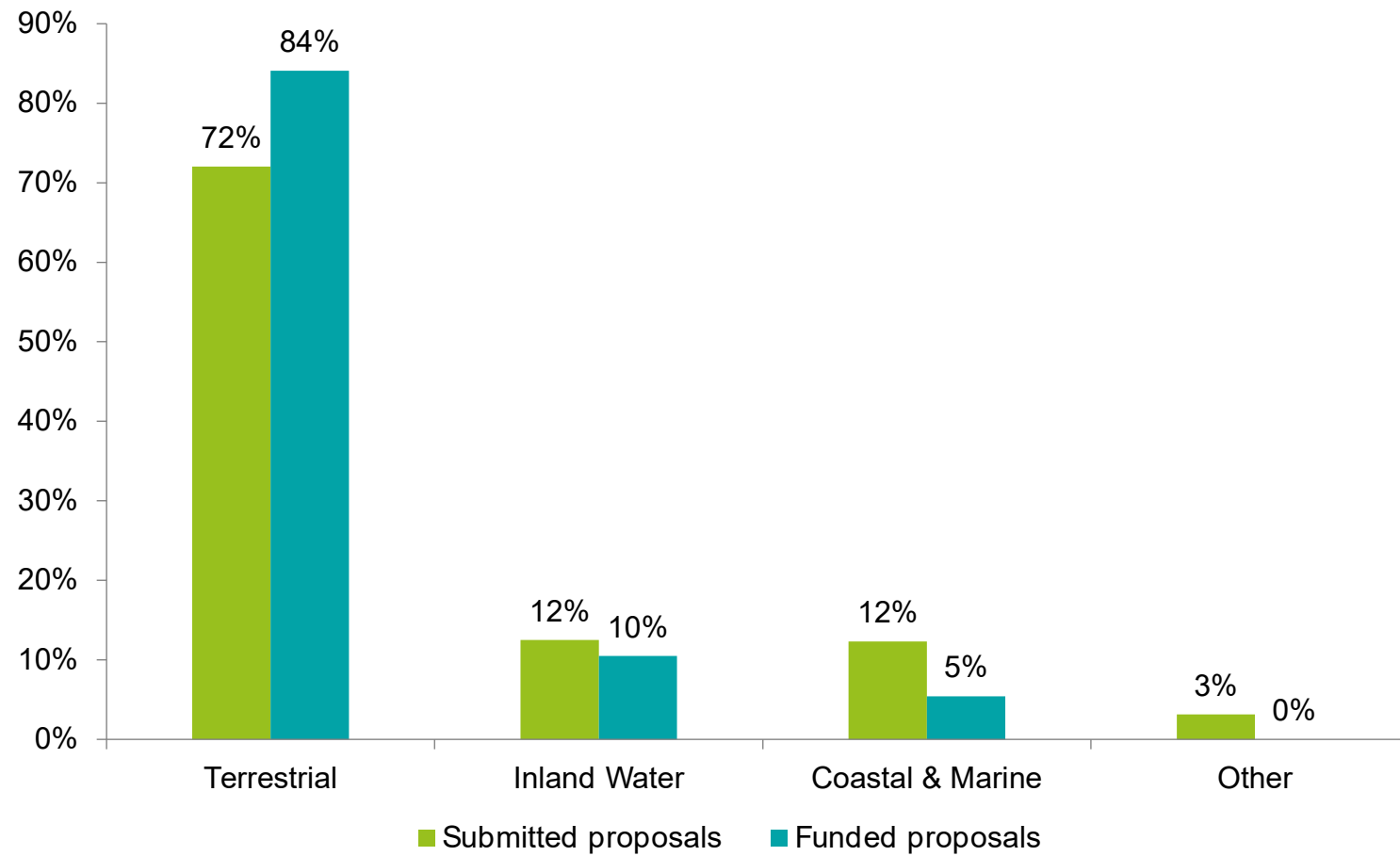
## 2 TYPES OF PROJECTS FUNDED

- **ACTION A: classic collaborative research projects** producing new primary data to generate new knowledge
- **ACTION B: Synthesis research projects** generating new knowledge using existing data

# Overview of the results of the Call



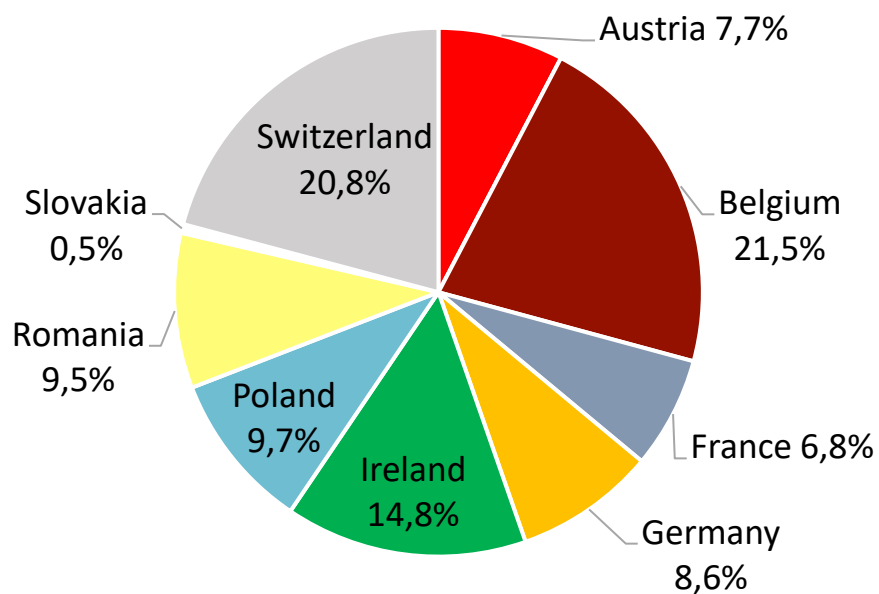
## Studied environments



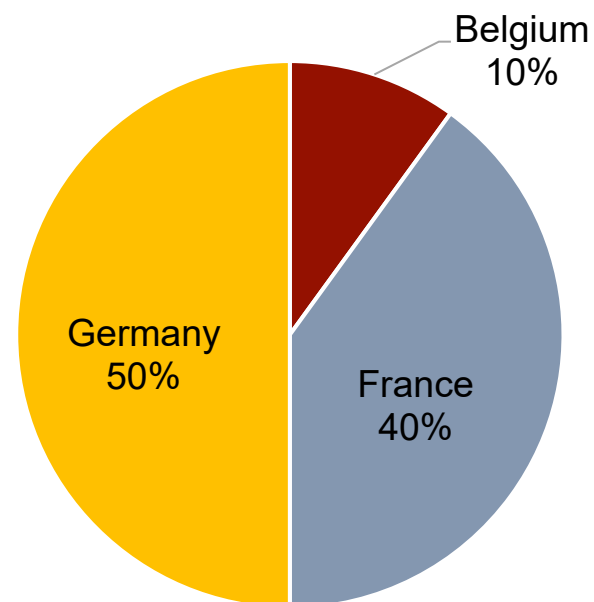
## Origin of applicants

### Awarded budget to successful projects

(value normalised by community size)



### Coordination of funded projects



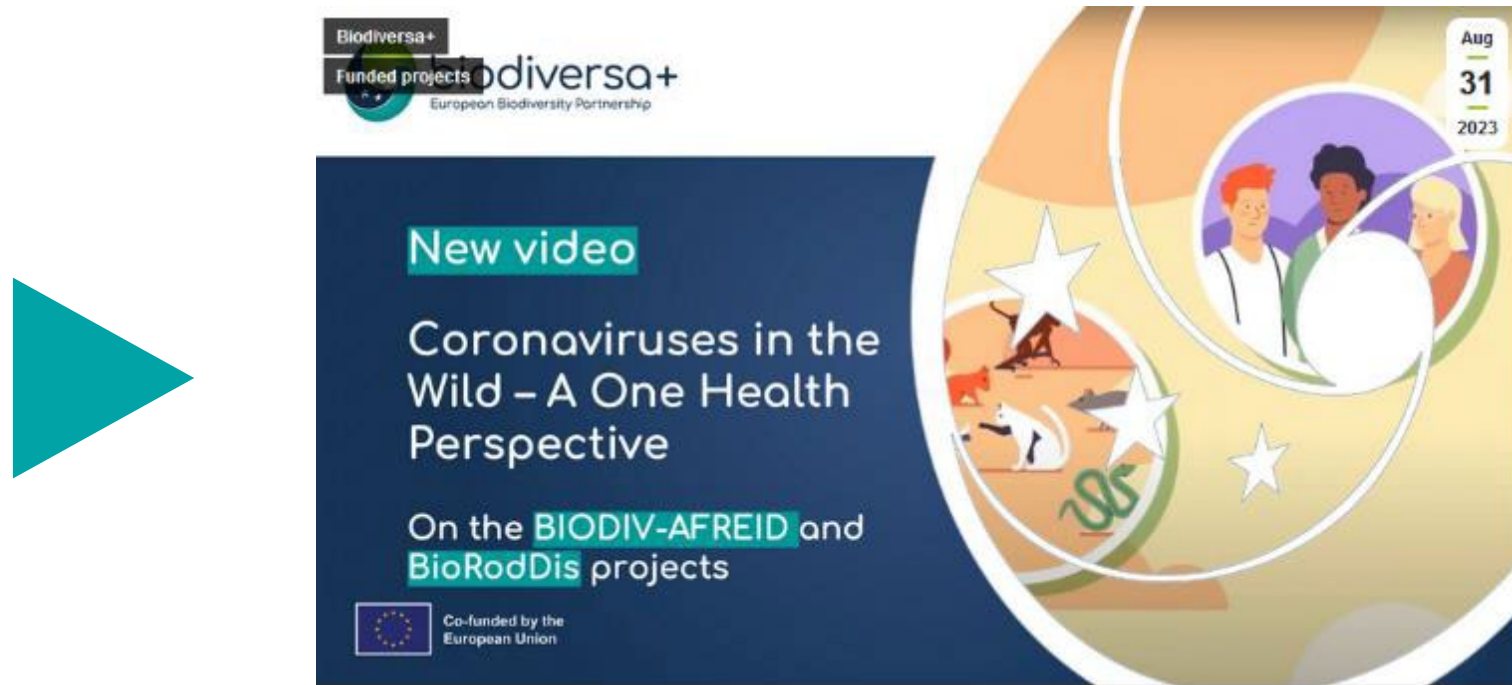
# More information on the Call



**More information on the call  
process & figures in the  
BiodivHealth call catalogue**

➤ **You can download it from the  
Biodiversa website:  
<http://www.biodiversa.org/1757/download>**

Last year a video was produced



Video available here:

<https://www.biodiversa.eu/2023/08/31/coronaviruses-in-the-wild-a-one-health-perspective/>



An interview & watching of the video during this conference

Last year, a webinar on strengthening collaboration with the Convention on Biological Diversity (CBD) and other Multilateral Environmental Agreements (MEAs)



Recording and slides available here:

<https://www.biodiversa.eu/2023/07/03/watch-the-recording-strengthening-collaboration-for-biodiversity-conservation/>



# Very recently, 3 produced policy briefs



Policy briefs available here:  
<https://www.biodiversa.eu/actionable-knowledge/policy-briefs/>



A dedicated session during this conference

## The success of the Call was possible thanks to :

- ✓ The Biodiversa team, Call Secretariat (ANR, FRB, NCN & TAGEM)
  - ✓ The funding organisations
  - ✓ The European Commission
  - ✓ The Evaluation Committee
- ✓ The consortia of the funded projects
- **A GREAT THANKS TO ALL!!**

# Introduction

## European Commission welcome words

*by Karin Zaunberger, International relations officer, DG ENV*



# biodiversity and health final conference for the research projects under BiodivHealth Call

Karin ZAUNBERGER  
European Commission, DG Environment, International Relations Officer



# Connecting Global Priorities: Biodiversity and Human Health

*A State of Knowledge Review*



## **COP 12**

Decision XII/21 Biodiversity and Human Health (Full decision)

**The first full decision on biodiversity and human health, under the joint work programme with the World Health Organization was concluded at the 12th Conference of the Parties, held in November 2014 in Pyeongchang, South Korea.**

## **COP 15/29**

Biodiversity and Human Health (Full decision)  
Latest decision on biodiversity and health adopted at the 15th Conference of the Parties held in December 2022 in Montreal, Canada.

## **COP 14/4**

Biodiversity and Human Health (Full decision)  
Latest decision on biodiversity and health adopted at the 14th Conference of the Parties held in November 2018 in Sharm el-Sheikh, Egypt.

For further updates see also the (COP 14 biodiversity and health website)

## **COP 13/6**

Biodiversity and Human Health (Full decision)  
The second full decision on biodiversity and health was concluded at the 13th Conference of the Parties held in December 2016 in Cancun, Mexico.

# WHO Manifesto for a healthy recovery from COVID-19 (26 May 2020)

## Prescriptions for a healthy and green recovery from COVID-19

....

### 1) ***Protect and preserve the source of human health: Nature***

*Economies are a product of healthy human societies, which in turn rely on the natural environment - the original source of all clean air, water, and food. Human pressures, from deforestation, to intensive and polluting agricultural practices, to unsafe management and consumption of wildlife, undermine these services. They also increase the risk of emerging infectious diseases in humans – over 60% of which originate from animals, mainly from wildlife. Overall plans for post-COVID-19 recovery and specifically plans to reduce the risk of future epidemics, need to go further upstream than early detection and control of disease outbreaks. They also need to lessen our impact on the environment, so as to reduce the risk at source.*

...

# Global Action Plan on Biodiversity & Health adopted at CBD COP16 Cali

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- *includes a set of **voluntary actions that can be implemented at various levels and on different scales**, from international to national and local and from multisectoral to sector-specific, with cross-sectoral collaboration at the governmental level, and that allow for the **participation** of civil society, indigenous peoples and local communities, women, children, youth, the elderly and people with disabilities, as well as academia and the private and financial sectors, among others. In view of the cross-cutting nature of biodiversity and health interlinkages, other multilateral instruments and processes should also be considered when implementing the Plan, in a consistent manner with relevant international obligations.*



**COP16**  
**COLOMBIA**  
Paz con la Naturaleza



# **Keynote speech**

## **Biodiversity & Health: One Health system challenges**

*by Hans Keune, Chair Care and the Natural Living Environment, University of Antwerp*

# Biodiversity & Health: One Health system challenges

20241128 BiodivHealth Final Conference



- Hans Keune
- *Thanks to many*



Provincie  
Antwerpen



Chair Care and the  
natural living environment  
Universiteit Antwerpen

<https://www.uantwerpen.be/en/chairs/care-and-natural-living-environment/>

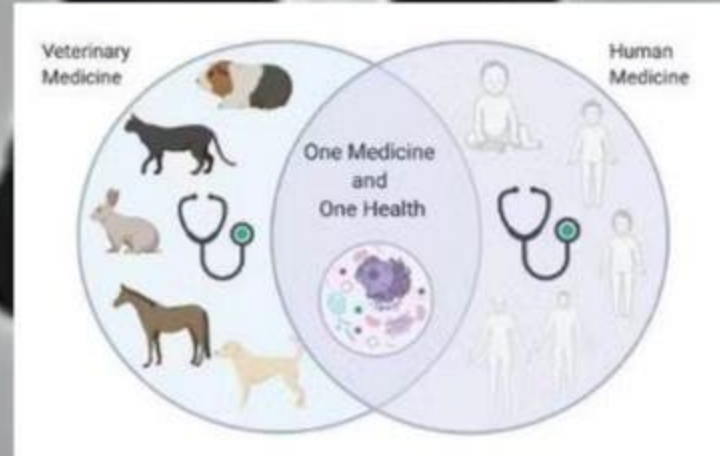
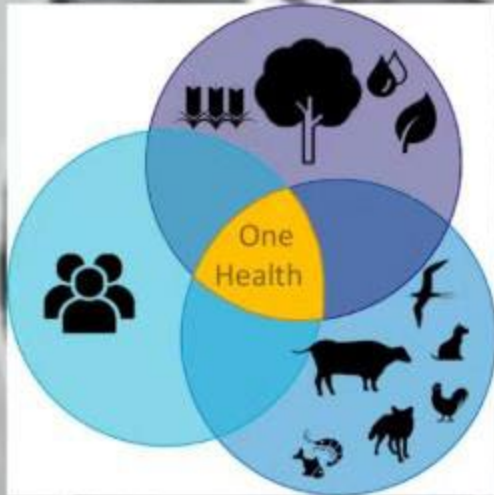


*Who  
is  
One  
Health?*



# My name is One Health

GAME  
SHOW





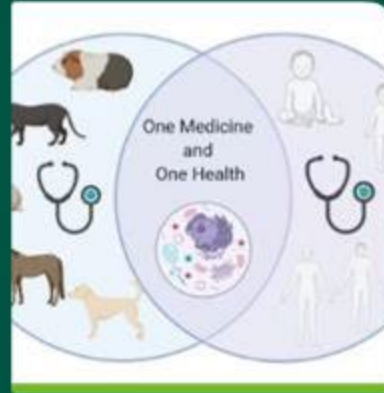
# Who is One Health?

