BELGIAN ONE HEALTH

Event Report

Ecosystems in the balance

supporting future policy and research

22-23 January 2025

Brussels

PASTEUR NETWORK

sciensano

Health Food Chain Safety Environment

.be Belgian Biodiversity Platform

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1. INTRODUCTION

This report summarises key insights from the BeOH event "*Ecosystems in the balance: supporting future policy and research*" held in Brussels on 22–23 January 2025.

Experts, policymakers, and stakeholders explored the impact and role of biodiversity loss, climate change, wildlife trade, IAS, data and monitoring on One Health. The following pages provide an overview of the organisers, speakers, programme, highlights of workshop discussions, keynote abstracts, and poster presentations.

What was the event about?

Sciensano and the Belgian Biodiversity Platform are both involved in promoting the One Health approach.

Sciensano (see Sciensano One Health webpage and this booklet, p. 9) is the Belgian scientific health institute and houses most of the reference centres and laboratories for human and animal infectious diseases, zoonoses and AMR. The institute has developed a One Health programme, which brings together expertise in areas such as AMR, respiratory infections, foodborne diseases, zoonoses, vector-borne diseases, the exposome, climate, and innovative technologies. The institute also has extensive expertise in non-communicable diseases, and monitors health risks, analyses health care, etc. The outcomes of these activities provide the Belgian health authorities with timely and evidence-based advice on health policy.

The Belgian Biodiversity Platform (see BBPf One Health webpage and in this booklet, p. 7) supports the One Health approach by promoting the communication between scientists and policy makers from different backgrounds (i.e. human, animal and plant health, natural and social sciences), their multidisciplinary collaboration and capacity building.

The complementary expertise of these two organisations provided a strong foundation for organising a two-day One Health event. It focussed on the role of environmental factors influencing possible pathways of infectious disease emergence, as well as prevention, early warning mechanisms, and effective preparedness solutions.

The overarching topics of the event were (1) the impacts of biodiversity loss and climate change, (2) the risks associated with wildlife trade and Invasive Alien Species, and (3) data and monitoring approaches.

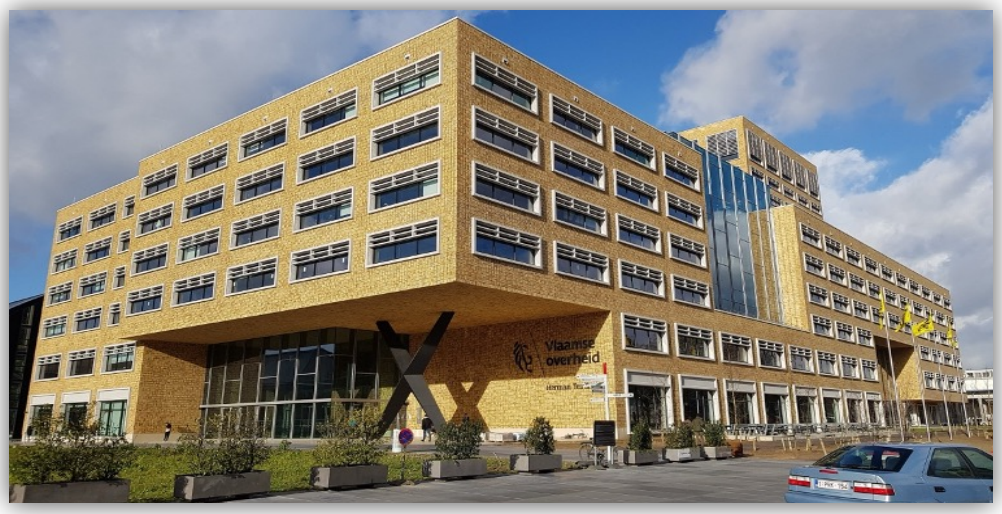
The event was aimed at experts and stakeholders interested in intersectoral cooperation, while also engaging administrators and policymakers. Keynote presentations - on the areas highlighted above - were followed by discussions in breakout groups.

The conclusions of the exchanges between experts and policymakers will inform a position paper (to be prepared and published by the organisers), providing guidance to reinforce cross-sectoral, multidisciplinary collaboration and strengthen prevention and preparedness strategies.

Venue

The two-day event took place in the Herman Teirlinck building, located at Havenlaan/Avenue du Port, 88 - 1000 Brussels.