13



Option 1

0



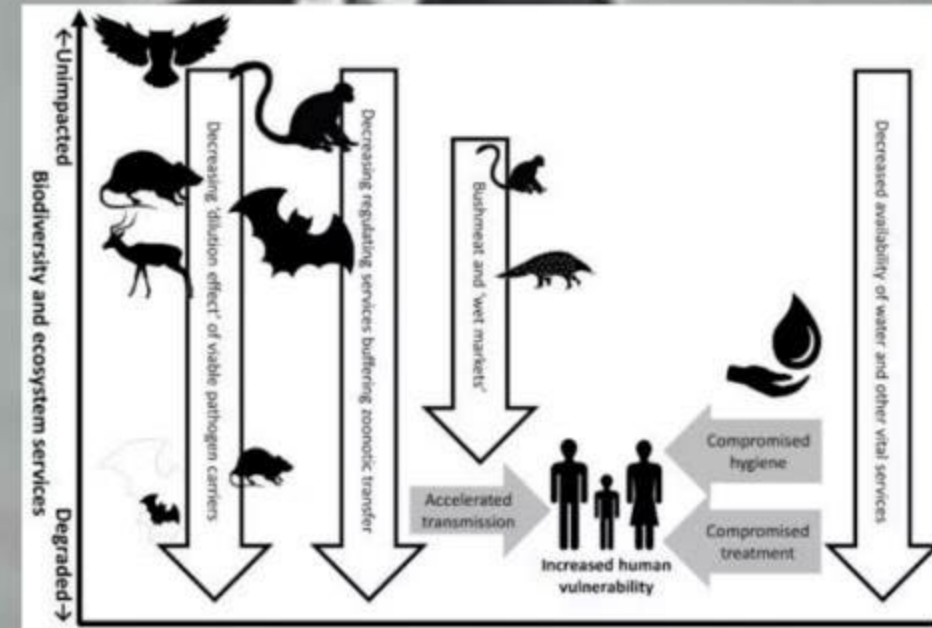
Option 2

28



Option 3

# My name is One Health





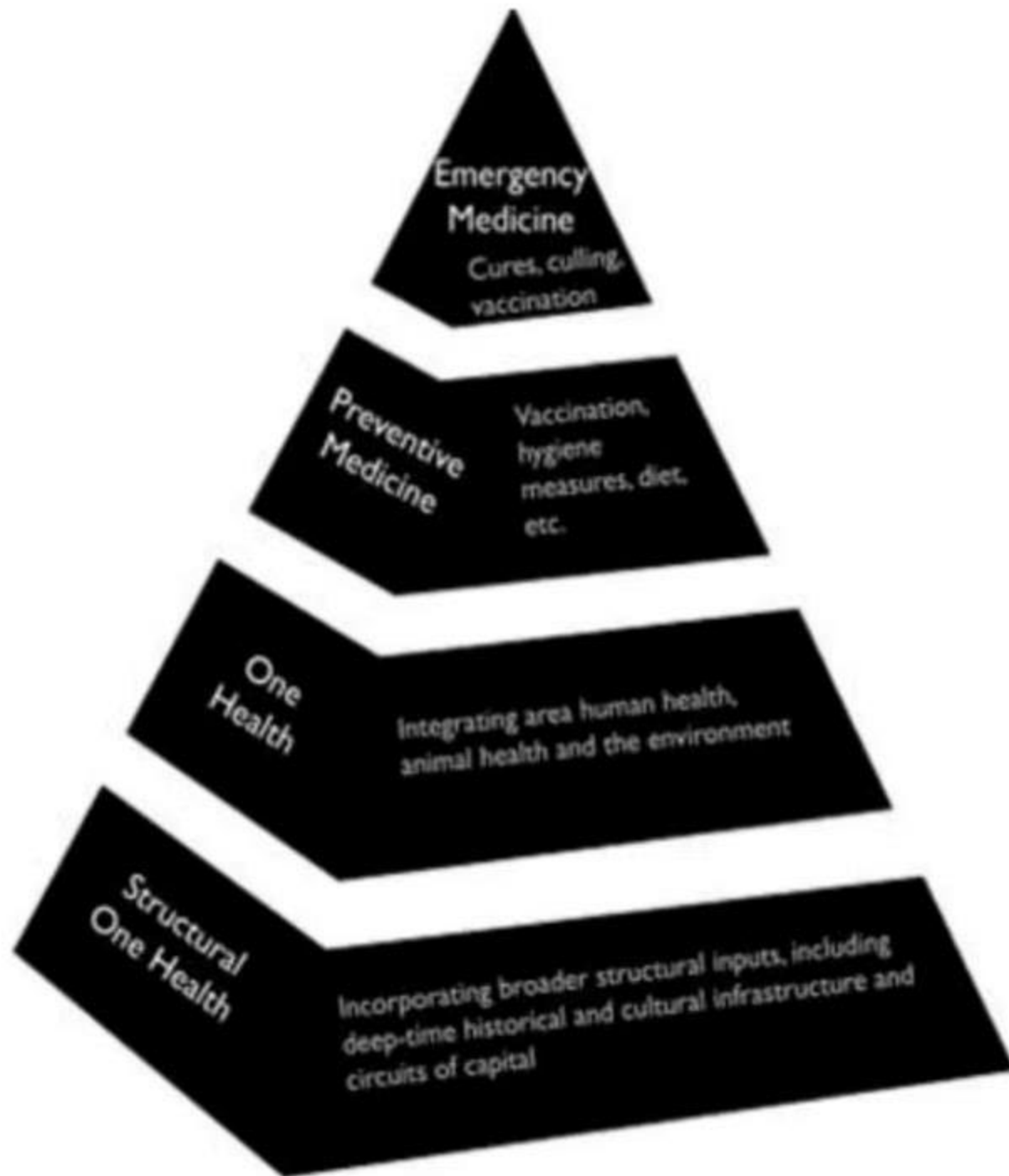


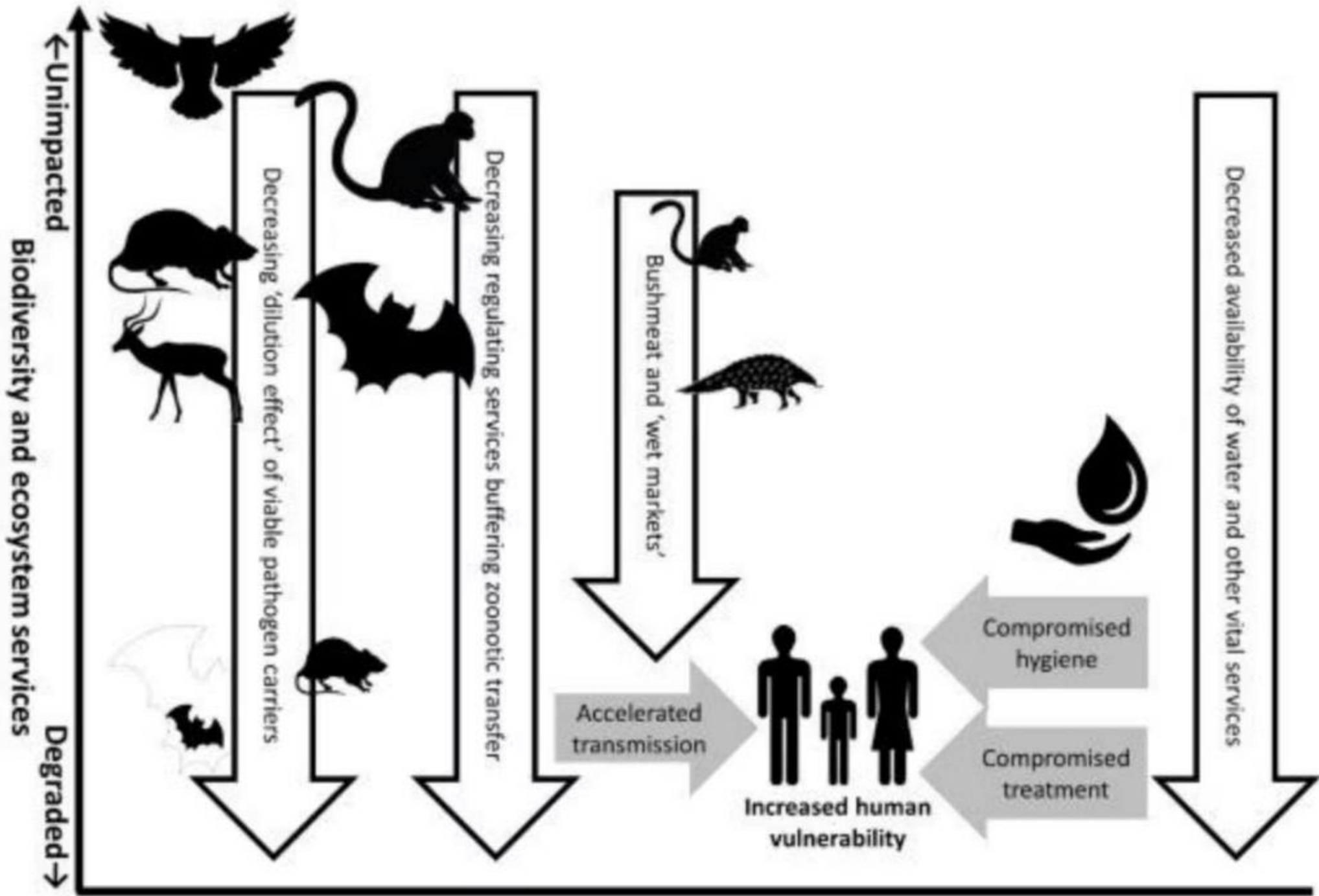
# "Nature is potentially the worst bioterrorist," says Anthony Fauci

BY CLARE HYMES

SEPTEMBER 26, 2018 / 5:50 AM / CBS NEWS







# Who is One Health?

2



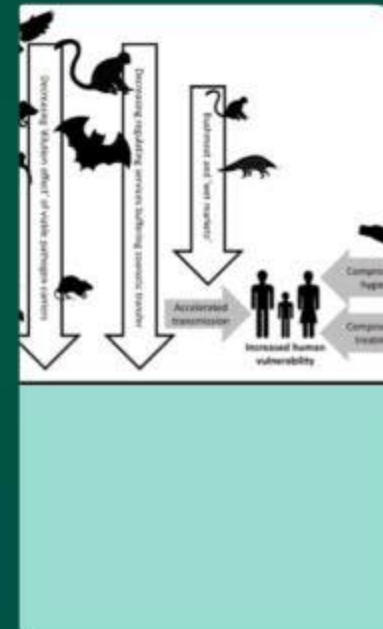
Option 1

13



Option 2

20



Option 3



## 5 - One Health and Biodiversity

from Part III - Cross-Cutting Issues Central to Transformative Biodiversity Governance

Published online by Cambridge University Press: 26 May 2022

By Hans Keune, Unnikrishnan Payyappallimana, Serge Morand and Simon R. Rüegg

Edited by Ingrid J. Visseren-Hamakers and Marcel T. J. Kok

Show author details

### One Health challenges

Generic transformative governance challenges	One Health challenges			
	1. Practical implementation of One Health	2. Integration of animal, human, plant and ecosystem health	3. Integrated view on nature-related health risks and benefits	4. Integration of structural societal One Health drivers
A. Integrative	Combining different relevant ecosystem and health issues, sectors, and structural systemic drivers and outcomes			
B. Inclusive	Choosing how to deal with system complexity is inherently normative, which warrants the inclusion of societal deliberation next to scientific analysis			
C. Transdisciplinary	Combining different relevant forms of knowledge, stemming both from different scientific disciplines and different societal perspectives			
D. Adaptive	We cannot wait for perfect understanding or consensus; we need to take One Health to iterative implementation: learning by doing			
E. Anticipatory	Complexity, ongoing normative debate and development of insight need to be incorporated in analytical–deliberative transformative processes			





Transforming  
Biodiversity  
Governance

## 2 - Defining Nature

### from Part II - Unpacking Central Concepts

Published online by Cambridge University Press: 26 May 2022

By Hans Keune, Marco Immovilli, Roger Keller, Simone Maynard, Pamela McElwee, Zsolt Molnár, Gunilla A. Olsson, Unnikrishnan Payyappallimana, Anik Schneiders, Machteld Schoonenberg, Suneetha M. Subramanian and Wouter Van Reeth

Edited by Ingrid J. Visseren-Hamakers and Marcel T. J. Kok

#### Chapter

### Summary

In any attempt to “rethink” biodiversity governance, we need to consider that defining nature (and related concepts such as biodiversity, ecosystems, landscapes or green infrastructure) is not merely an objective scientific exercise. In reality, context-specific, subjective, normative and dynamic worldviews and values are at play in any definition of nature, whether explicitly or implicitly. Being aware of this pluralism is essential for avoiding “objective” definitional attitudes that risk disregarding and marginalizing the plurality of values and worldviews connected to different definitions of nature. In fact, paternalistic positions can create breeding grounds for fruitless dialogues between stakeholders, and thus pluralistic approaches help open up spaces for discussion.



## Network for Ecohealth and One Health

Laing et al.  
CABI One Health (2023)  
<https://doi.org/10.1079/cabionehealth.2023.0002>



### REVIEW



## Advancing One Health: Updated core competencies

Gabrielle Laing<sup>1,2</sup>, Eleanor Duffy<sup>2</sup>, Neil Anderson<sup>2,3</sup>, Nicolas Antoine-Moussiaux<sup>2,4</sup>, Maurizio Aragrande<sup>2,5</sup>, Caetano Luiz Beber<sup>2,6</sup>, John Berezowski<sup>2,7</sup>, Elena Boriani<sup>2,8</sup>, Massimo Canali<sup>2,5</sup>, Luis Pedro Carmo<sup>2,9,10</sup>, Ilias Chantziaras<sup>2,11</sup>, Glen Cousquer<sup>2,3</sup>, Daniele De Meneghi<sup>2,12</sup>, Ana Gloria Rodrigues Sanches da Fonseca<sup>2,13,14</sup>, Julie Garnier<sup>2,15</sup>, Martin Hitziger<sup>2,16</sup>, Thomas Jaenisch<sup>2,17,18</sup>, Hans Keune<sup>2,19</sup>, Claire Lajaunie<sup>2,20,21</sup>, Lorena Franco Martinez<sup>2,22</sup>, Rebecca Maudling<sup>2,23</sup>, Marie K. McIntyre<sup>2,24</sup>, Barry J. McMahon<sup>2,25</sup>, Alberto Munoz Prieto<sup>2,26</sup>, Liza Rosenbaum Nielsen<sup>2,27</sup>, Ranya Özcelik<sup>2,28</sup>, John W.A. Rossen<sup>2,29</sup>, Simon R. Rüegg<sup>2,15</sup>, Sara Savic<sup>2,30</sup>, Margarida Pires Simoes<sup>2,31,32</sup>, Deborah J. Thomson<sup>2,33</sup>, Laura Tomassone<sup>2,25</sup>, Asta Tvarijonaviciute<sup>2,21</sup>, Manuela Vilhena<sup>2,34</sup>, Barbara Vogler<sup>2,36</sup>, and Barbara Häsler<sup>2,36</sup>

### Abstract

One Health recognises the interdependence between the health of humans, animals, plants and the environment. With the increasing inclusion of One Health in multiple global health strategies, the One Health workforce must be prepared to protect and sustain the health and well-being of life on the planet. In this paper, a review of past and currently accepted One Health

## Integrated approaches to health

### A handbook for the evaluation of One Health

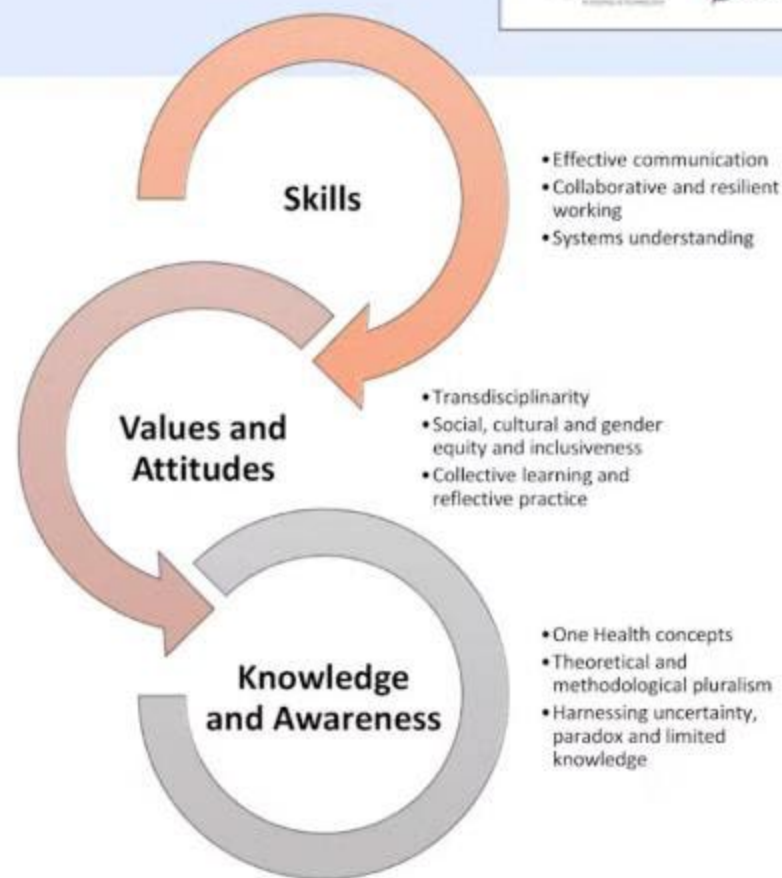
Editors: Simon R. Rüegg, Barbara Häsler and Jakob Zinsstag

Published: 2018 Pages: 256

eISBN: 978-90-8686-875-9 | ISBN: 978-90-8686-324-2

<https://doi.org/10.3920/978-90-8686-875-9>

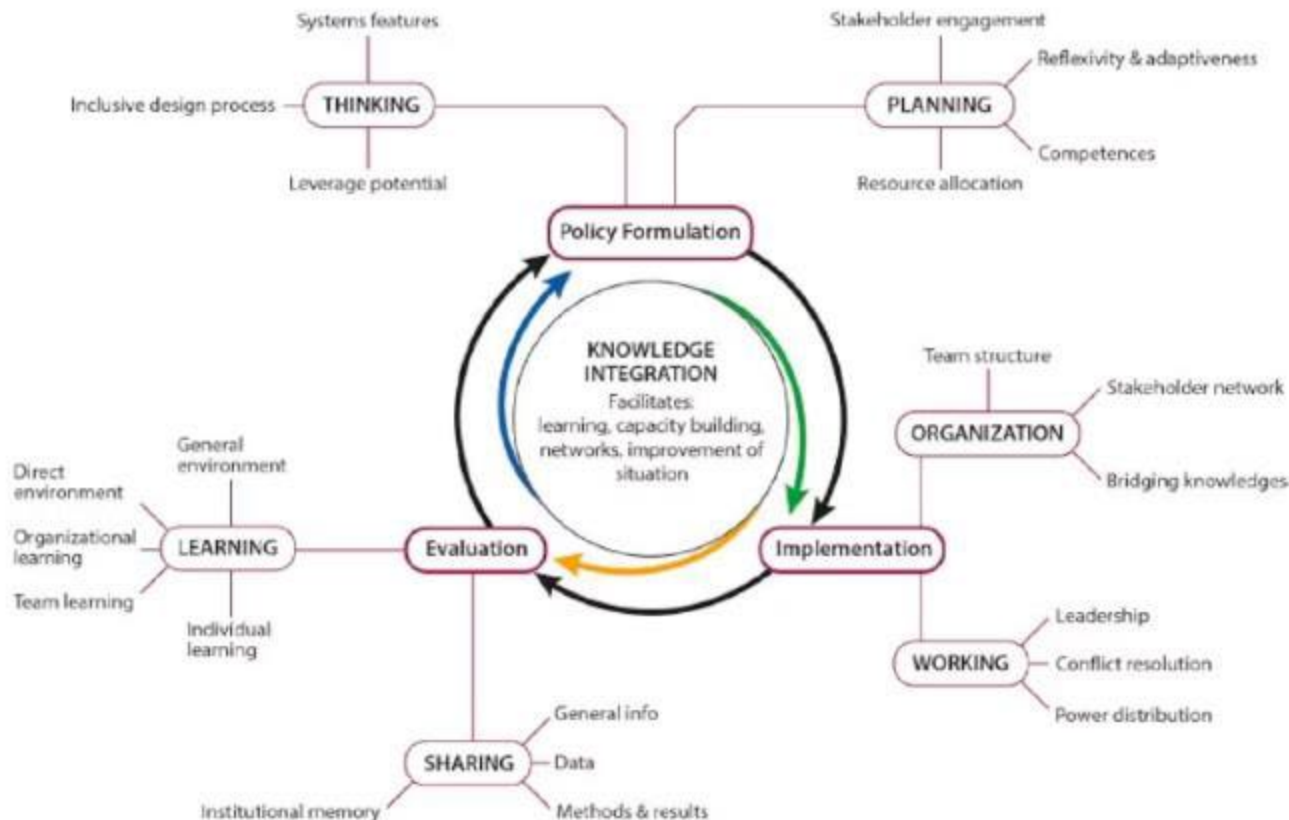
Book Type: Edited Collection





Next NEOH book publication  
announcement end of 2024:

**Fig. 1.** Graphical overview of the EVOLvINC approach. The center displays the conceptual core of the framework: to assess the capacity for knowledge integration in multistakeholder governance, which facilitates learning, capacity building, networks, and improvement of the addressed situations. Successful knowledge integration strengthens multistakeholder governance at each of the three stages of the policy cycle (Hitziger et al. 2018) (outer circle). Six key aspects (thinking, planning, etc.) relate to the stages of the policy cycle. Each is operationalized through several criteria (systems features, etc.).



*'Principles of One Health for a  
Better Planet'*

Published by CABI

Over 70 authors from all over  
the world

16 chapters

For an entry level of One Health  
for either students or experts

Nine core competencies are  
covered grouped by skills, values  
and attitudes, and knowledge  
and awareness.



Intergovernmental  
Science-Policy  
Platform on  
Biodiversity and  
Ecosystem Services  
(IPBES)  
(>140 member  
states)





Interlinkages among biodiversity, water, food and health,  
climate change

<https://ipbes.net/nexus>

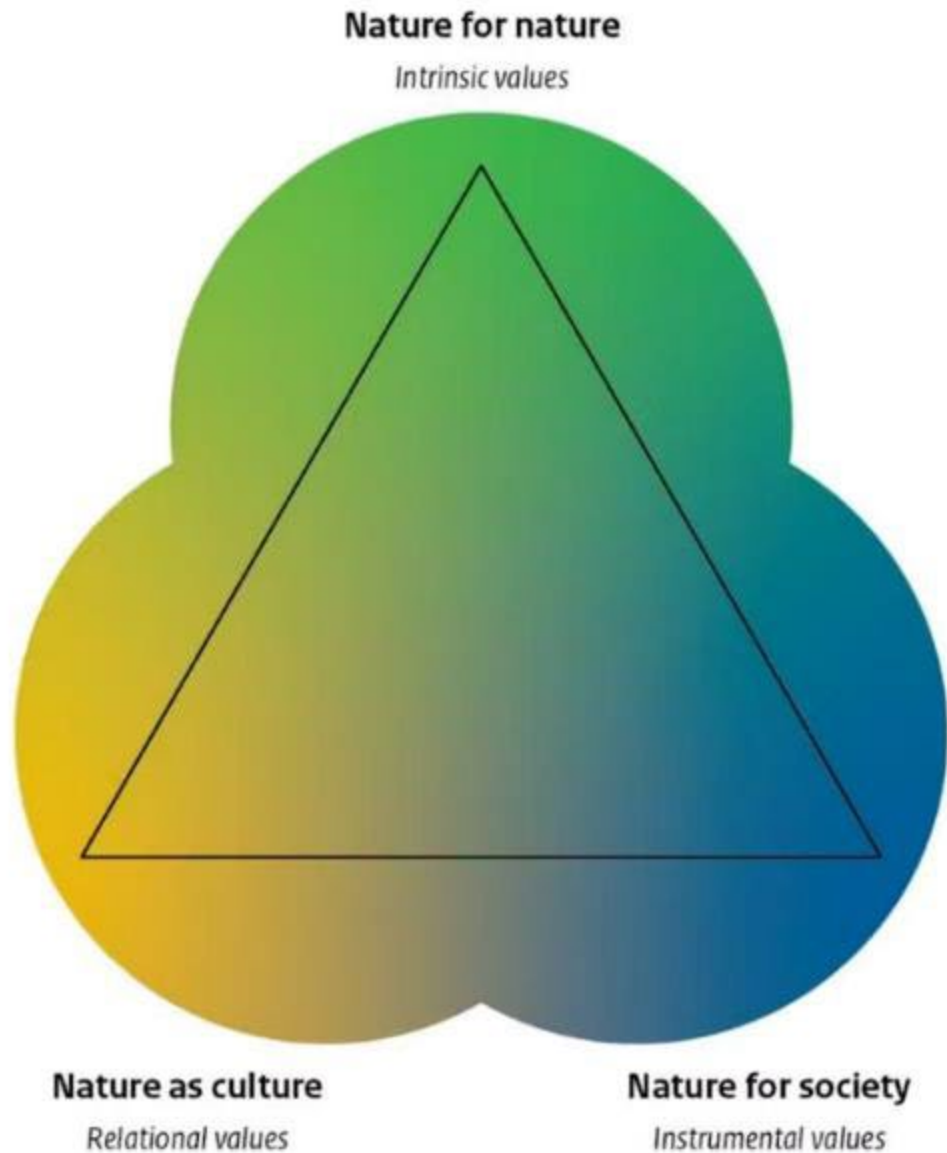
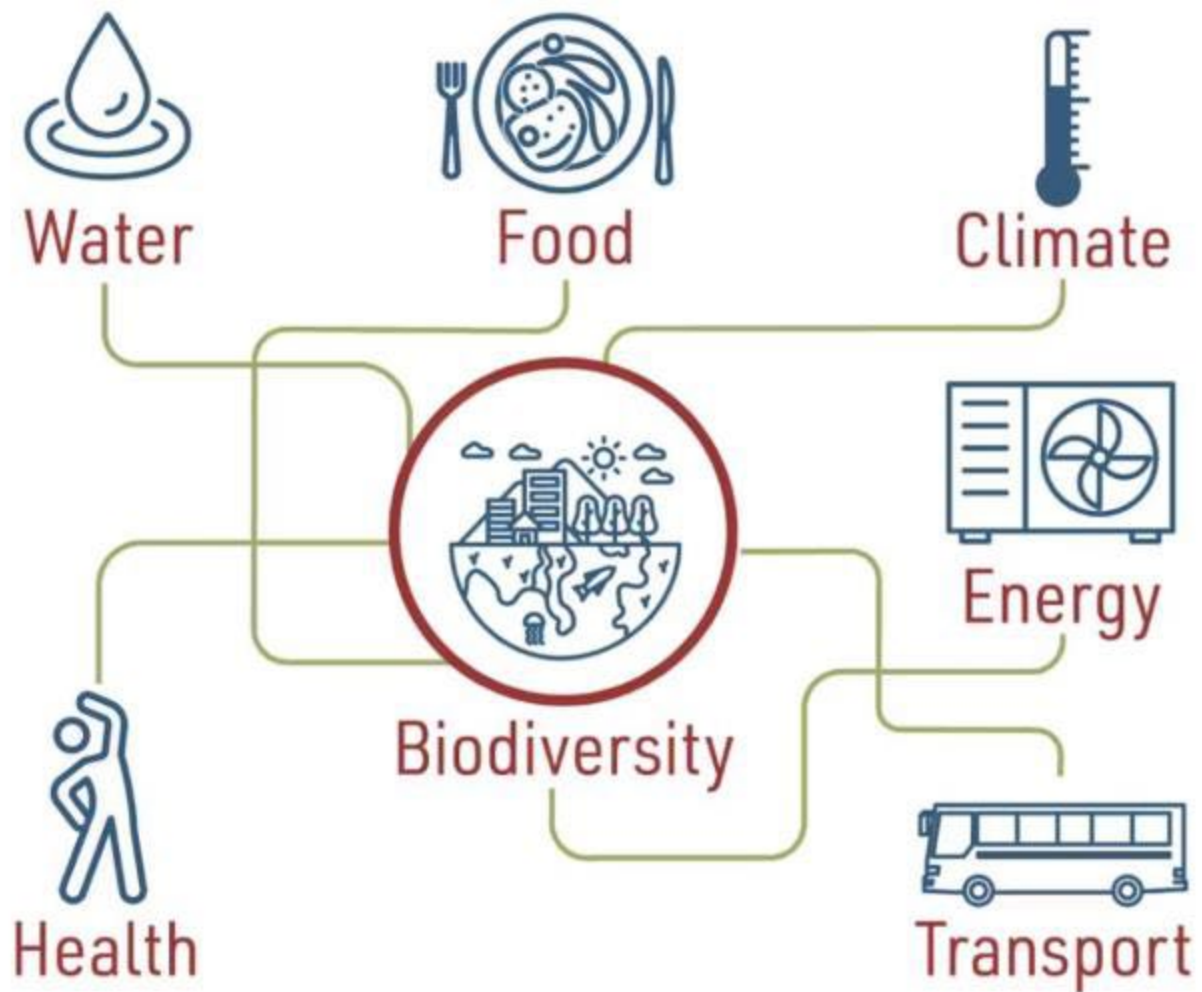