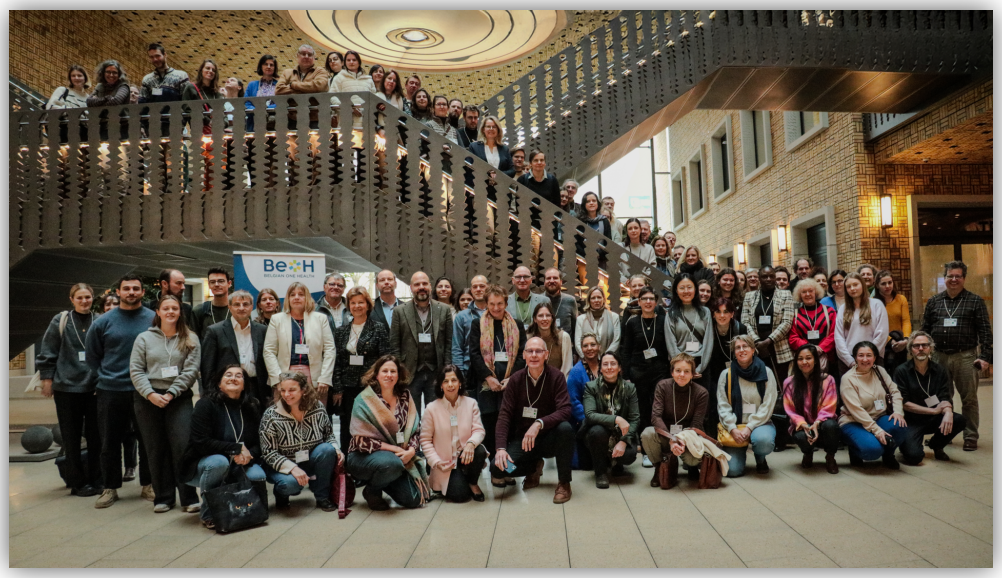
We encouraged all participants to use public transportation when coming to our event.



The Herman Teirlinck building

Event resources

- ✓ This report, the keynote presentations, and posters can be found on the event's page
- ✓ The pictures are published on the Belgian Biodiversity Platform's Flickr account
- ✓ For any questions or further information regarding the event: BeOH@sciensano.be



The participants

2. THE ORGANISER: THE BELGIAN ONE HEALTH NETWORK

The aim of the Belgian One Health network (BeOH) is to support collaboration, capacity building and communication among Belgian One Health actors. The BeOH activities are supported by a Coordination Team composed of experts from different research organisations as well as policy makers and other stakeholders.

One Health

The 'One Health' concept is a holistic, multi-, inter- and transdisciplinary approach to health, which recognizes that human, animal and environmental health are closely intertwined and interdependent.

The One Health High-Level Expert Panel (OHHLEP) of the Quadripartite (WHO, WOAH, FAO, and UNEP) has developed a widely accepted One Health definition, which is also subscribed by the Belgian One Health network (BeOH).

The WHO website offers a nice overview of key facts and the scope of the challenges our world faces in terms of One Health.

Since the start of the new millennium many One Health initiatives have been developed worldwide. At the Belgian level the Belgian One Health network was created in 2019.

A brief overview of Belgian One Health

In 2011 the Belgian Biodiversity Platform organised the Belgian Biodiversity & Health conference, aiming to raise scientific and policy attention in Belgium for the relation between Biodiversity and Public Health, to stimulate networking amongst experts and to discuss how the knowledge base on the issue could be improved. The conference wanted to contribute to building a Belgian Community of Expertise and Practice working on these topics.

As a follow-up of this conference, a structural support for Biodiversity and One Health was established. Moreover, a series of publications followed, and an Inventory of Scientific Research Needs and Ideas (2012).

In 2016, the Belgian Biodiversity Platform organised the European One Health / EcoHealth Workshop, building upon a survey in which a wide range of relevant experts from science, policy and societal practice were consulted to give their perspective on the One Health ambition, and aiming to formulate messages on key lessons learned and key steps forward.

In 2019, the Belgian One Health network (BeOH) was launched (see launch report).

3. ORGANISING AND SCIENTIFIC COMMITTEES

Organising Committee

- Nicolas Antoine-Moussiaux (Université de Liège, Faculté de Médecine Vétérinaire)
- Miryam Benalla (FPS Health, Food Chain Safety and Environment)
- Robbert Boudewijns (KU Leuven - Leuven One Health)
- Claire Collin (FPS Health, Food Chain Safety and Environment)
- Maxime Coupremanne (Belgian Biodiversity Platform - DEMNA)
- Sigrid De Keersmaecker (Sciensano)
- Lise Goudeseune (Belgian Biodiversity Platform)
- Anna Heck (Belgian Biodiversity Platform)
- Hein Imberechts (Sciensano)
- Thomas Janssens (FPS Health, Food Chain Safety and Environment)
- Divija Jata (Belgian Biodiversity Platform)
- Moira Kelly (Sciensano)
- Svetlana Malysheva (Sciensano)
- Marcella Mori (Sciensano)
- Ashley Norman (Belgian Biodiversity Platform)
- Davide Olchini (Médecins du Monde)
- Lennie Plaetinck (Belgian Biodiversity Platform)
- Stefan Roels (Sciensano)
- **Dominique Vandekerchove (Sciensano and Belgian Biodiversity Platform; organiser of the BeOH event)**
- Sylvie Vekemans (Sciensano)

Scientific Committee

- Robbert Boudewijns (KU Leuven, Leuven One Health)
- Sigrid De Keersmaecker (Sciensano, One Health Working Group Innovation)
- Hein Imberechts (Sciensano, One Health)
- Thomas Janssens (FOD VVVL, One Health)
- Moira Kelly (Sciensano, One Health Working Group AMR)
- Svetlana Malysheva (Sciensano, One Health Working Group Exposome)
- Marcella Mori (Sciensano, Infectious Animal Diseases)
- Stefan Roels (Sciensano, Scientific Coordination)