IPBES First Author Meeting of the Nexus Assessment  
Venue: Senckenberg Society for Nature Research  
Dates: 16 – 20 May 2022

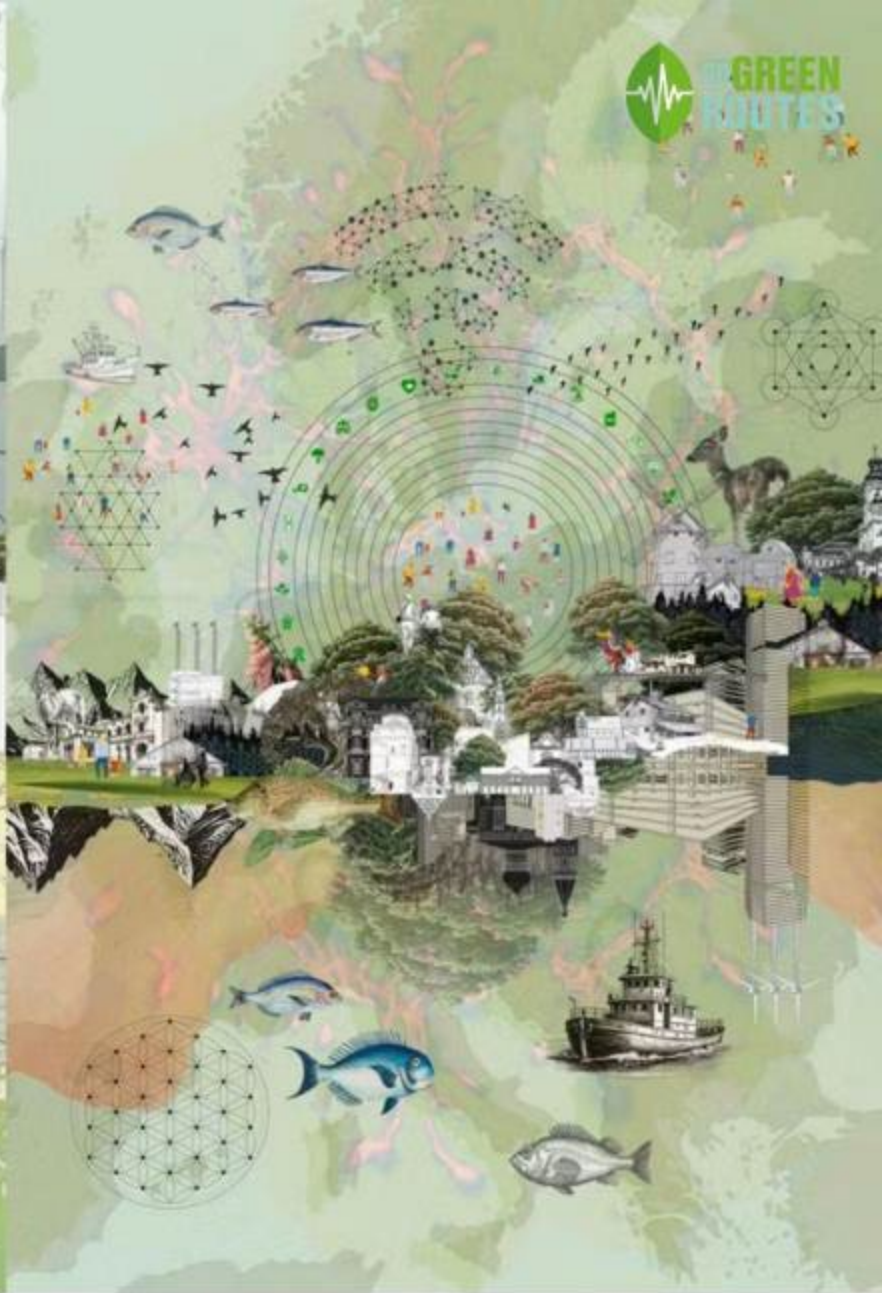














# Evaluation of knowledge integration - reflexivity



*Stepwise reflexive process on integration of **One Health** in Nexus modelling:*

- 1) One Health expert Delphi consultation*
- 2) Face to face expert workshop*
- 3) One Health co-design activities  
Nexus models*
- 4) Synthesis of results, dissemination,  
publications, policy briefs*

**One Health Nexus modelling expert  
workshop Athens, September 17 – 18 2024**





*Lina Kusaite (www.cocooncharacters.com)*

**Thank you for your attention.**

**Questions?**

[hans.keune@uantwerpen.be](mailto:hans.keune@uantwerpen.be)

<https://www.uantwerpen.be/en/chairs/care-and-natural-living-environment/>





# Time for discussion with the speakers

*Magnus Tannerfeldt, FORMAS, Biodiversa+ co-Chair*

*Karin Zaunberger, International relations officer, DG ENV*

*Hans Keune, Chair Care and the Natural Living Environment, University of Antwerp*

*Moderated by Rainer Sodtke, DLR, Biodiversa+ co-Chair*

**For any questions: use “Q&A” FUNCTION**

Please note that **we may give you the possibility to ask your question orally.**

Stay tuned if you have a question & start your question by introducing yourself (name & organisation)

# **FUNDED PROJECTS PRESENTATION SESSION 1**

# *ANTIVERSA - Biodiversity as an ecological barrier for the spread of clinically relevant antibiotic resistance in the environment*

Prof. Thomas Berendonk (coordinator):

Dr. Fiona Walsh

Dr. Christophe Merlin

Dr. Markus Wögerbauer

Robert Kreutzinger, Julia Vierheilig

Dr. Helmut Bürgmann:

Dr. Cristian Coman:

Prof. Magdalena Popowska

Stadtentwässerung

TU Dresden, Germany

Maynooth University, Ireland

CNRS, France

Agency for Health & Food Safety, Austria

Universität Wien

EAWAG, Switzerland

INCDSB, Romania

University of Warsaw, Poland

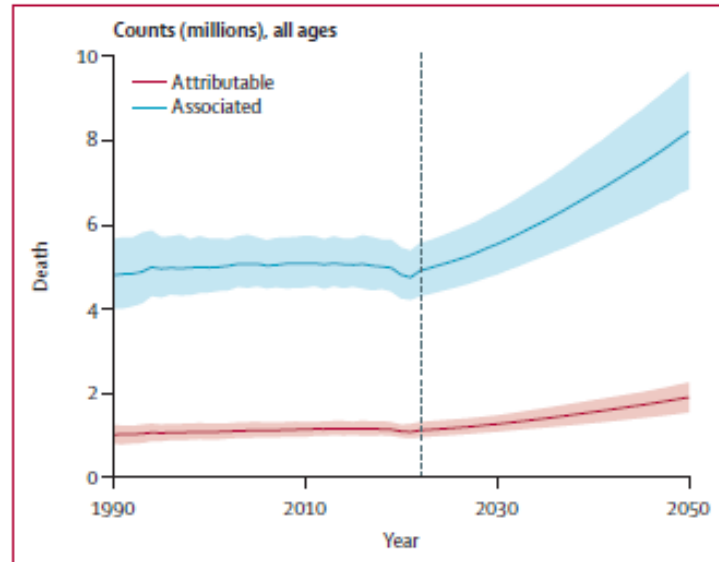
Dresden, Germany

# „The silent Pandemic“

- 1.27 Mio. deaths in direct context of antibiotic resistance

*The Lancet* 2022 399:629-655 DOI: (10.1016/S0140-6736(21)02724-0)

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**Figure 6:** Global attributable and associated AMR burden in the reference scenario, 2022–2050

Shading represents the 95% uncertainty interval. The vertical line is placed at 2021 to distinguish estimates from forecasts.

Global burden of bacterial antimicrobial resistance  
1990–2021: a systematic analysis with forecasts to 2050

GBD 2021 Antimicrobial Resistance Collaborators\*

[www.thelancet.com](http://www.thelancet.com) Published online September 16, 2024 [https://doi.org/10.1016/S0140-6736\(24\)01867-1](https://doi.org/10.1016/S0140-6736(24)01867-1)

nature communications



Article

<https://doi.org/10.1038/s41467-022-34312-7>

## Genomic analysis of sewage from 101 countries reveals global landscape of antimicrobial resistance

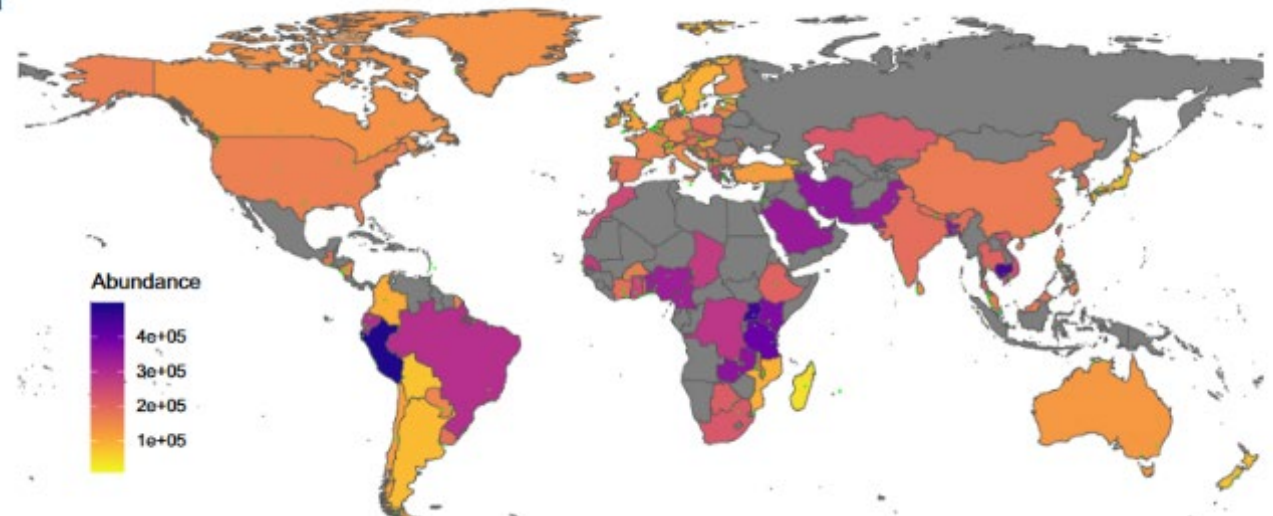
Received: 25 July 2022

Accepted: 20 October 2022

Published online: 01 December 2022

Patrick Munk<sup>1</sup>, Christian Brinch<sup>1</sup>, Frederik Duus Møller<sup>2</sup>, Thomas N. Petersen<sup>3</sup>, Rene S. Hendriksen<sup>1</sup>, Anne Mette Seyfarth<sup>1</sup>, Jette S. Kjeldgaard<sup>4</sup>, Christina Aaby Svendsen<sup>1</sup>, Bram van Bunnik<sup>5</sup>, Fanny Berglund<sup>6</sup>, Global Sewage Surveillance Consortium\*

a



### Hypothesis:

Diversity can serve as a barrier to invasion by ARB and their transferable ARGs

→ Diverse environmental communities should contain less ARGs



## Pristine soil and river environmental samples from across Europe



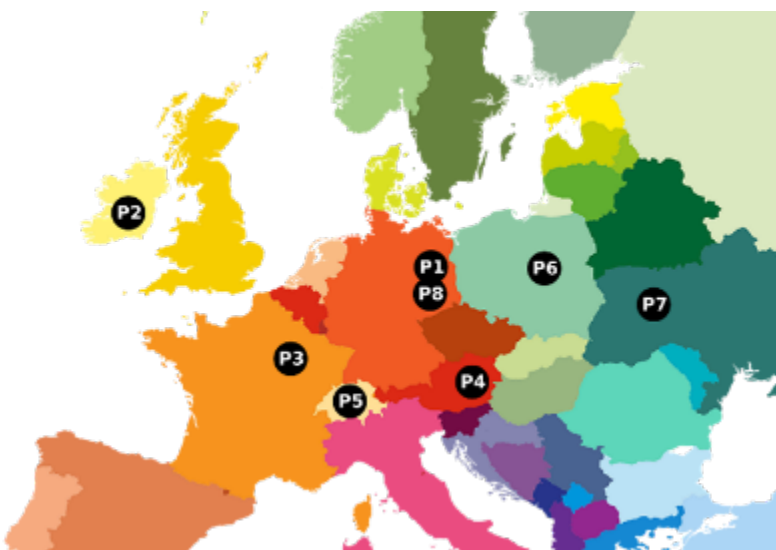
**River sediments & biofilms:  
dynamic**



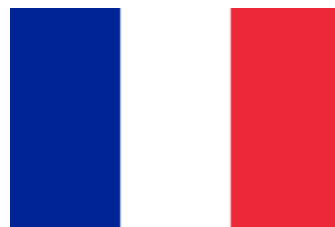
**Forest soils:  
static, structured**

16s rRNA based sequencing

HT-qPCR of 30 ARGs **resistomap**



Germany



France



Romania



Poland



Austria



Ireland



Switzerland

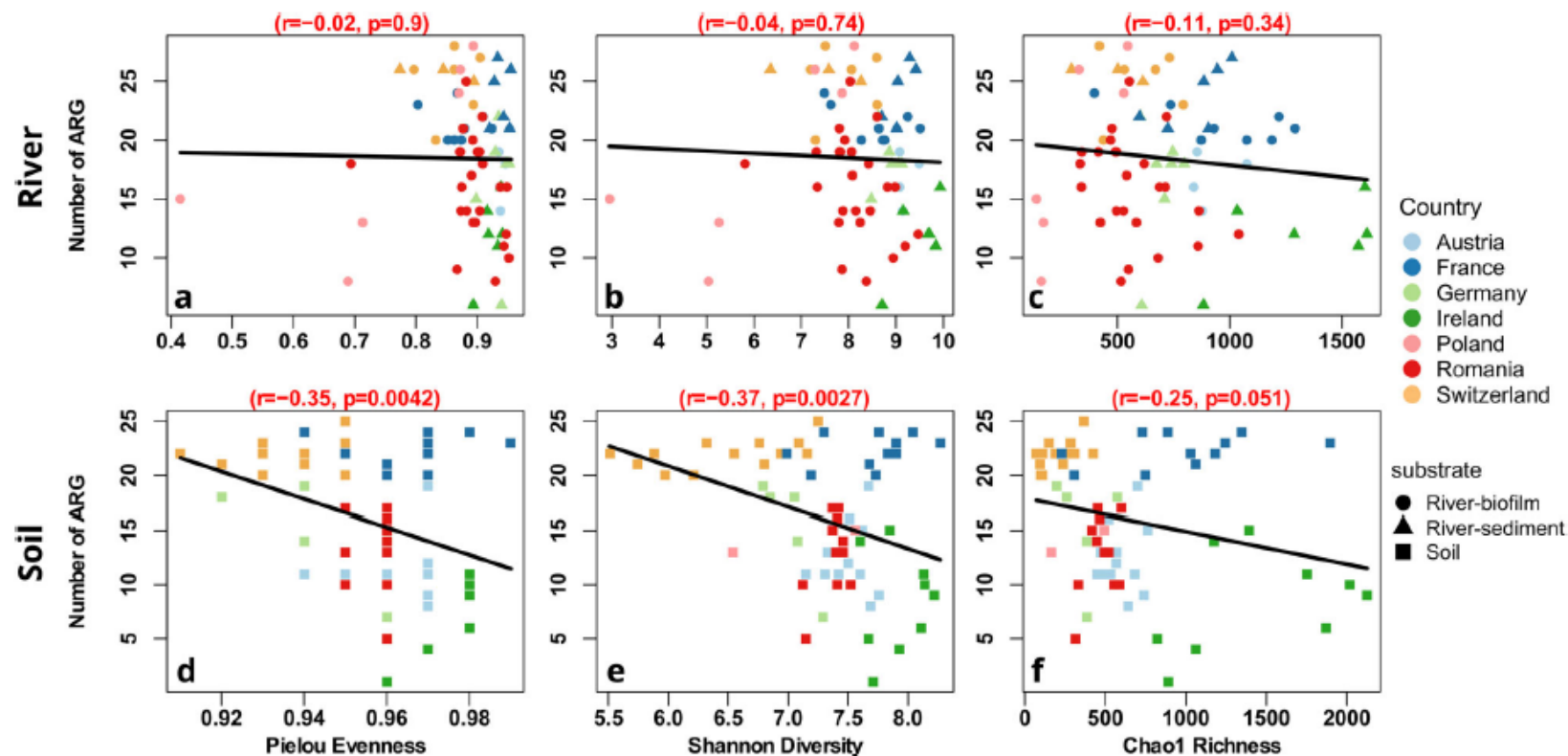
**>200 samples overall**


<https://doi.org/10.1038/s42003-024-06338-1>

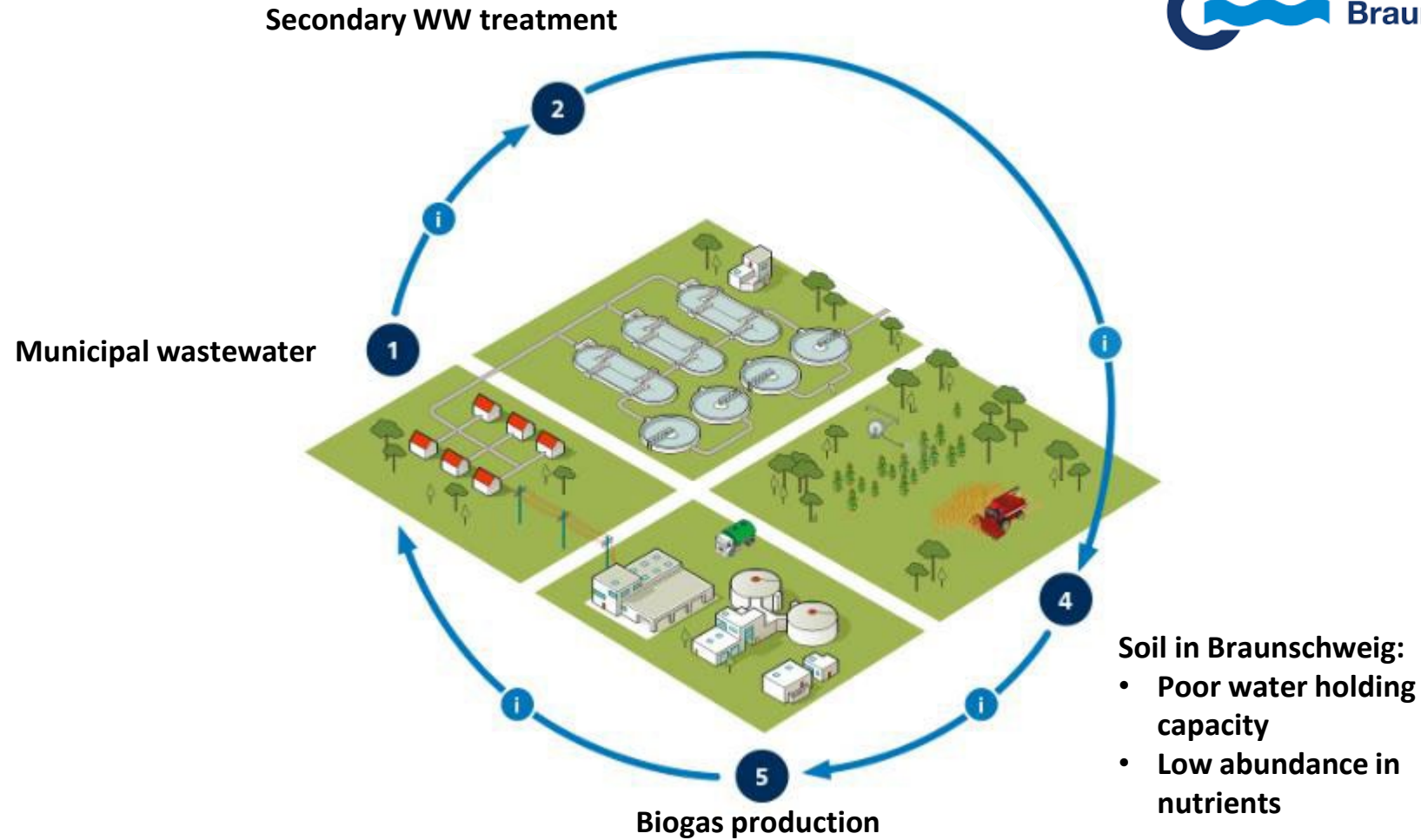
# Environmental microbiome diversity and stability is a barrier to antimicrobial resistance gene accumulation

Check for updates

Uli Klümper<sup>1,13</sup>, Giulia Gionchetta<sup>2,13</sup>, Elisa Catão<sup>3,4,13</sup>, Xavier Bellanger<sup>3</sup>, Irina Dielacher<sup>5</sup>, Alan Xavier Elena<sup>1</sup>, Peiju Fang<sup>1</sup>, Sonia Galazka<sup>6</sup>, Agata Goryluk-Salmonowicz<sup>7,8</sup>, David Kneis<sup>9</sup>, Uchechi Okoroafor<sup>9</sup>, Elena Radu<sup>5,10</sup>, Mateusz Szadziul<sup>7</sup>, Edina Szekeres<sup>11</sup>, Adela Teban-Man<sup>11</sup>, Cristian Coman<sup>11</sup>, Norbert Kreuzinger<sup>5</sup>, Magdalena Popowska<sup>7</sup>, Julia Vierheilig<sup>5,12</sup>, Fiona Walsh<sup>9</sup>, Markus Woeggerbauer<sup>6</sup>, Helmut Bürgmann<sup>2,14</sup>, Christophe Merlin<sup>3,14</sup> & Thomas Ulrich Berendonk<sup>1,14</sup> ✉



# Water –Reuse in Germany The Braunschweig model





# ANTI.VERSA

Bacterial diversity against AMR







# DiMoC

## Diversity components in mosquito-borne diseases in face of climate change

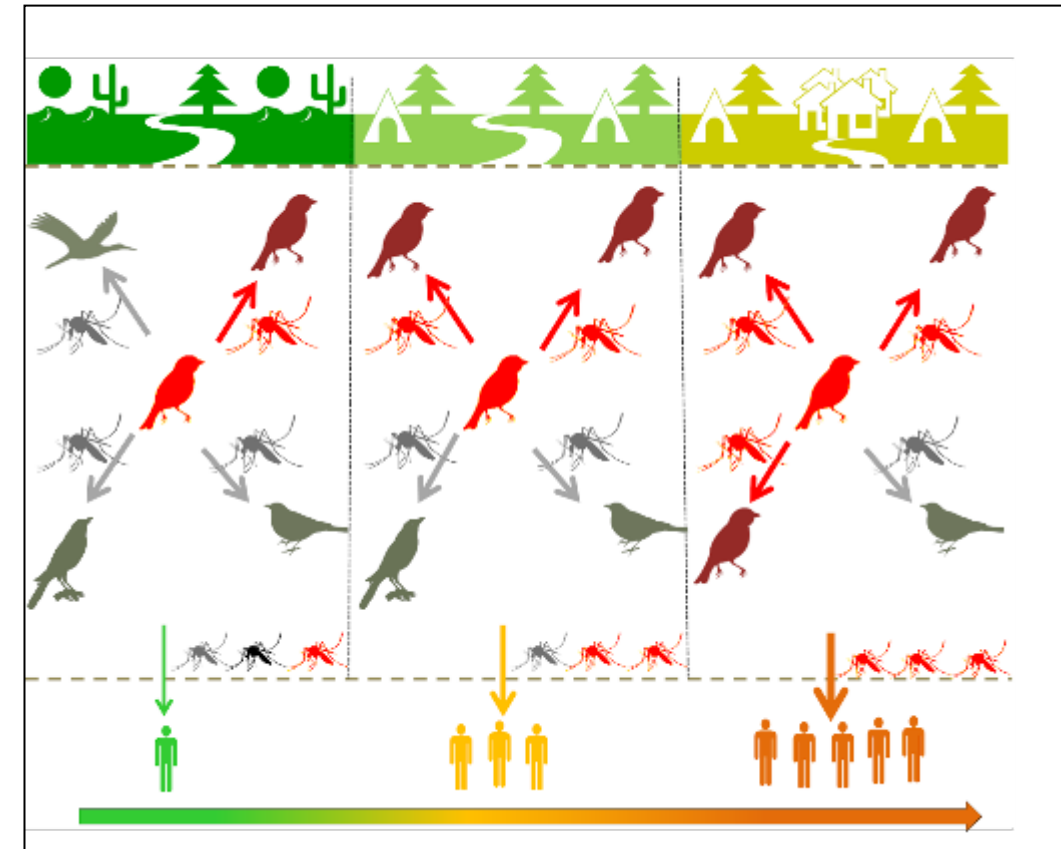
By Prof. Dr. Carl Beierkuhnlein

*Prof. Carl Beierkuhnlein, University of Bayreuth, Biogeography, Bayreuth*  
*Prof. Ruth Müller, Institute of Tropical Medicine, Medical Entomology, Antwerp*  
*Dr. David Roiz, Institute de Recherche pour le Développement, Montpellier*  
*Prof. Jonas Schmidt-Chanasit, Bernhard Nocht Institute, Arbovirology, Hamburg,*  
*Prof. Gerardo Suzan, National Autonomous University of Mexico, Disease ecology & One Health*



# Main Objectives

- Mosquito diversity and transmission risk influenced by interspecific interactions (e.g. competition, predator-prey)
- Greater host diversity reduces transmission risk (dilution effect)
- Insect virus diversity reduces relative transmission risk
- Climatic conditions better explain patterns of diversity than socio-economic factors
- Climate, landscape, and societal diversity models quantify future transmission risk uncertainty



■ Infected individual or  
high vector competence

■ High susceptibility

# Main Findings - Science and Innovation

## Drivers of Mosquito Diversity

- Experiments: Larval competition and prey-predator interactions on mosquito species (ITM Fig.1)
- Joint Species Distribution Modelling: Species-specific responses to abiotic and biotic factor (seven mosquito species across six ecological units (UBT)).

## Dilution effect via host diversity

- Field work: Mosquito-virus and mosquito-host interactions (IRD/UNAM)
- Literature review: host feeding patterns (BNITM/UNAM)

## Diversity in mosquito-specific virus

- Vector competence studies in combinations of mosquito species and 3 different arborviruses (BNITM)

## Global and European spatial patterns of diversity

- Statistical analysis of global patterns of mosquito-associated viruses (UBT, Fig.2)
- Species Distribution Models: For all mosquito species in Europe (UBT)

## Nature based solutions: diving beetles in mosquito control

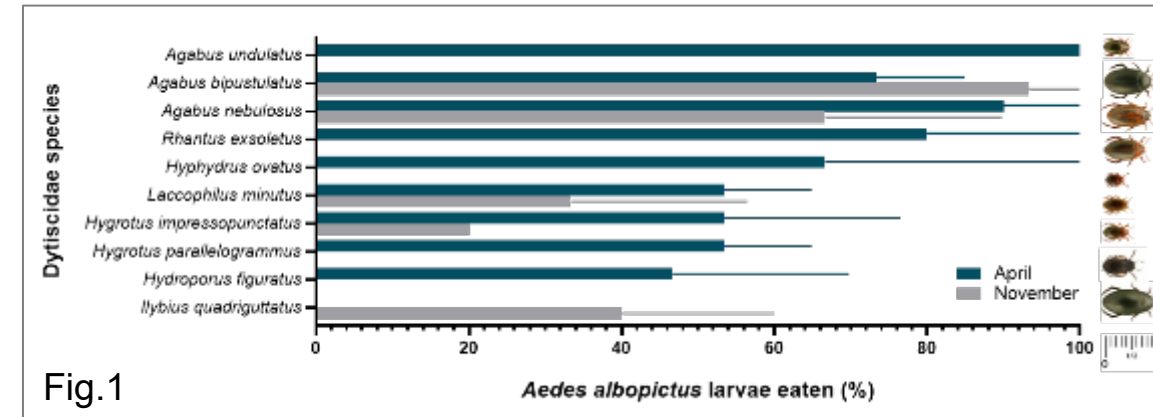


Fig.1

## Mosquito-associated virus: Gaps in Knowledge

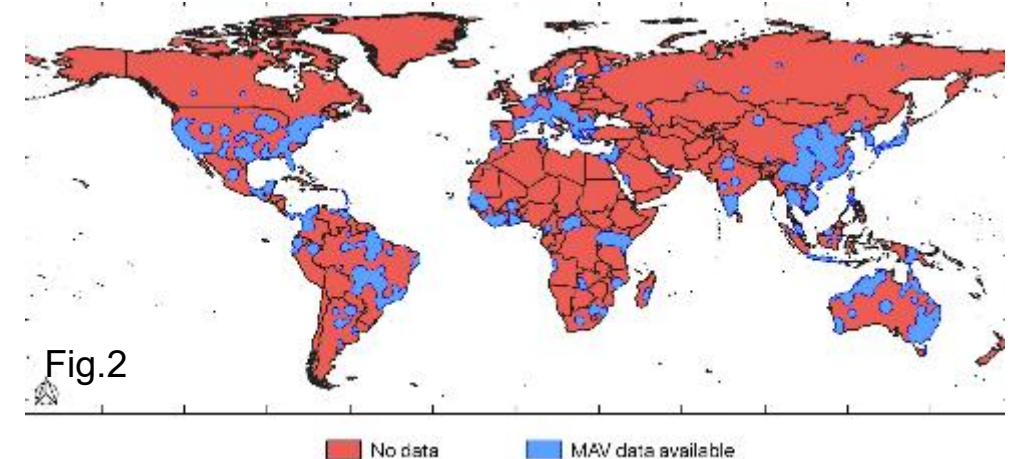


Fig.2

# Main Findings - Science and Innovation

## Describing

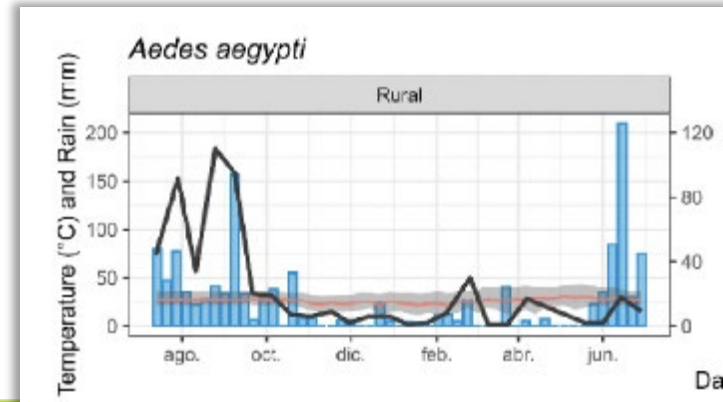
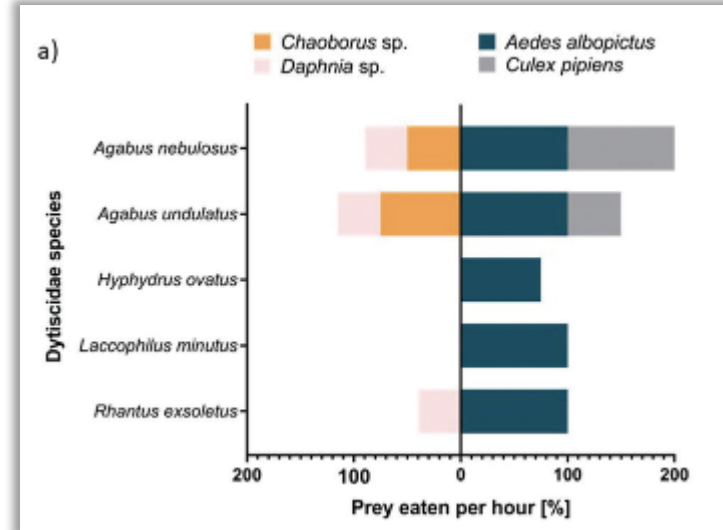
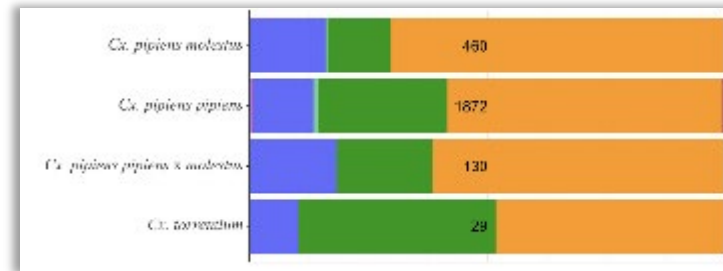
- Mosquito Diversity in Mexico: 90 mosquito species recognized in Yucatan Peninsula including 4 new records
- Natural field infections and laboratory experiments show that 30 *Culex* species can be naturally infected and 23 can transmit four flaviviruses.
- Standardized vector host-feeding studies should include 18 variables covering field methods, identification techniques, and outcome data.

## Testing

- Host-choice experiments showed no significant attraction to bird, mouse, and human lure for *Cx. pipiens pipiens* and *Cx. torrentium*.
- Experiments suggest at least four dytiscid predators prefer *Aedes albopictus* and could control its population in European small water habitats.

## Modelling

- Positive biotic interactions were found within the *Culex* community, but not among other mosquito genera.
- Both, species associations and abiotic parameters shaped the model projection for mosquito species abundance.
- Species-specific environmental variables like temperature, rainfall, and impervious surfaces significantly impact mosquito abundance.





# Main findings - Outputs of Societal & Policy Impact

- 3 PhD students
- 15 Bachelor and master theses
- > 20 presentations at scientific conferences

## One-week DiMoC Training workshop

- 15 lecturers from Germany, Belgium, France, and Mexico
- 16 participants (MSc, PhD, Postdocs, Public health)

## Active disseminating through various channels

- TV contributions, newspaper interviews, presentations, workshops, podcast interview, expert panels and blog.
- Member of EU Parliament in Bayreuth, Minister meeting Belgium, meetings with Public Health authorities national and regional level and mosquito control agencies, IPBES Stakeholder Day, IPBES nexus assessment
- “One Health: Why Biodiversity is important?” Symposium at “Ecological Society of Germany, Austria and Switzerland” with 2 DiMoC Partners with 4 participants, 2 talks, 1 poster (Organiser: Dr. Forest)



# Dr. Forest

## Diversity of forests affecting human health and well-being

By Michael Scherer-Lorenzen

University of Freiburg, Germany

BOS+ Vlaanderen, Belgium

German Centre for Integrative Biodiversity Research, Leipzig, Germany.

Ghent University, Belgium

Institut national de recherche pour l'agriculture, l'alimentation et l'environnement, Cestas, France.

KU Leuven, Belgium

Medical University of Vienna, Austria

Universität für Bodenkultur, Vienna, Austria

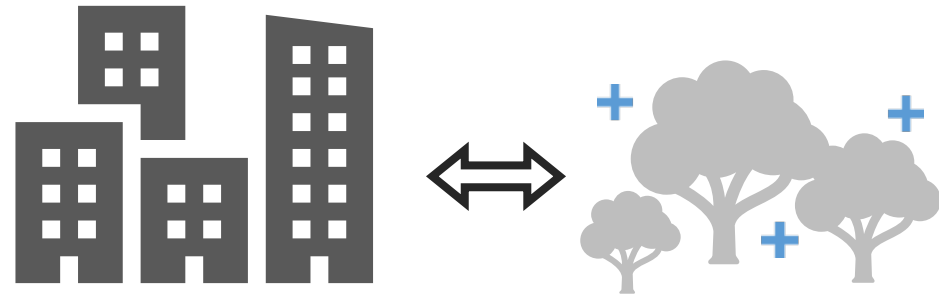
Universität Leipzig, Germany

Université Catholique de Louvain, Belgium

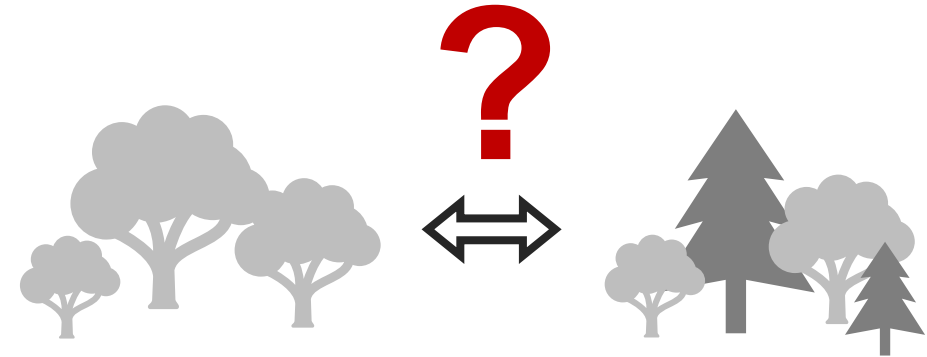
University of Warsaw, Poland



# Objectives and Study Approach



**urban vs. green spaces**



**Low diverse green space vs.  
high diverse green space**



**Mature Forests**



**Experimental Plantations**

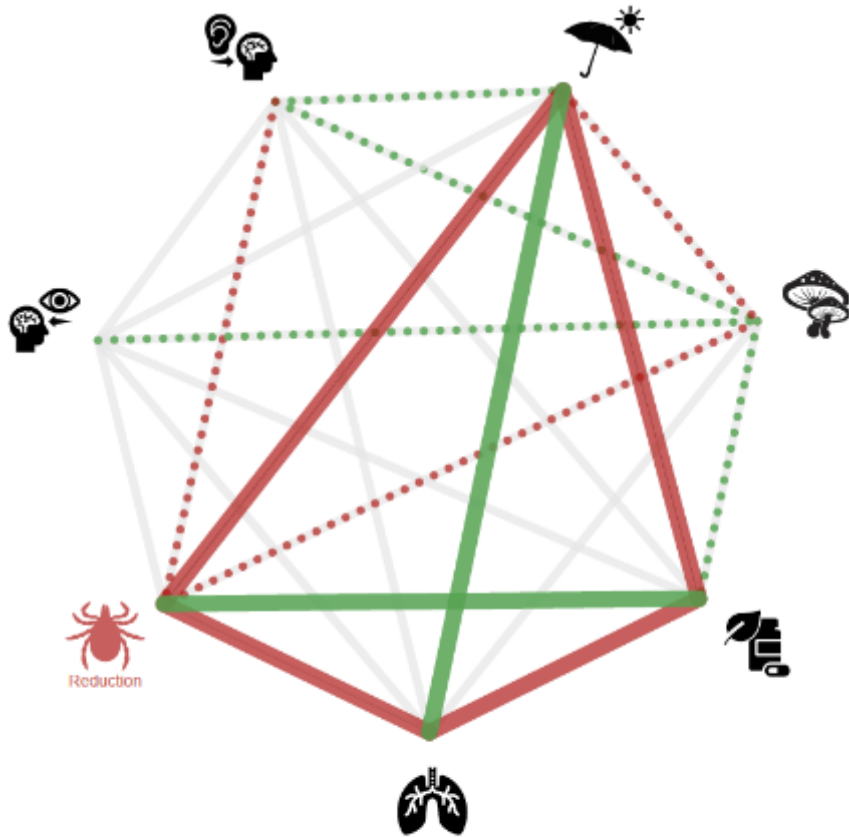








# Societal and Policy Impact



## • Forests, managed in the right way, may

- aid public health as health promoting environment
- mitigate disservices
- but **not always** at the same location

For further information:

[www.dr-forest.eu](http://www.dr-forest.eu)



# Time for discussion with the speakers

*Thomas Berendonk, ANTIVERSA project*

*Carl Beierkuhnlein, DiMoc project*

*Michael Scherer-Lorenzen, Dr. FOREST project*

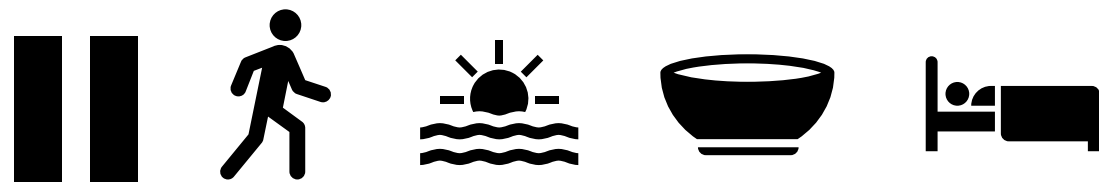
*Moderated by Stéphanie Thomas, DiMoc project*

**For any questions: use “Q&A” FUNCTION**

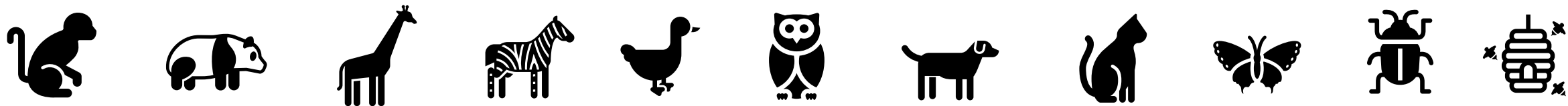
Please note that **we may give you the possibility to ask your question orally.**

Stay tuned if you have a question & start your question by introducing yourself (name & organisation)

# Time for a break!



10:45 – 10:55



# **FUNDED PROJECTS PRESENTATION SESSION 2**



# NutriB2: Nutrition as a critical link between Biodiversity and Bee health

Speaker: Dr. Alejandra Parreño (Postdoc. Germany)

Contact: [alejandra.parreno@tum.de](mailto:alejandra.parreno@tum.de)

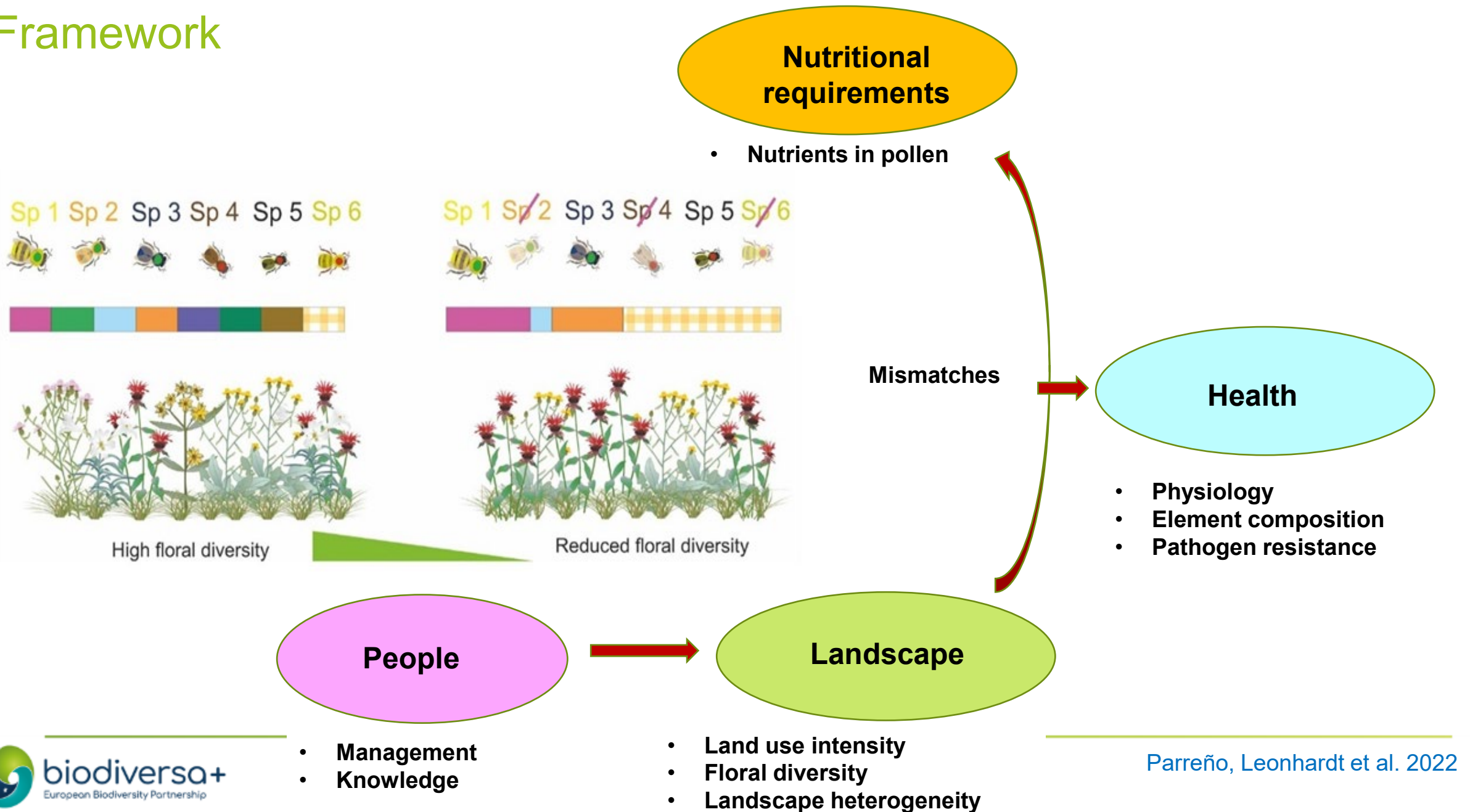


**Partners:** Prof. Dr. Sara Leonhardt, Prof. Dr. Alexander Keller, Prof. Dr. Alexandra Klein (Germany), Dr. Ivan Meeus (Belgium), Prof. Dr. Cedric Alaux (France), Dr. Michal Filipiak (Poland). **External partners:** Dr. Fabrice Requier (France), Prof. Dr. Michael Kuhlmann (Germany), Prof. Dr. Phil Stevenson (UK), Dr. Evan Palmer-Young (USA)

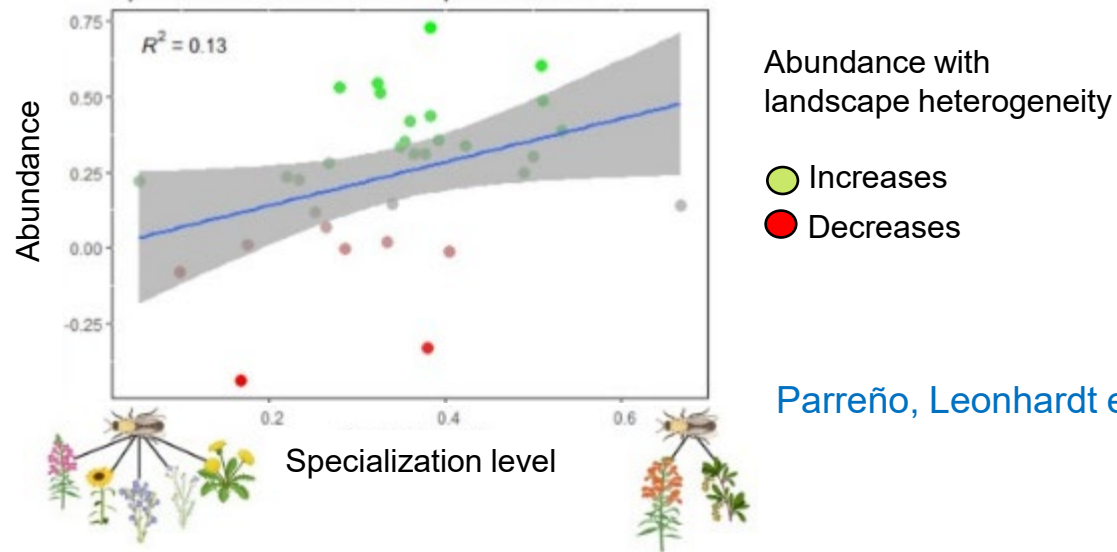
**PhD students:** Dr. Clementine Leroy (France), Susanne Werle (Germany), Louella Buydens (Belgium). **Assistants:** More than 50 postdocs, students, technicians and field managers



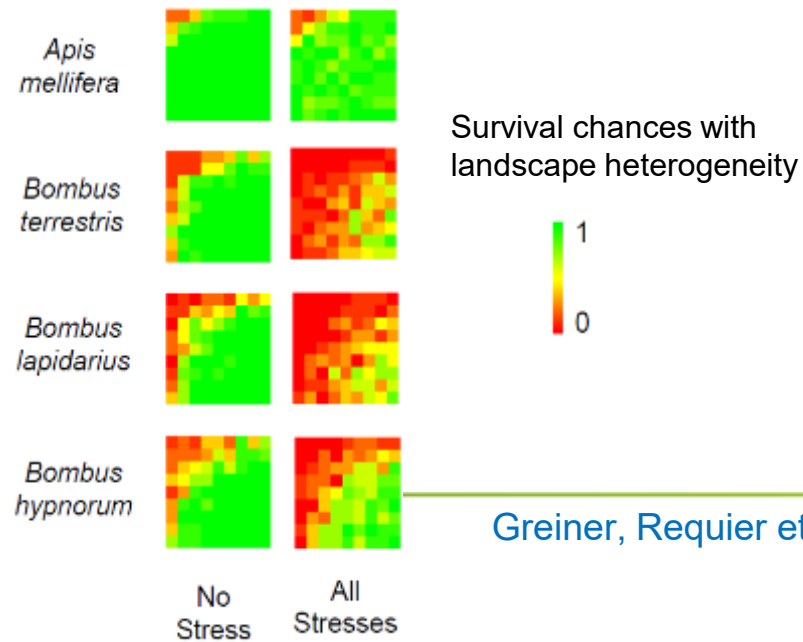
# Framework



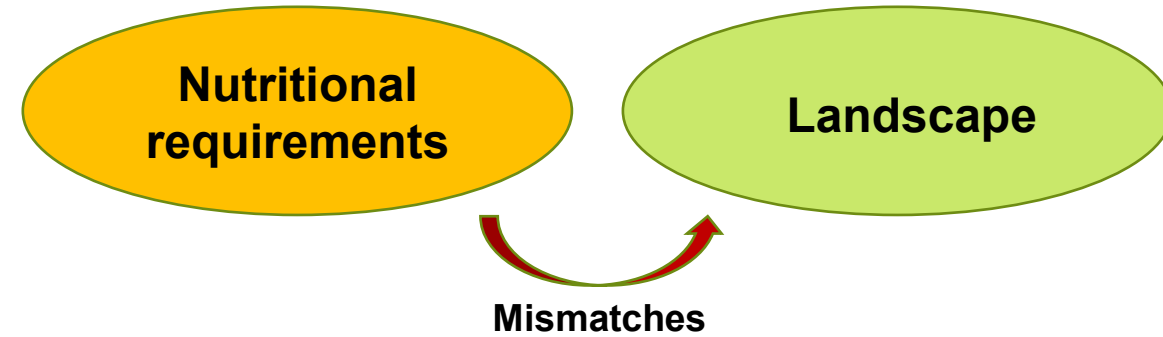
# Bees have diverse responses to landscape stressors based on their traits



Parreño, Leonhardt et al. 2024

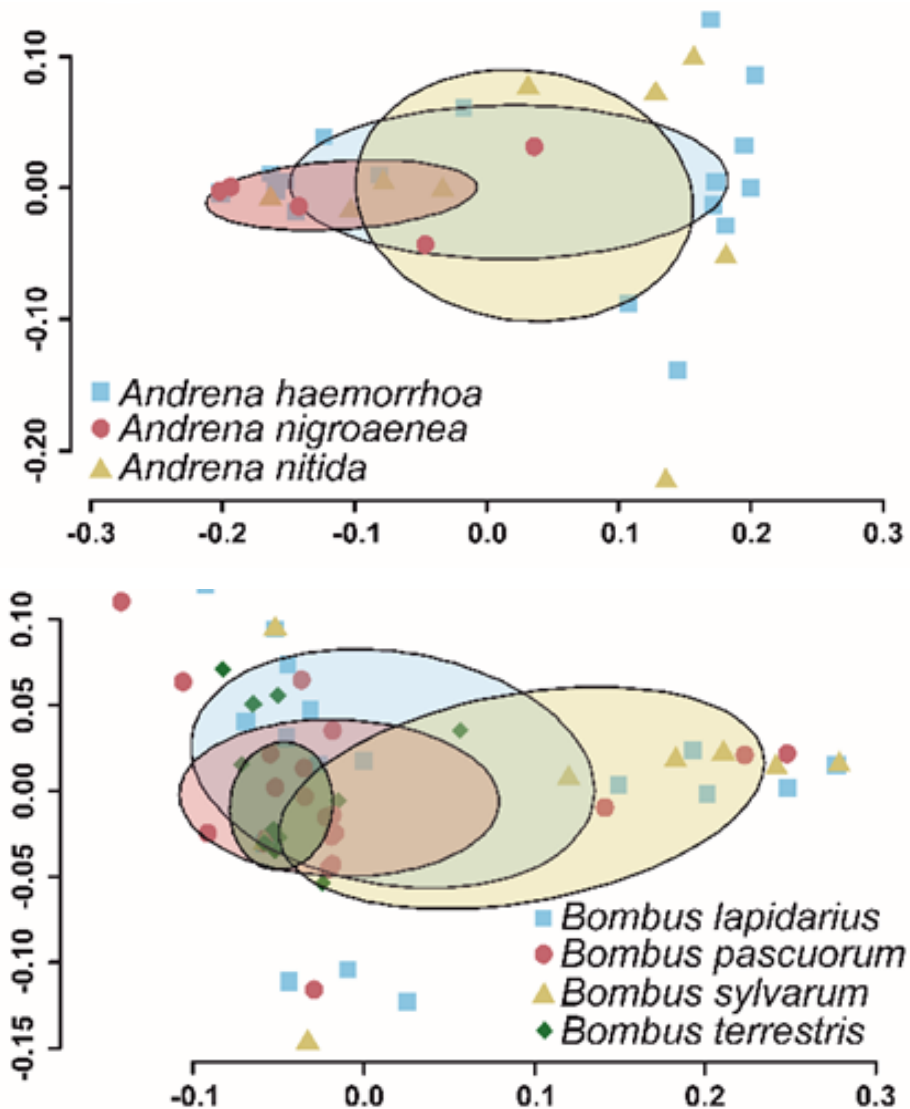


Greiner, Requier et al. (prep.)



- Specialist bees show stronger need for diverse landscapes (i.e., hedges, forest patches, bare soil)
- Specialist bees populations decline with landscape simplification (e.g., intensive agriculture)
- Different species show stark contrasts in survival rates faced to stressors

# Bees have diverse nutritional needs



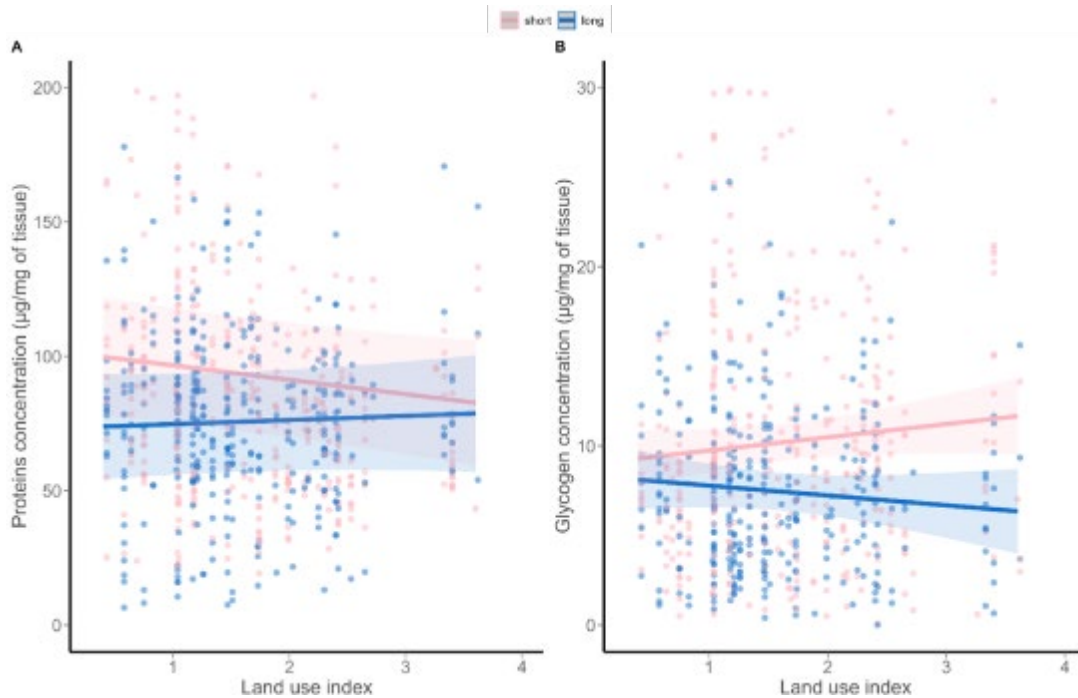
## Nutritional requirements

- Each bubble represents a space of nutrient combination for a species
- Fatty acids and proteins are obtained from diverse pollen they consume
- Size, position and overlaps of those nutrients define bees' diet



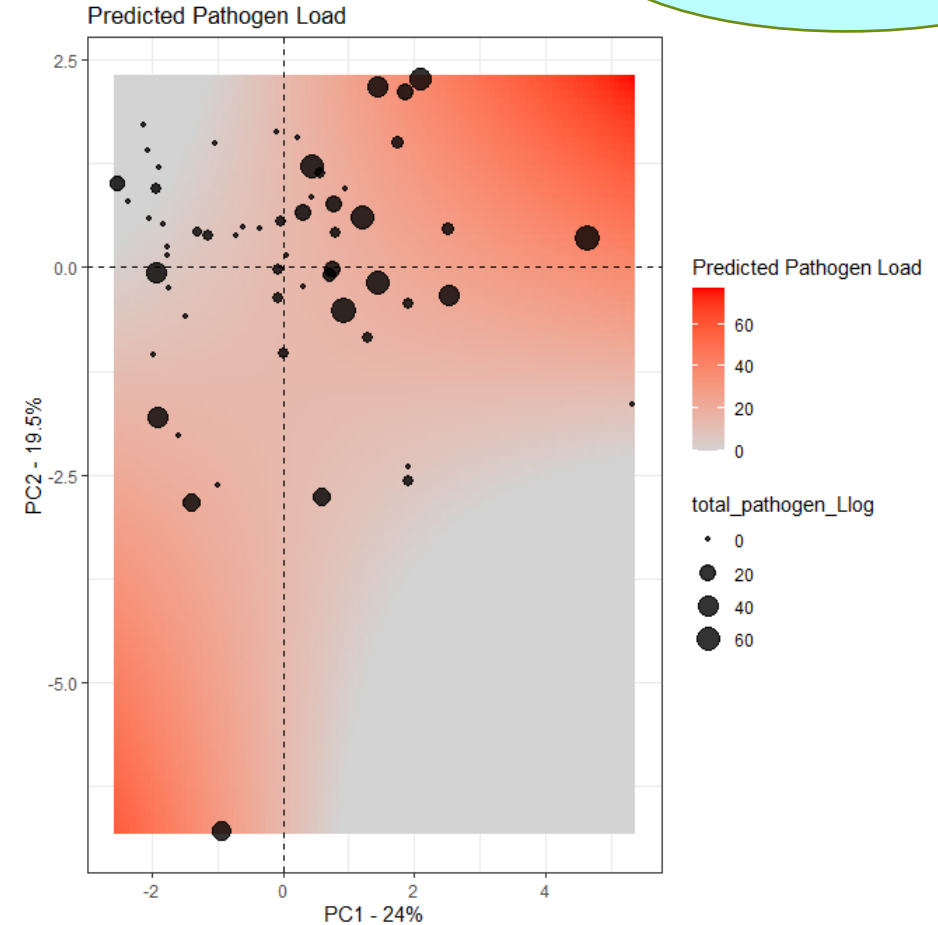
# Bees health is affected by nutritional deficiencies

Health



- **Protein and glycogen are altered with land use intensity and lower flower diversity**

Leroy, Alaux et al. (prep)

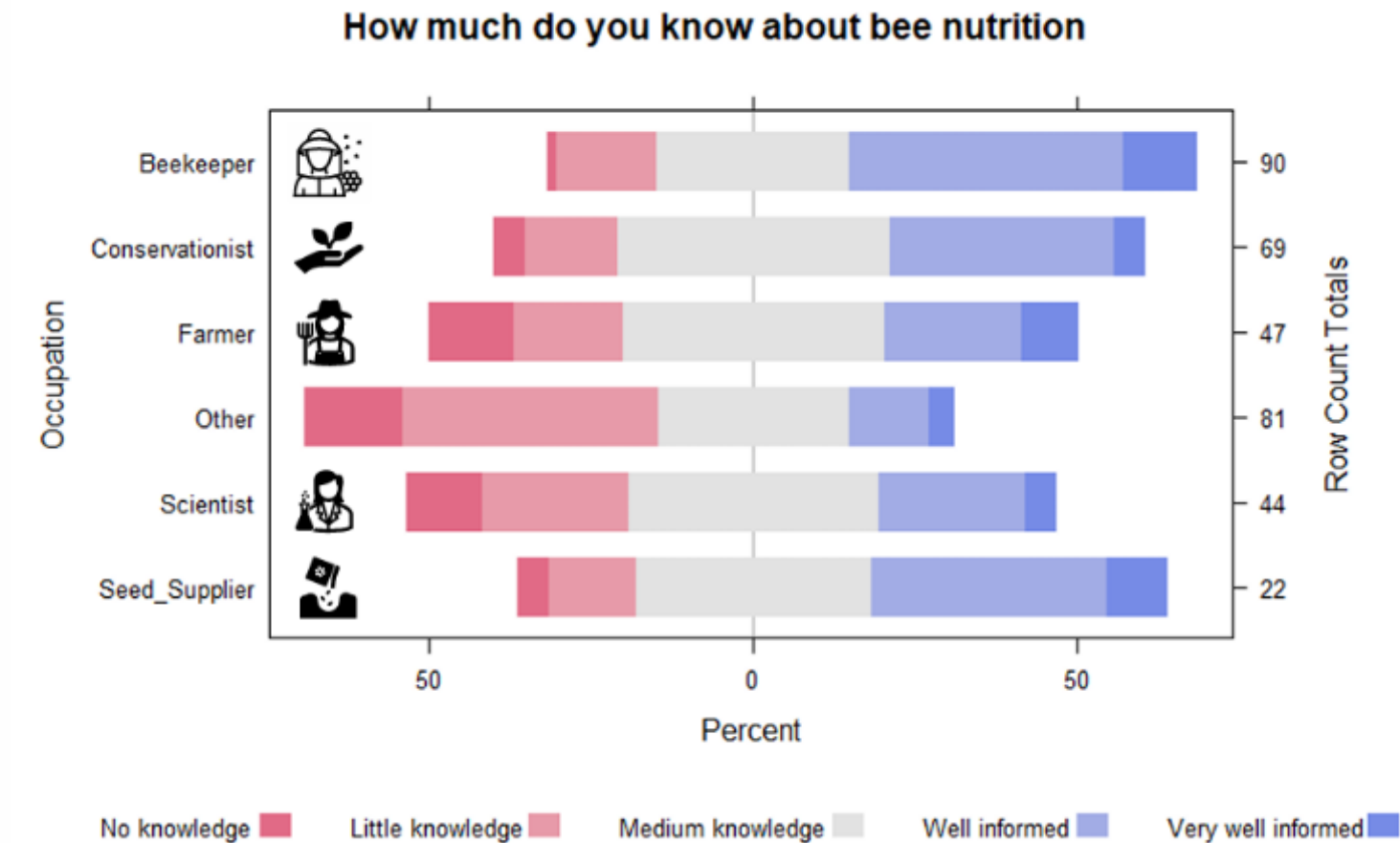


- **Bees high in the limiting elements (i.e. iron, magnesium, calcium) also show higher resistance to pathogens**

Meeus, Filipiak et al. (prep)

# Bee nutrition is not well known outside niche professions

People



Ostermann, Klein et al. (prep)

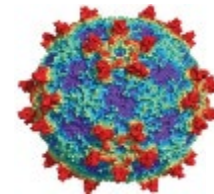


Adam VANBERGEN + VOODOO consortium

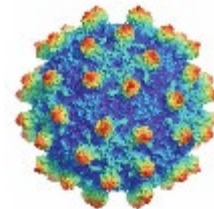
[adam.vanbergen@inrae.fr](mailto:adam.vanbergen@inrae.fr) UMR Agroécologie, INRAE – National Research Institute for Agriculture, Food and Environment,

# What is the interplay between land-use and pathogen spill-over between managed and wild pollinators?

- Land use & landscapes
  - Urbanization
  - Agricultural intensification
- Viral pathogens of bees
  - Black Queen Cell Virus (BQCV)
  - Deformed Wing Virus (DWV)



Spurny et al. 2017

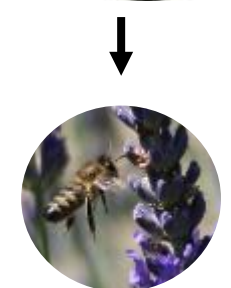
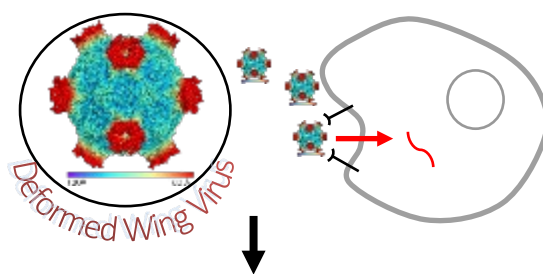


Max Planck Institute, 2017

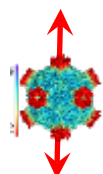


Honey bee & wild bumble bee sharing a flower





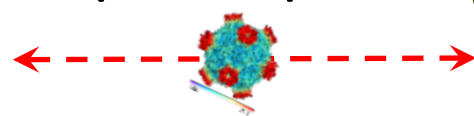
Spill-over



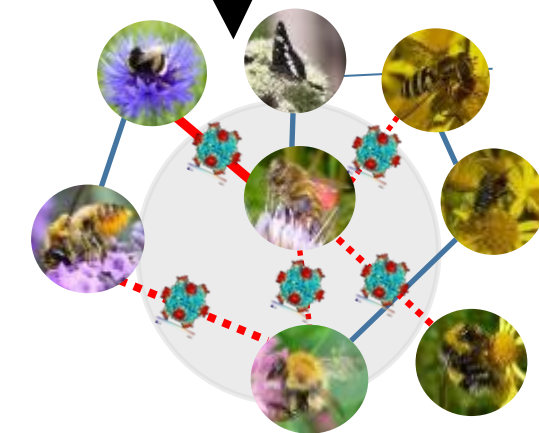
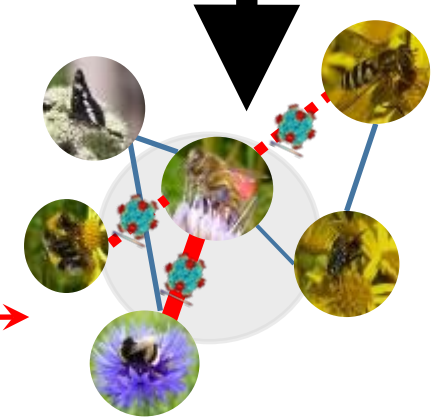
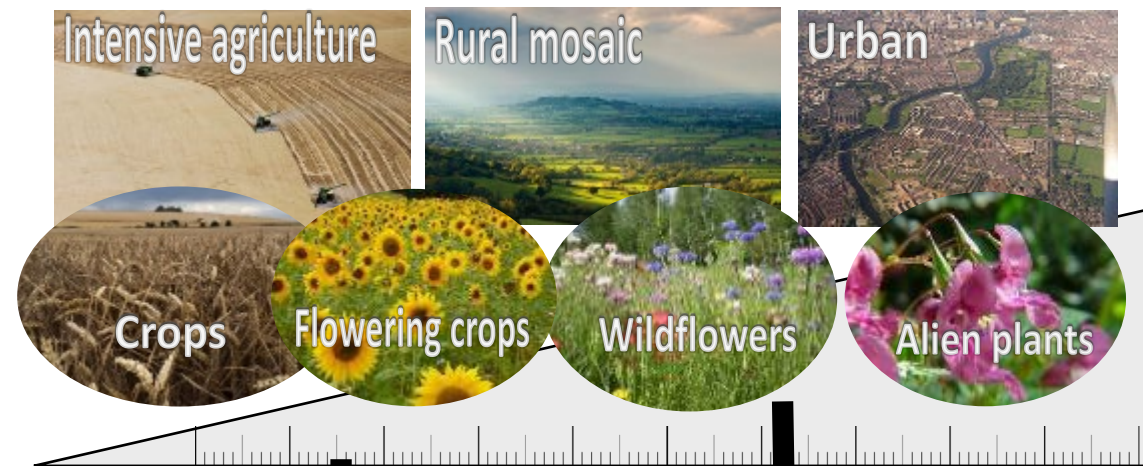
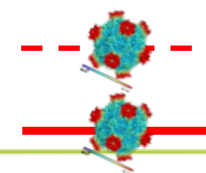
Spill-back



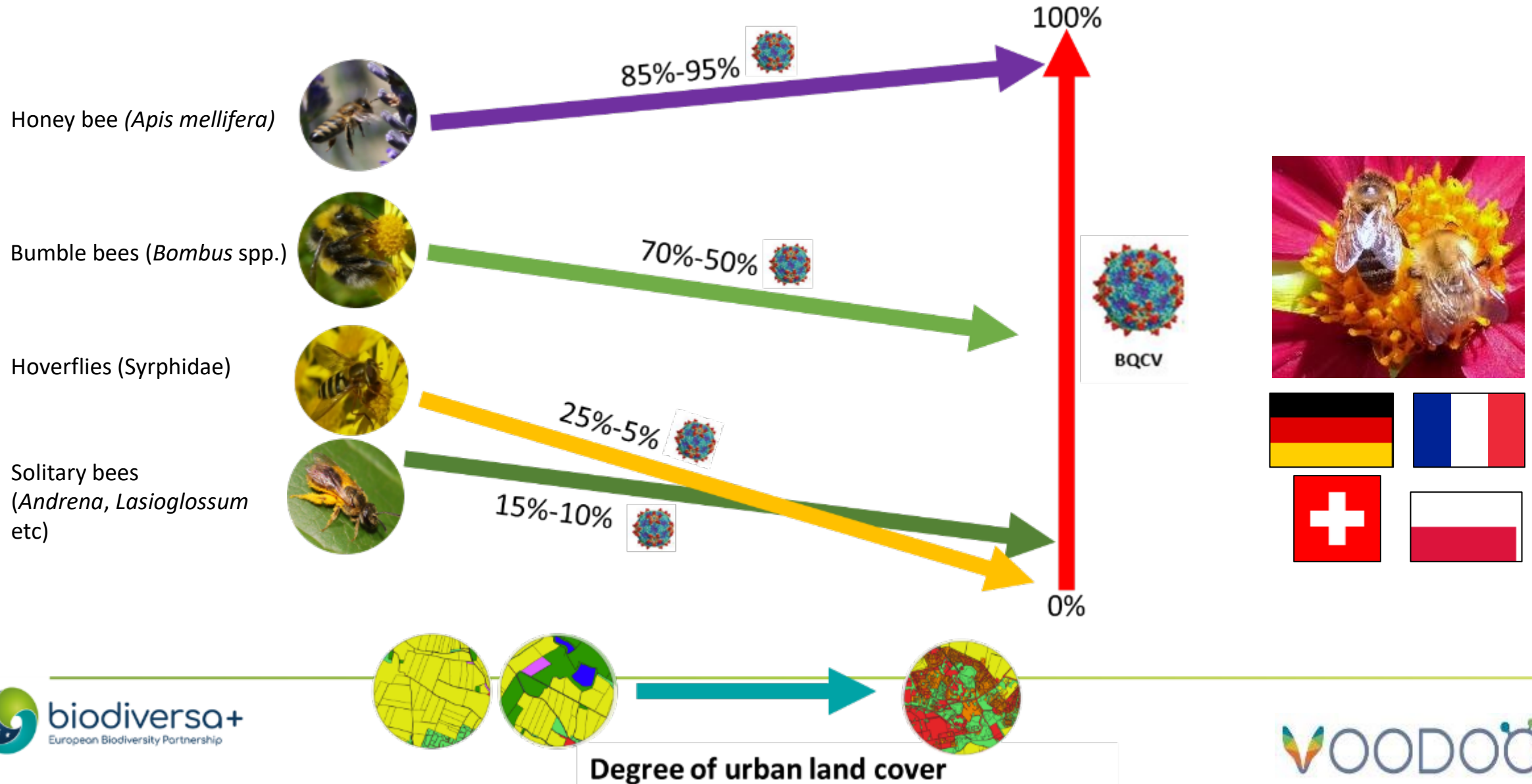
Spillover-Spillback



Viral transmission:  
Dash = hypothesis  
Solid = known

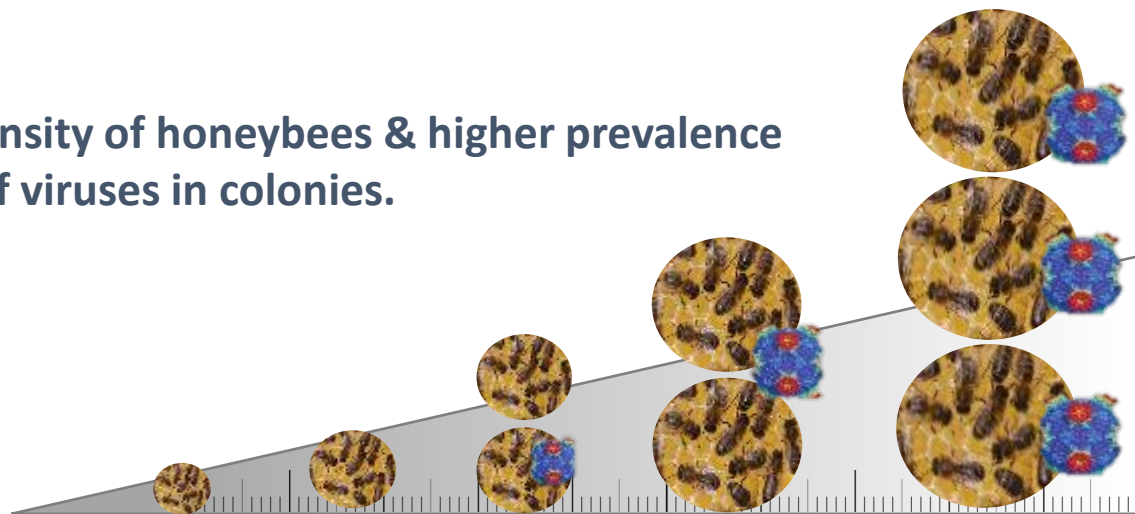


# Key message 1: Prevalence of the virus (BQCV) varies among different pollinators and is shaped by landscape



## Key message 2: Transmission of viruses between honey bees and wild pollinators is driven by viral density and ecological niche overlap

Greater density of honeybees & higher prevalence and load of viruses in colonies.



Greater degree of overlap in flower use with the managed honey bee



Higher risk of viral spillover from managed honey bees to wild pollinators



# Take home messages

- Honey bees are main viral host
- Virus is detected in wild pollinators
- Boosting a diversity of pollen and nectar sources (habitats) at landscape scales
  - Dilute the risk from pathogen spillover
  - Boost wild pollinator populations





# Acknowledgements



Adam Vanbergen



Willem Proesmans



Maryline Pioz



Cedric Alaux



Anne Dalmon



Robert Paxton



Oliver Schweiger



Hans Thulke



Heidi Wittmer



Josef Settele



Hajnalka Szentgyorgyi



Anna Gajda

Peter Neumann



Matthias Albrecht



Contact: Adam VANBERGEN

[adam.vanbergen@inrae.fr](mailto:adam.vanbergen@inrae.fr)

<https://voodoo-project.eu/>



Thanks to funders, the VODOO consortium especially all the PhD, Masters students and technicians without whom the project is not possible!

# SuppressSOIL - Soil biodiversity and suppressiveness of soil against plant diseases and insect pests

By Yvan Moënne-Loccoz

*P1: Université Lyon 1 (Yvan Moënne-Loccoz, Daniel Muller, Gilles Comte)*

*P2: Université de Lausanne (Christoph Keel)*

*P2a: Agroscope Changins (Thomas Steinger)*

*P2b: AGRIDEA (Numa Courvoisier)*

+ collaboration Belgrade University

*P3: UFZ Halle (François Buscot)*

*P4: Julius Kühn-Institut, Braunschweig (Kornelia Smalla)*

# What is the contribution of soil microbiome diversity to protection of crops against soil-borne pathogens and insect pests in a changing environment ?

In certain soils, the soil microbiome protects crops against root pathogens (= disease suppressiveness) :

- Which microbiome traits confer suppressiveness ?
- Protection also from insect pests ?
- Can organic matter be used to stimulate the soil microbiome and confer suppressiveness ?
- Which impact of global change on soil microbial diversity and suppressiveness ?

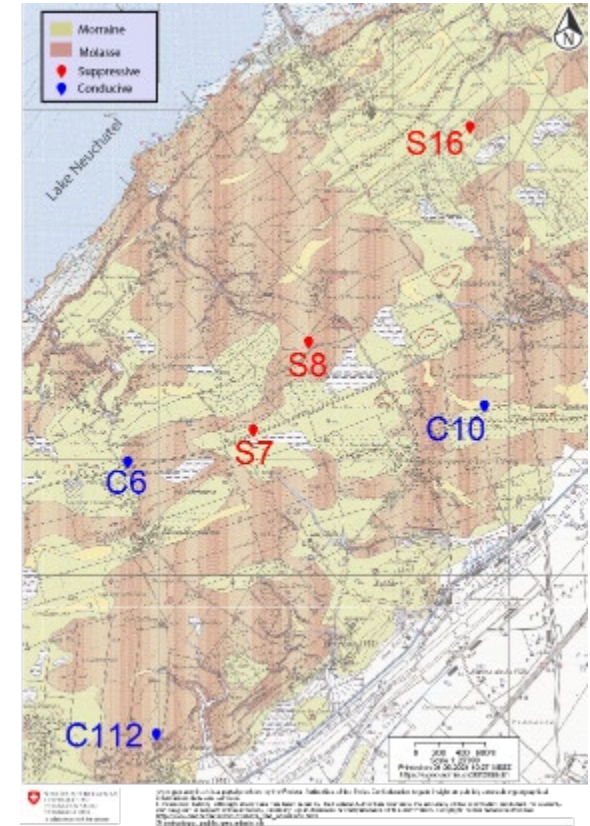


*Oulema  
melanopus*



# Some key results - Soil microbiome and crop protection

- Soil suppressiveness: involves common but also local properties (at different scales).
- New microbial actors identified.
- Suppression can extend to the case of insect pests.
- Global change conditions affect soil suppressiveness, more under conventional than organic agriculture.





## Societal and/or policy impact - Soil microbiome and crop protection

- Suppressiveness is rather site-specific : it emphasizes the need to assess its geographic distribution to help guide farming decisions (*soil analysis*).
- Importance of soil biodiversity for suppressiveness : biodiversity monitoring tools can be useful when testing new farming practices (*soil management*).
- Suppressiveness can also entail protection from herbivory insects : microbiome management can bring additional benefits (*soil awareness*).
- Global change can affect suppressiveness potential : suppressiveness today does not mean automatically suppressiveness tomorrow (*cropping system*).

# FunProd (synthesis project): Relationships between functional diversity and food production and quality under ecological intensification

By Klaus Birkhofer, Brandenburg University of Technology, Germany

**Emmanuel Kesse-Guyot**, Nutritional Epidemiology (EREN) – INRAE/ INSERM/CNAM/Paris 13 University – Bobigny – France

**Adrien Rusch**, Vineyard Health and Agroecology (SAVE) – INRAE/Bordeaux Sciences Agro – Villenave d'Ornon– France

**Péter Batary**, Ecology and Botany – Hungarian Academy of Sciences – Vácrátót – Hungary

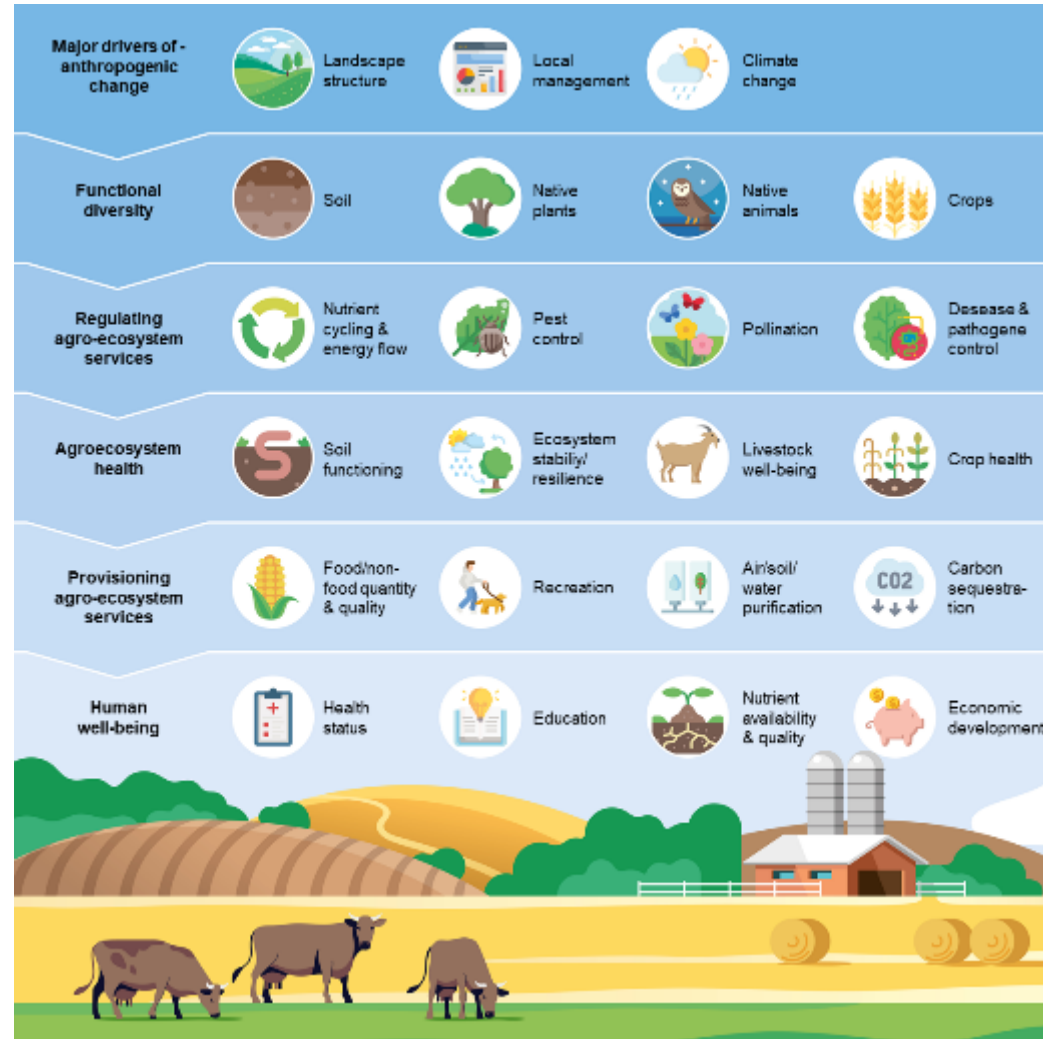
**Dara Stanley**, School of Agriculture and Food Science – University College Dublin – Dublin – Ireland

**Werner Ulrich**, Ecology and Biogeography – Nicolaus Copernicus University Toruń – Toruń – Poland

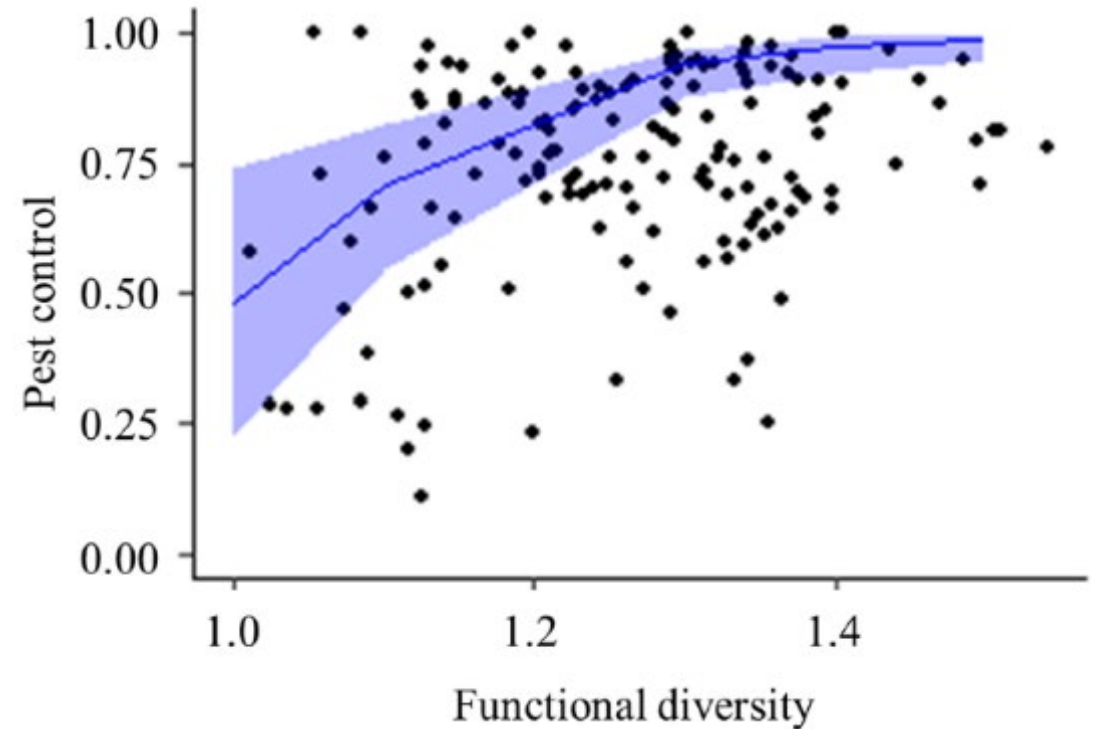
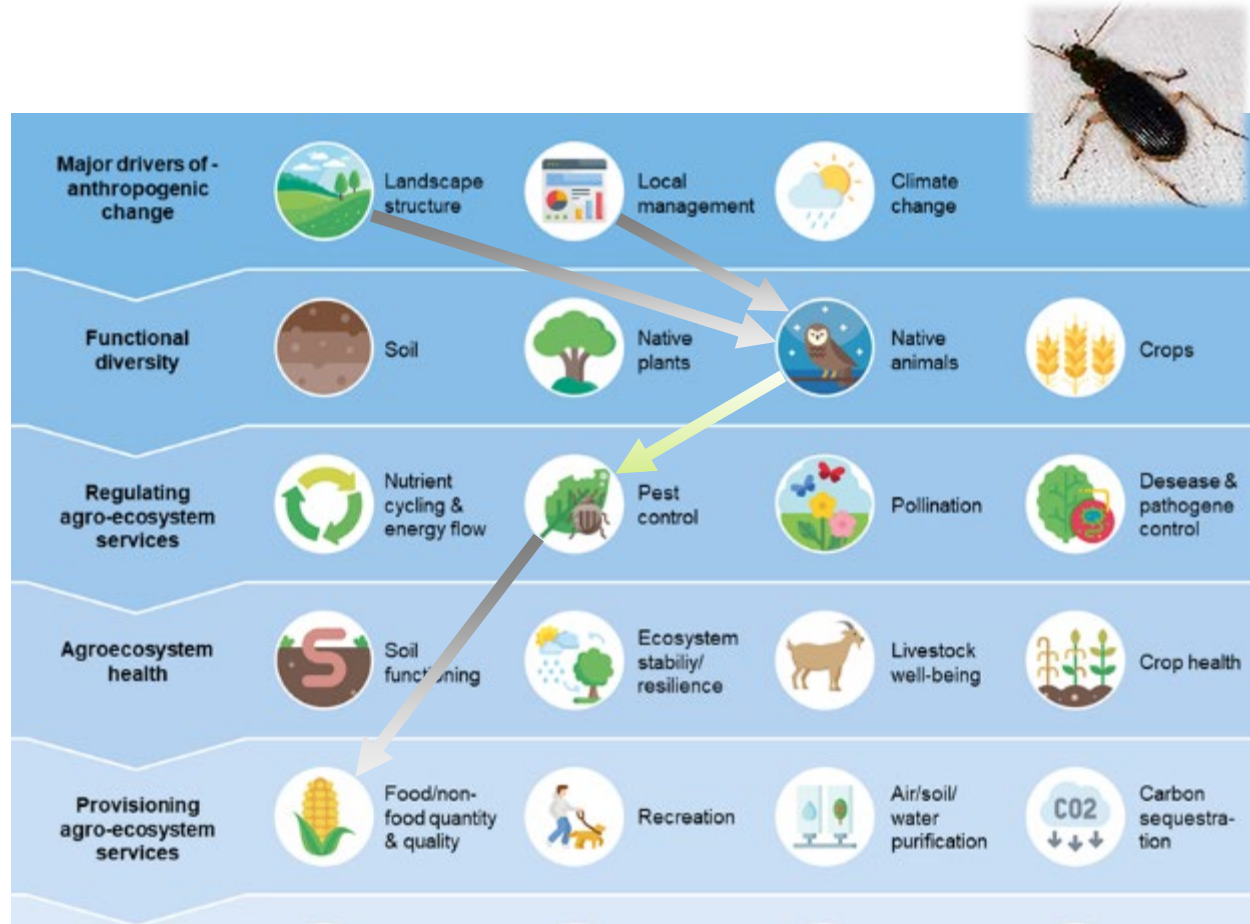
**Ewa Rembiałkowska**, Functional and Organic Food and Commodity – Warsaw University of Life Sciences – Warszawa – Poland

**Andrea Čerevková**, Environmental and Plant Parasitology – Institute of Parasitology – Košice – Slovakia

# Objectives FunProd (synthesis project)



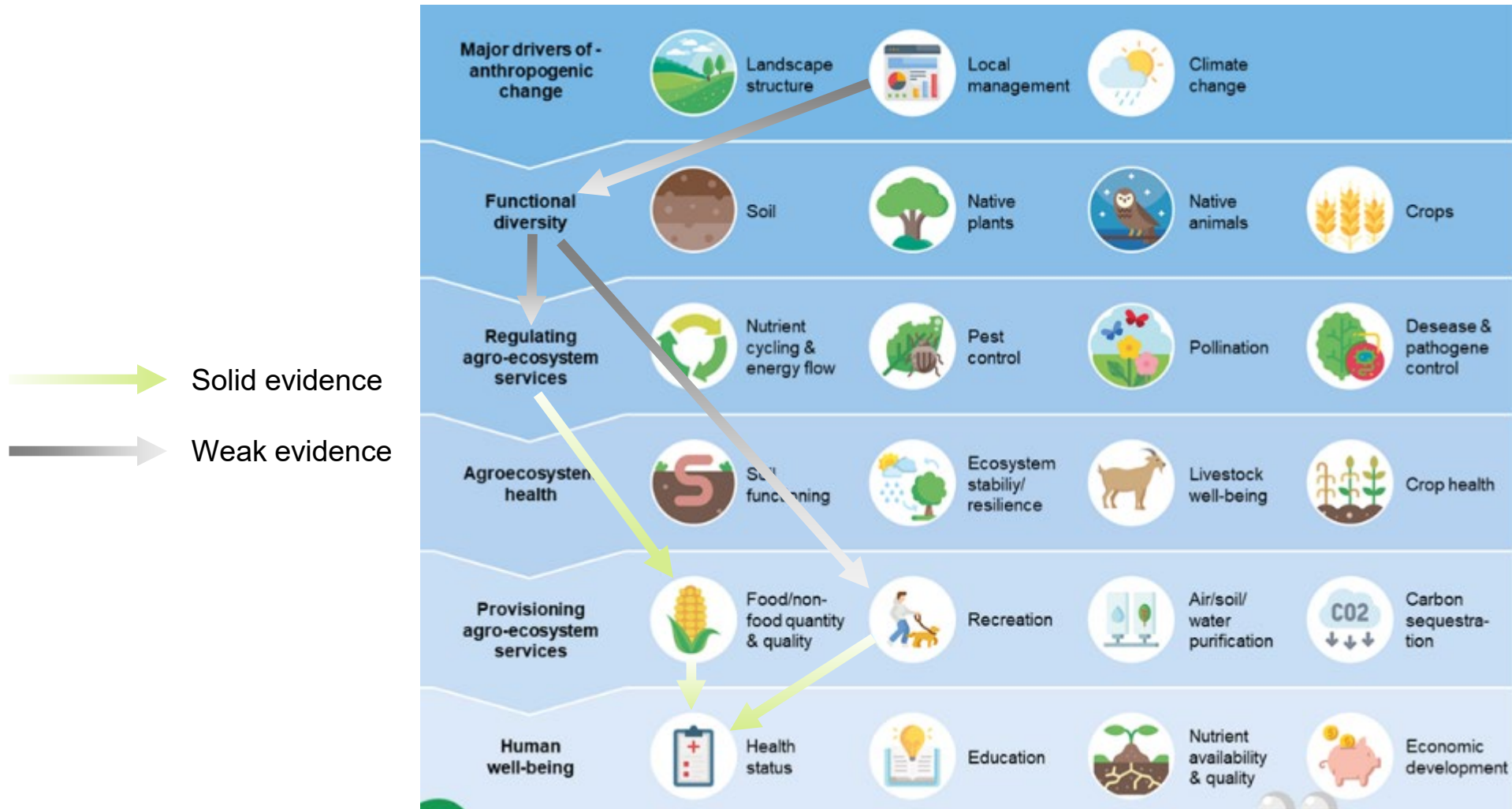
# Results FunProd (synthesis project)



positive no effect

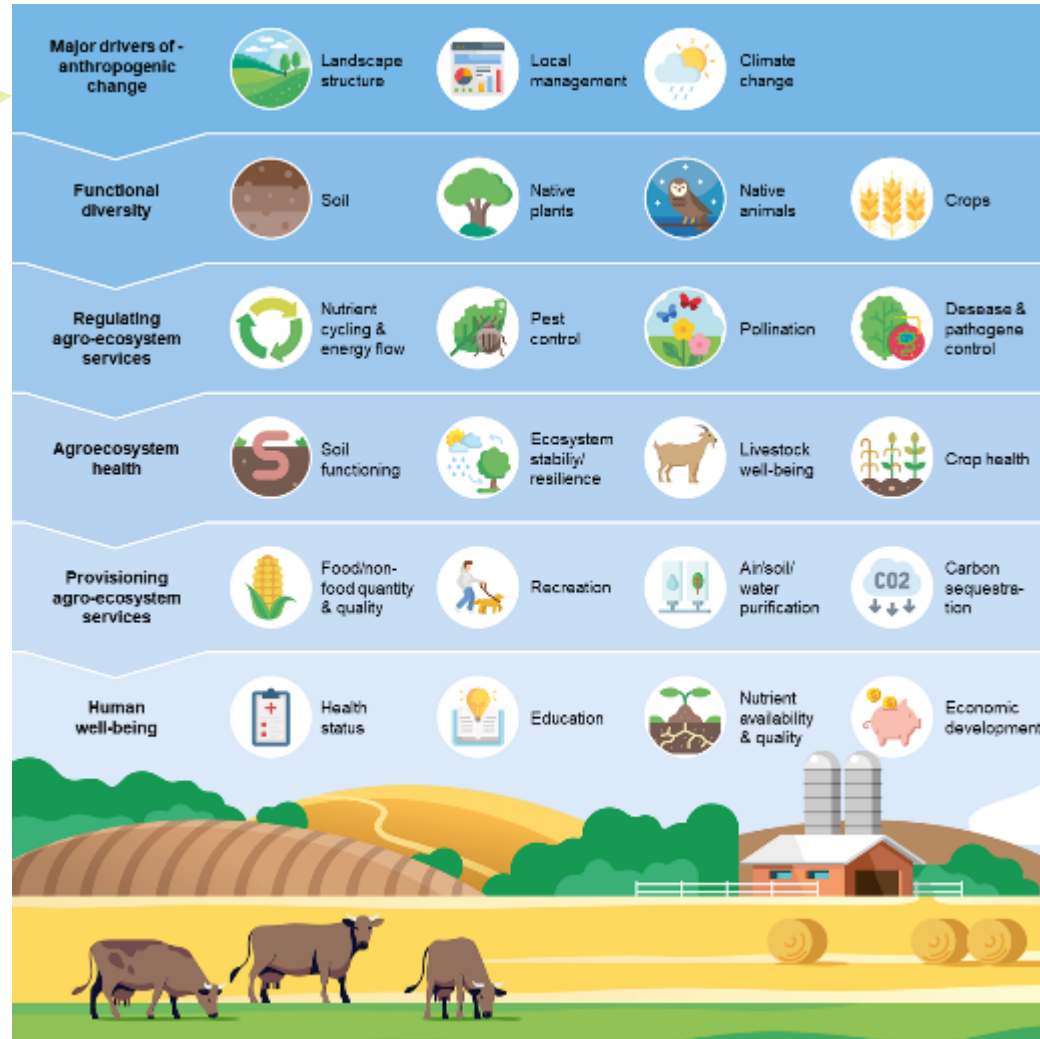
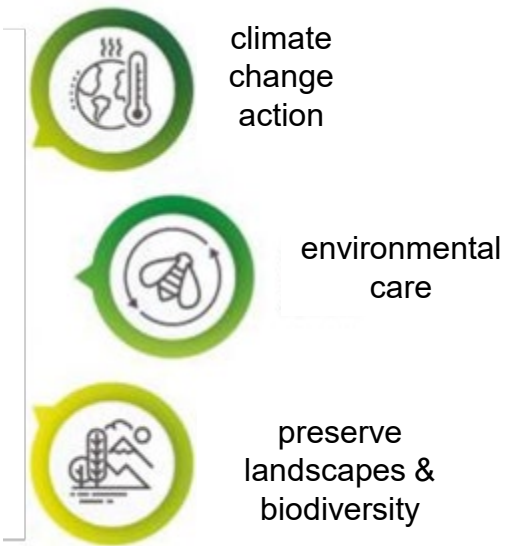


# Results FunProd (synthesis project)



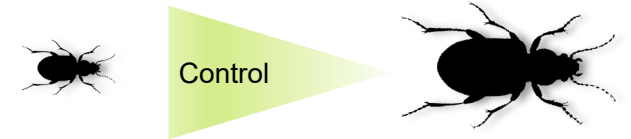
# Policy Impact & Challenges

addressed by eco-schemes  
(CAP 2023-2027)



Functional diversity is important for the provision of ecosystem services and health

What aspects of functional diversity?



How can landscapes and farmland be managed for their benefit?



How do you encourage those management practices?

fostering knowledge & innovation



# Time for discussion with the speakers

*Alejandra Parreno, NutriB2 project*

*Adam Vanbergen, VOODOO project*

*Yvan Moënne-Lozoz, SuppressSoil project*

*Klaus Birkhofer, FunProd project*

*Moderated by Miri Tsalyuk, Knowledge broker for Biodiversa+*

**For any questions: use “Q&A” FUNCTION**

Please note that **we may give you the possibility to ask your question orally.**

Stay tuned if you have a question & start your question by introducing yourself (name & organisation)

# FUNDED PROJECTS PRESENTATION SESSION 3



**Co-funded by  
the European Union**





## BIODIV-AFREID

# Biodiversity changes in African Forests and Emerging Infectious Diseases : should we worry ?

prof. dr. Herwig Leirs



*H. Leirs  
J. Mariën  
L. Joffrin  
S. Gryseels*

...



*E. Verheyen*



*D. Akaibe (+)  
G. Crespini*



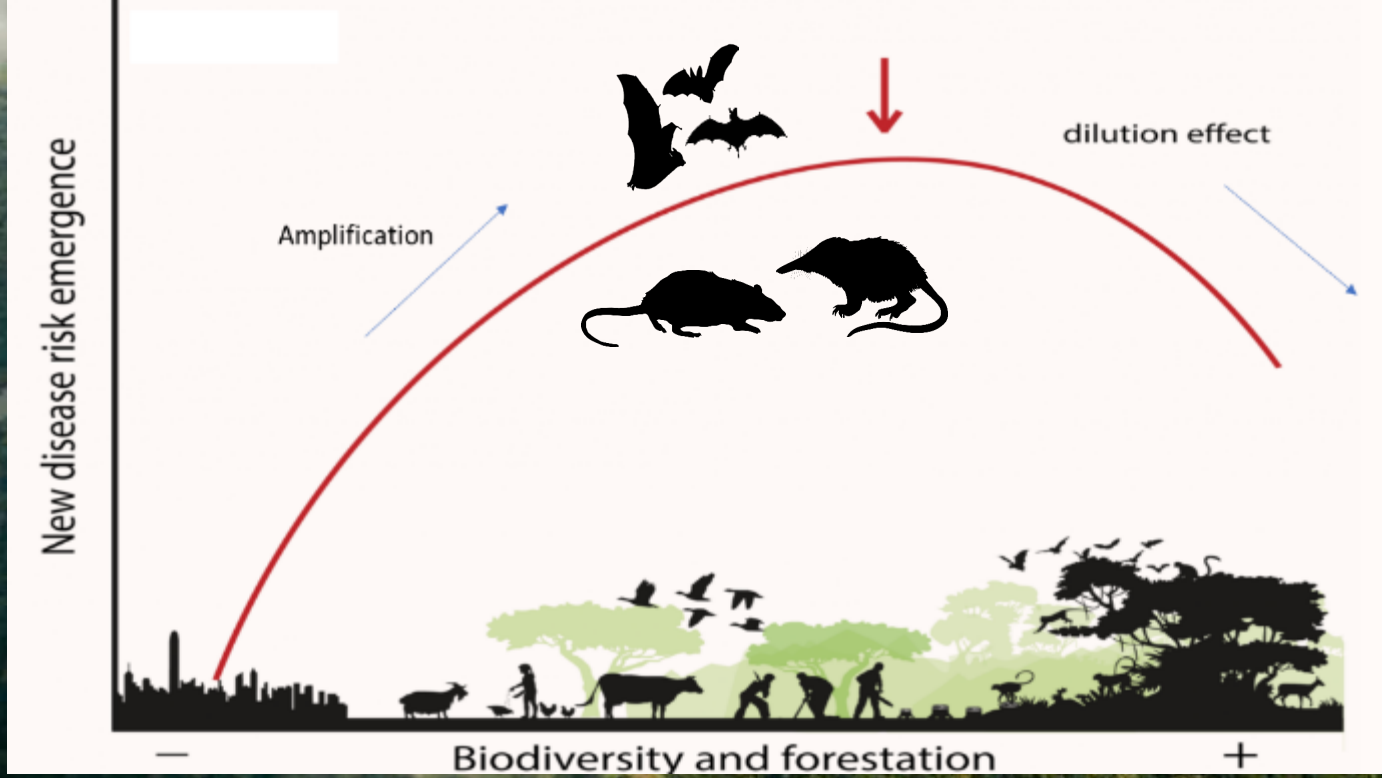
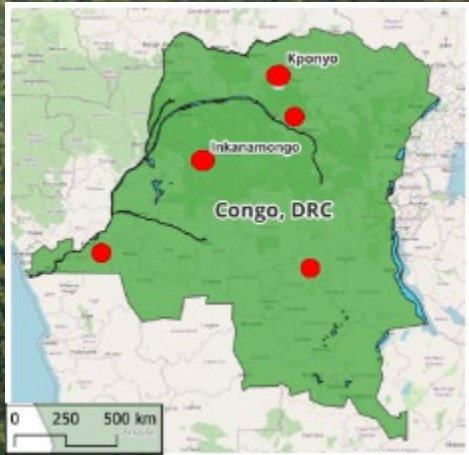
*M. Peeters  
A. Ayoub*



*F. Leendertz  
S. Calvignac-Spencer  
L. Lagostina  
E. Couacy-Hymann*

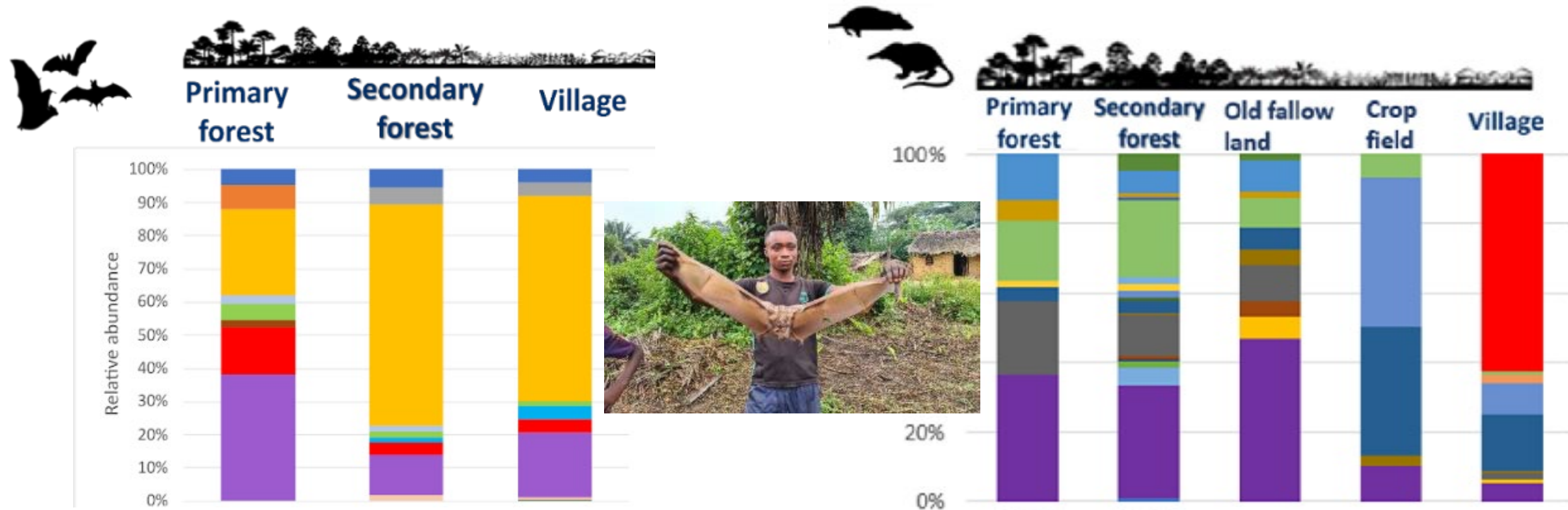








# Project objectives





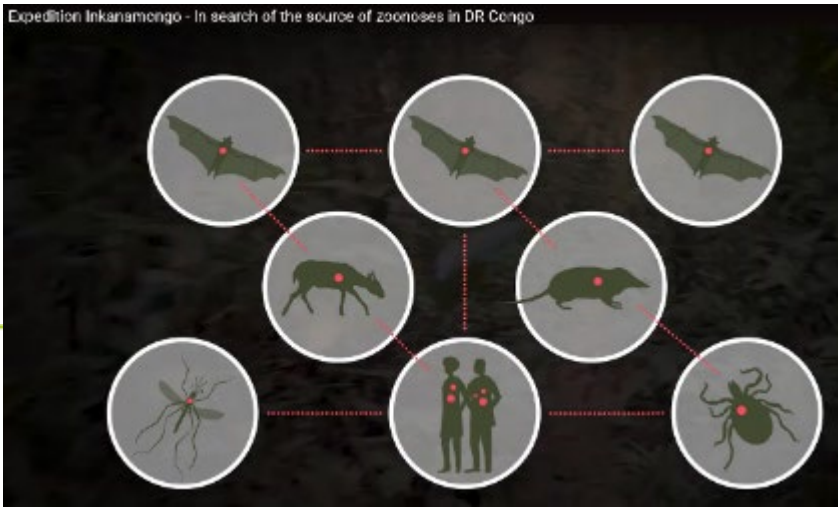
# Scientific results: Small mammal community composition and viruses



	 Paramyxovirus	 Coronavirus	 Flavi/ Hepacivirus	 Poxvirus	 Filovirus	 Orthonairovirus
Rodents (n=577)	14.9 %	0	9.3%	0	0	0
Shrew (n=179)	18.4 %	1.1 %	0	0	0	6.1 %
Bats (n=562)	3.0 %	17.3%	0.5%	0	0	0



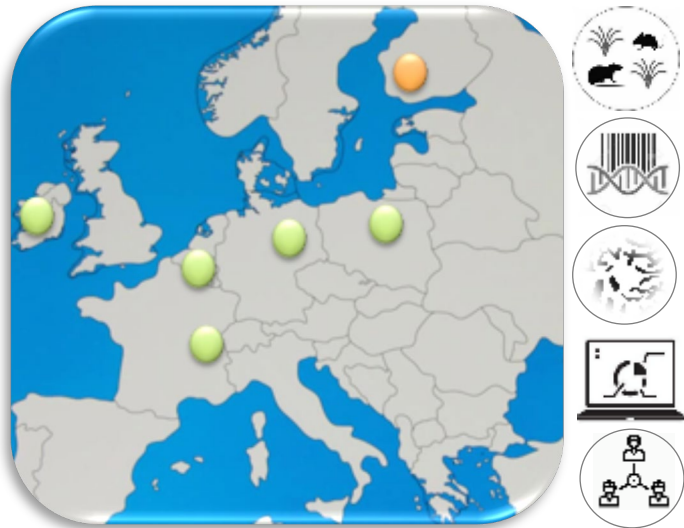
# Main output: societal impact





# BIOdiversity and RODent-borne DISeases in forests and urban green spaces

By Nathalie Charbonnel



P1: INRAE CBGP; P2: IRD MIVEGEC; P3: INRAE LESSEM, **France**  
P4: Univ Potsdam, **Germany**  
P5: Munster Technological Univ, **Ireland**  
P6: Medical Univ Gdansk, **Poland**  
P7: Univ Antwerp, **Belgium**  
P8: Univ Helsinki, **Finland**

# Context and objectives

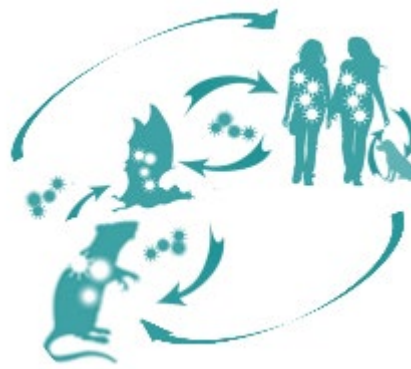
## Context

An era of (zoonotic) **pandemics**

**Human changes**, wildlife biodiversity and the circulation of zoonotic pathogens

**Small mammals** are main zoonotic reservoirs

**Forests and urban parks**, contacts between humans and wildlife, **and** high zoonotic risks



## Aim of the project

What relationships between living beings and their **diversity** may increase the **prevalence** and **transmission** of zoonotic pathogens?

## Specific objectives

**Describe** small mammal assemblages and their pathogens

**Model** influence of small mammals' diversity on pathogens' circulation

**Inform, consult, involve** stakeholders and policy makers to improve zoonoses prevention strategy & awareness campaigns

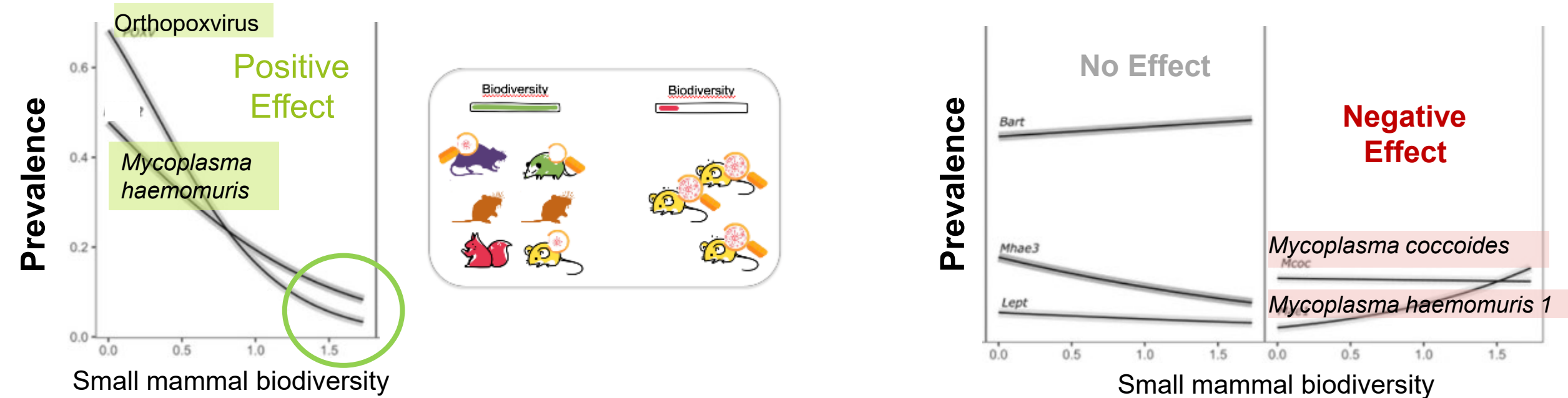






# Breakthroughs and their impacts

- Small mammal biodiversity **MAY** regulate certain pathogens' circulation (**DILUTION EFFECT**)

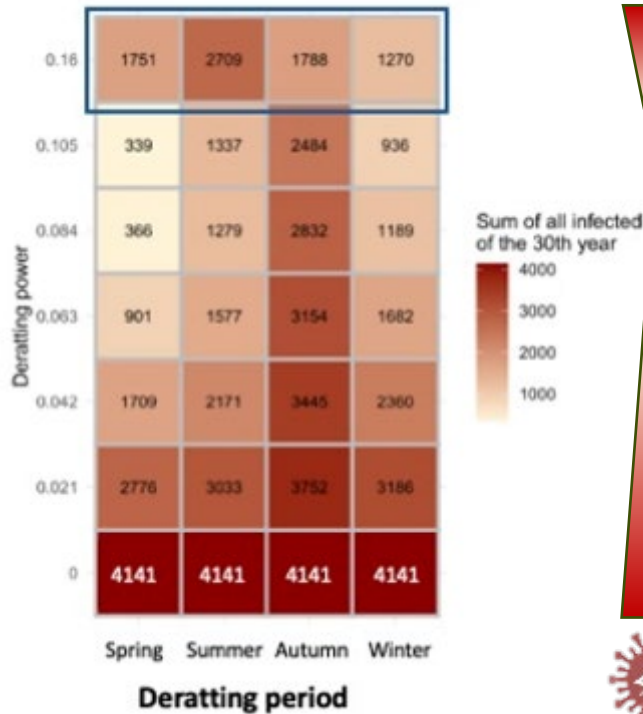


Biodiversity/health relationships are **complex and context-dependent**

**Essential to monitor** small mammals and their pathogens  
in response to anthropization or climate change

# Breakthroughs and their impacts

## Impact of rodent management on zoonotic danger



### Modeling Rats / Seoul virus Urban park

Beyond a certain rodent control pressure : re-increase in the total number of Seoul virus (SEOV) infected rats



## Knowledge is a good pre-requisite to make prevention strategies effective



**Bioroddis** Participez à notre projet de recherche sur les liens biodiversité – santé

**BioRodDis : un projet scientifique européen**


**Nos questions de recherche**

- Quelles **maladies** sont liées aux rongeurs ?
- Quels facteurs favorisent le risque de transmission aux humains ?
- Comment améliorer la **prévention** de ces maladies liées aux rongeurs ?

**L'implication des usagers des sites**

Participez à notre questionnaire en ligne, pour nous aider à :

- Identifier les lieux, publics et activités à risque face à ces maladies liées aux rongeurs
- Identifier l'état des connaissances sur les rongeurs et les maladies associées.

 **SCAN ME**

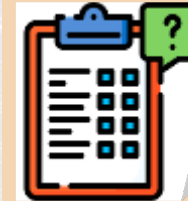
<https://sondages.inrae.fr/index.php/374135?lang=fr>

**ANR** **biodiversa** [https://www.inrae.fr/biodiversa-bioroddis\\_fre](https://www.inrae.fr/biodiversa-bioroddis_fre)

### Questionnaires

Users & practitioners  
3 countries

(Perceived) Knowledge of rodent-transmitted diseases  
=> Precautions against zoonoses



# TRUST AND ENGAGEMENT

## Unlocking the power of transdisciplinary collaboration



Before the project  
**PROJECT FRAMING**

Presentation of the  
project's idea & Discussion

During the project  
**INFORMATION**

Reports,  
Provision of data & results

**CO-PUBLICATIONS**  
**CO-DESIGN** of  
prevention strategies  
**MEDIAS & MEDIATION**



2019

2027

**Build and Strengthen Trust...**

**... Collaborate**

During the project  
**CONSULTATION**

Provision of authorization  
and information

During the project  
**INVOLVEMENT**

**FOCUS GROUP**  
**MEETINGS, WORKSHOPS**  
Solution for rodent control  
& zoonotic risk prevention

Since Bioroddis

**LOCAL HEALTH POLICY**  
**NEW PROJECTS &**  
**FUNDINGS**  
**INFERNO, ROCOCITY**



# Interview and Q&A session

*Herwig Leirs, BIODIV-AFREID project*

*Nathalie Charbonnel, BioRodDis project*

*Interview by Julie de Bouville, FRB, Biodiversa+ WP6 (communication) leader*

# Highlight of concrete achievements of projects in linking excellent science with support to practice and policy



Video available here:

<https://www.biodiversa.eu/2023/08/31/coronaviruses-in-the-wild-a-one-health-perspective/>

# FOSTERING POLICY IMPACT

## Introduction to policy briefs: co-learning, key results & recommendations

*by Miri Tsalyuk, Knowledge broker for Biodiversa+*



# **BiodivHealth Policy Briefs on Biodiversity & Health**

**Biodiversa+ Final Conference for BiodivHealth**

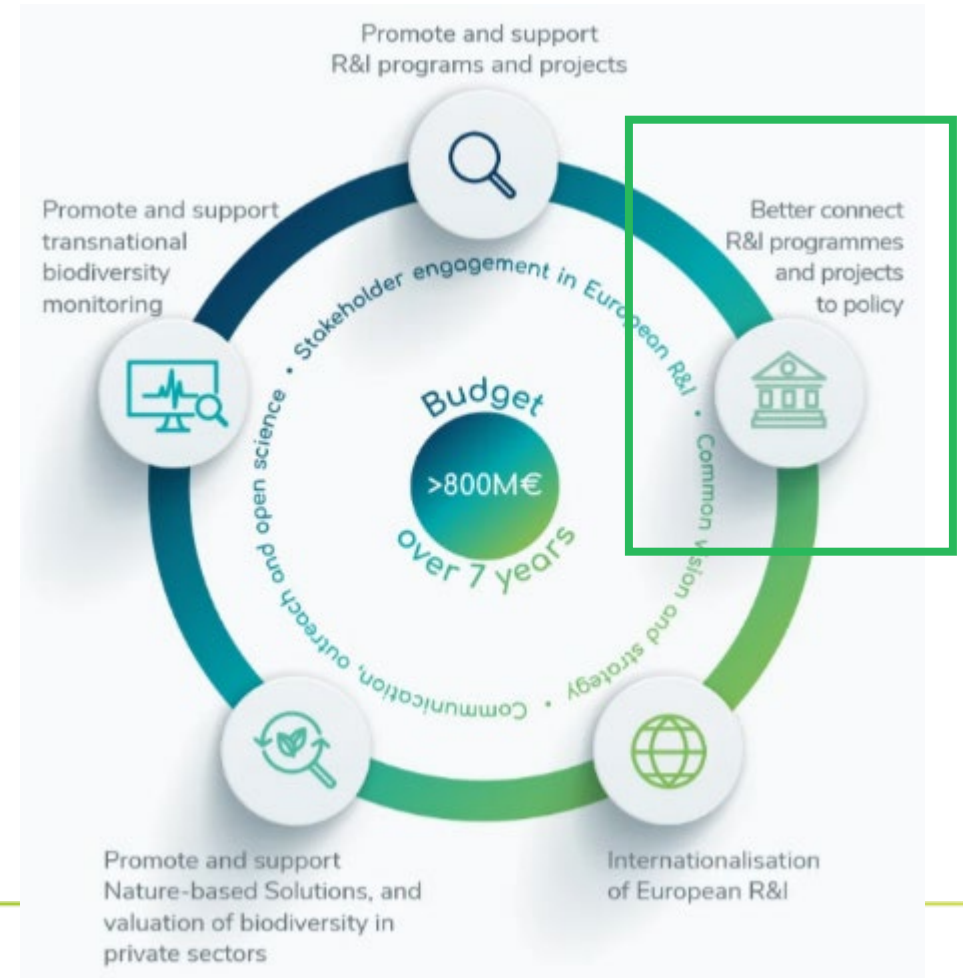
**November 28<sup>th</sup>, 2024**

**Miri Tsalyuk, PhD**

**[biodiversMT@gmail.com](mailto:biodiversMT@gmail.com)**

# Goals of the Policy Briefs

- Communicate Biodiversa+ supported research results to a wide audience.
- Provide information to support current policy processes.
- Provide policy and management recommendations to support both biodiversity and health for.



# Policy briefs development: work process

**Clustering workshops**

**Identifying relevant EU & global policies**

**Meeting with each research group PIs**

**Consolidating relevant scientific results**

**Summarizing scientific manuscripts**

**Policy advisory group meeting**

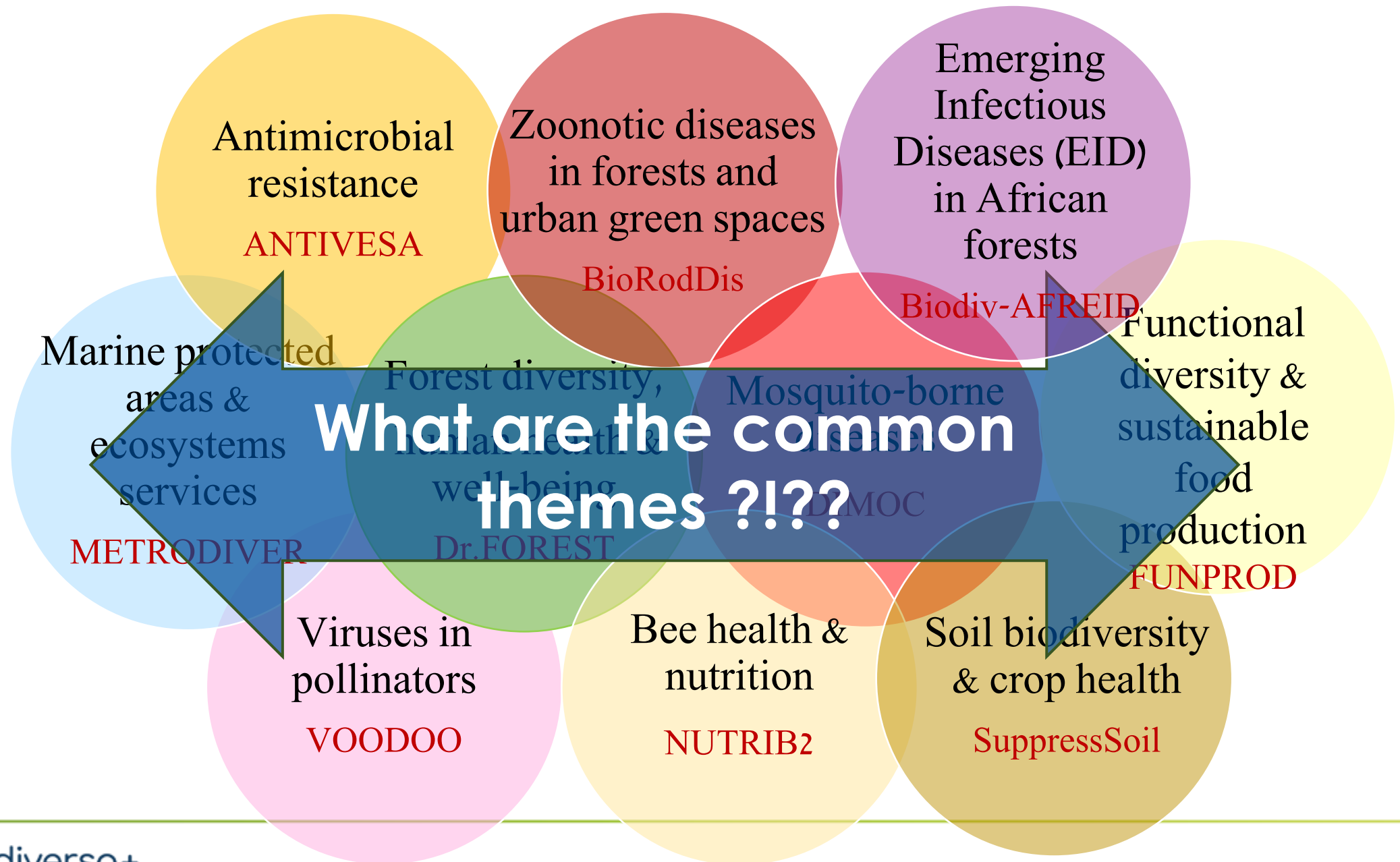
**Writing policy briefs**

**PIs & biodiverse+ team reviews**

**WP4 & Policy advisory group reviews**

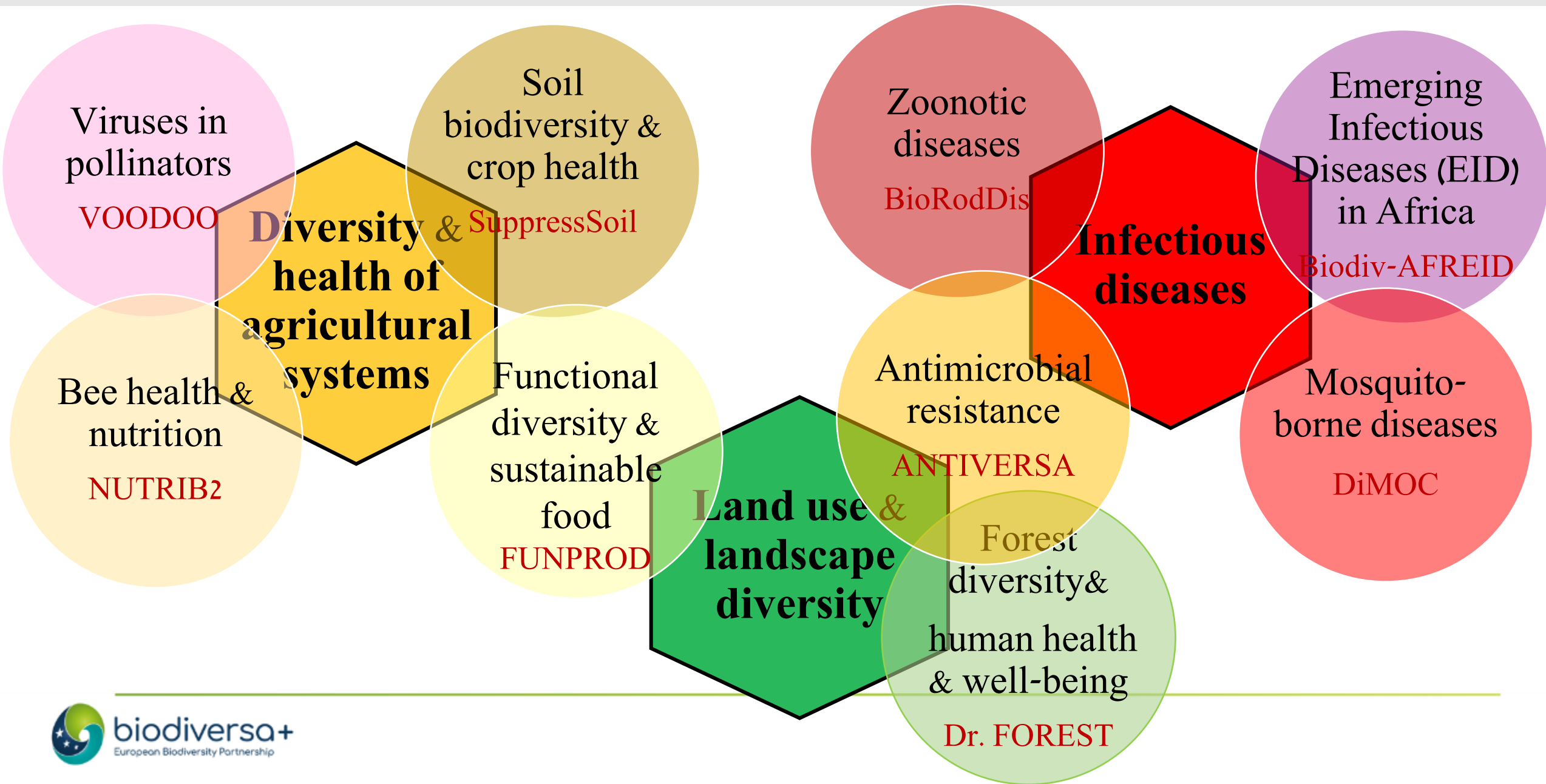
**Production**

 Policy  
 Science





# Clustering research project into policy themes



## Policy brief

## Health topics

## Research groups

### **Landscape Diversity Enhances Human Health**

- Nutrition
- Air pollution
- Heat stress
- Mental health
- AMR

FunProd  
Dr. Forest  
ANTIVERSA

### **Biodiversity mitigates health risks**

- Zoonotic disease
- EID
- Vector-Borne
- AMR
- Microbial diversity

Biodiv-AFREID  
BioRodDis  
Dr. Forest  
DiMoC  
ANTIVERSA

### **Biodiversity promotes healthy agricultural systems and benefits human health**

- Ecosystem health
- Pollinator health
- Soil and plant health

FunProd  
NutriB2  
VOODOO  
SuppressSoil

# Policy brief #1:

## Landscape diversity enhances human health

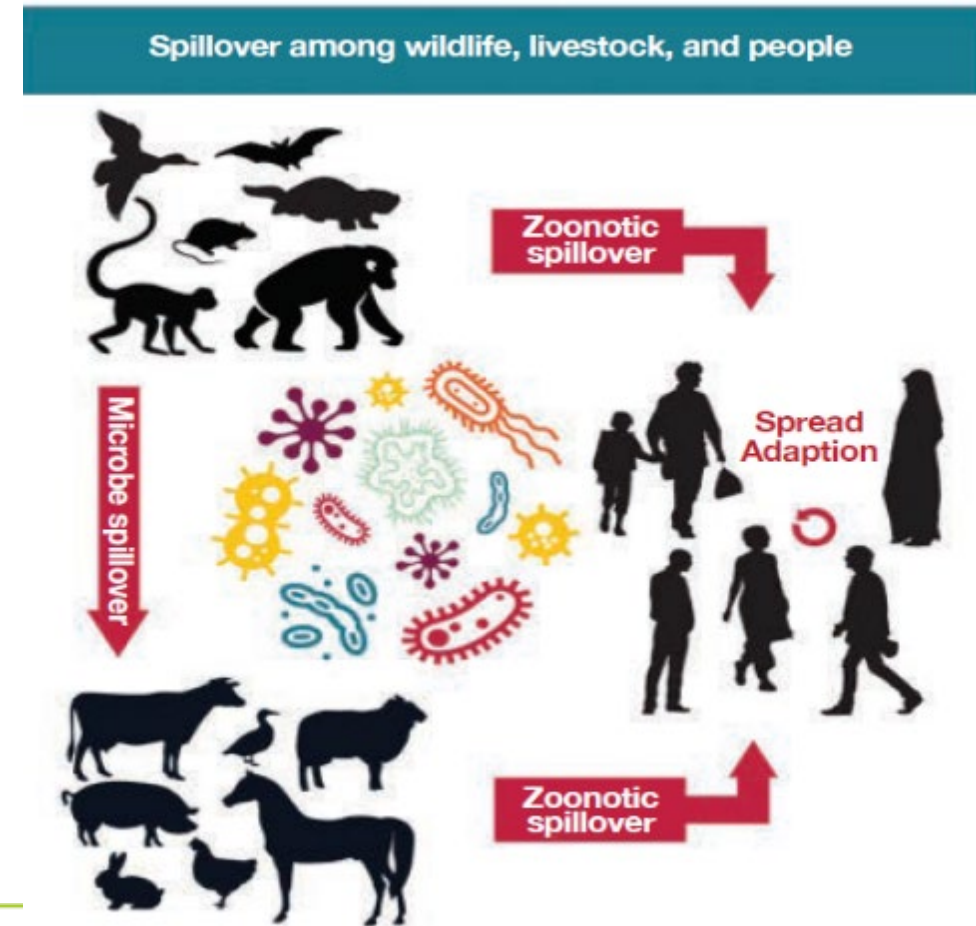
- Protect **landscape diversity** (types, shapes, and arrangements of natural patches) to gain different human health benefits.
- Conserve diverse **agricultural landscapes** to improve food quality.
- Protect and restore **forests** with high diversity of species, canopy structures, and ages to reduce **thermal stress**, reduce **air pollution**, and improve **mental health**.
- Protect watersheds since even small changes in land use can introduce **antimicrobial resistance** into the environment.



# Policy brief #2:

## Biodiversity mitigates health risks

- Monitor wildlife, since it may carry significant number of pathogens.
- Protect natural habitats to prevent spill-over of zoonotic pathogens.
- Protect species diversity and habitat properties that can reduce pathogen prevalence.
- Protect **microbial diversity** to reduce pathogen infections in wildlife and plants, and to prevent spread of antimicrobial resistance to the environment.





# Policy brief #3:

## Biodiversity promotes healthy agricultural systems and benefits human health

- Protect **functional diversity**, which is essential to provide regulatory ecosystem services in agricultural systems.
- Protect floral and landscape diversity to support the variable nutritional needs of pollinators.
- Protect floral diversity and implement biosecurity in beekeeping to prevent pathogen spread among pollinator species.
- Support soil microbial diversity to suppresses plant pathogens and insect pests.





# Lessons learned

- ❖ Species -, landscape-, and functional diversity are critical for our health, wellbeing, and survival.
- ❖ Protecting and restoring diversity for health often involves solutions and planning on the landscape-level.
- ❖ Collaborations of environmental scientists and ecologist with the health sector should be strengthened to address the tight links between biodiversity and health.
- ❖ Planning for needed societal and policy impact early in the research stages promotes excellent science with high practical value.





# Thank you !

- **BiodivHealth project coordinators**
- **PIs and researchers**
- **SEPA team:**
  - Hannah Ostergard Roswall
  - Henrik Lange
  - Neda Farahbakhshazad
- **Biodiversa+**
  - Frédéric Lemaître
  - Cécile Mandon, Marlies Laethem,
  - Sophie Germann,
  - Julie de Bouville, Lennie Plaetinck,
  - Phong Hoang
- **Policy advisory group & reviewers**
- **Biodiversa+ WP4**



## Roundtable discussion between the funded projects, the developers, and policy makers

*facilitated by Miri Tsalyuk, Knowledge broker for Biodiversa+, with the following panelists:*

- Klaus Birkhofer (FunProd project)*
- Nathalie Charbonnel (BioRodDis project)*
- Daniela Haluza (Dr. FOREST project)*
- Karin Zaunberger (DG ENV, EC)*
- Cristina Romanelli, Programme Officer, Biodiversity, Climate Change and Health (WHO)*



# CONCLUDING REMARKS & WHAT IS NEXT?

*by Julie de Bouville and Magnus Tannerfeldt*

# Communication plan

## Key objectives

- Inform EU policymakers and stakeholders about biodiversity's vital role in public health and sustainable agriculture, highlighting key research and results from BiodivHealth projects through policy briefs.
- Build a network with media and influencers in Brussels to amplify the findings and influence public policy.
- Engage Biodiversa+ partners to disseminate policy briefs in their respective countries.
- Measure the impact of dissemination efforts through engagement metrics and media coverage.

# Communication tactic

## Develop influence within the European Community in Brussels

- **Press briefing** on December 5, 10 days before the launch of the IPBES NEXUS report

## Partners and stakeholders Engagement

- Communication tool kit with key messages (December 5)

## Targeted dissemination to key stakeholders

- Leverage the networks of key actors to **disseminate them to high-value contacts (By december 5)**

## Wider public communication

- Social media campaign based on the key messages of the policy briefs (December 6)





**biodiversa+**  
European Biodiversity Partnership

EUROPEAN PARTNERSHIP



Co-funded by  
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**Thank you!**



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