Event Report Team

- Maxime Coupremanne (Belgian Biodiversity Platform - DEMNA)
- Sigrid De Keersmaecker (Sciensano)
- Lise Goudeseune (Belgian Biodiversity Platform - RBINS)
- Anna Heck (Belgian Biodiversity Platform)
- Hein Imberechts (Sciensano, One Health)
- Divija Jata (Belgian Biodiversity Platform)
- Stefan Roels (Sciensano)
- Dominique Vandekerchove (Sciensano - Belgian Biodiversity Platform)
- Sylvie Vekemans (Sciensano)

4. INFORMATION ON THE SPONSORS

I. Belgian Biodiversity Platform

FOR SCIENCE, POLICY AND PRACTICE

The Belgian Biodiversity Platform (BBPF) is a science-policy interface body funded by the Belgian Science Policy Office (BELSPO) and is supported by a Cooperation Agreement between the federal and concerned federated authorities. Within the field of biodiversity, it acts as a broker between policy, science and practice.

To fight biodiversity loss, different types of stakeholders need to work hand- in-hand, from public authorities to scientists, businesses, citizens, practitioners and many more. The Platform maintains privileged relations with scientists and policymakers, but our strategic partners are not restricted to these two communities. Indeed, science-policy interfacing (SPI) activities encompass broader interactions between knowledge holders and people involved in governance, decision-making and biodiversity management on the ground.

OUR MISSION

"Decision making on biodiversity issues is grounded on sound evidence and takes place through collaboration between actors"

THE STRATEGIC OBJECTIVES OF THE PLATFORM:

- Strategic Objective 1: 'To provide capacity and infrastructures on biodiversity science, policy and practice
- Strategic Objective 2: 'To facilitate collaboration between regional and federal actors in support of biodiversity science-policy interfacing'.
- Strategic Objective 3: 'To catalyse innovative approaches which improve the transdisciplinary evidence-base on biodiversity'

These three strategic objectives are addressed through three non-mutually exclusive Working Areas, to accomplish our mission:

- Working Area 1: Knowledge Brokerage
- Working Area 2: Foresight and Research Framing
- Working Area 3: Open Evidence in support of Decision making

II. FPS Health, Food Chain Safety and Environment

An effective public health policy implies taking into account the factors that have a direct impact on:

- Human health: fight against communicable and non-communicable diseases (including health vigilance) and risky behaviours (alcohol, tobacco, drugs, unhealthy nutrition), the impact of work organisation, quality and access to care, etc;
- Animal and plant health: fight against animal, plant and pest diseases, quality of the food chain and plant products, etc;
- Environmental health: fight against climate change, preservation of biodiversity and the oceans, management of hazardous products, resources and waste production, etc.

The FPS Health, Food Chain Safety and Environment is the Federal Public Service in charge of human, environmental, animal and plant health (including food safety). Responsible for supporting and implementing federal policies in this field, the FPS has developed considerable expertise, particularly in collaborating with the federated entities (through the action on four inter-ministerial conferences) and in internationally representing Belgium (United Nations, European Union, OIE, WHO, IPPC, COP, etc.).

The FPS Health, Food Chain Safety and Environment advocates a One World, One Health approach that implies the need of:

- An intersectoral and integrated collaboration between public and private organizations involved in the different pillars of health. We cannot act on one determinant without taking into account its effects on other determinants.
- A structured collaboration with other policy sectors. Health and environment policies have a global and international societal impact, affecting social, employment, economy, education, mobility, taxation, world trade, security policy, etc.
- A long-term approach, given the systemic nature of all these determinants.

Within the FPS Health, Food Chain Safety and Environment, we are actively coordinating policies and programs across animal, human, plant and environmental health, focusing on 4 key areas: antimicrobial resistance, zoonotic disease, climate & health, and sustainable and healthy food.

For these key areas, we are improving communication, facilitate collaboration, and working to build one health capacity.

III. Sciensano

A UNIQUE PARTNER IN BELGIUM AND EUROPE

Sciensano is a public scientific & research institute of 1,000 employees. Our strength lies first and foremost in our combined – and recognised – expertise in human, animal and environmental health. Furthermore, we are the only scientific institute for public health in Europe accommodating both human and animal health under the same roof to operate from a One Health perspective, which emphasises the interconnection between human health, animal health and the wider environment.

PUBLIC HEALTH MISSIONS SERVING THE COMMUNITY

Sciensano's primary mission is to detect any elements likely to constitute a health risk, to monitor their evolution and to contribute to their elimination, based on knowledge and data. To achieve these goals, we align our priorities with those of the authorities and our stakeholders at national, European and international levels.

We carry out numerous research projects to ensure that our scientific expertise is continually evolving in line with the latest technologies and innovations. Our research activities are paramount to maintaining and consolidating the recognition of our expertise, both in Belgium and internationally.

In addition to supporting decision-makers and our motivation to improve scientific knowledge in our areas of expertise, our activities and missions are above all committed to anticipating future health challenges.

A WIDE RANGE OF SCIENTIFIC EXPERTISE AREAS

Sciensano’s surveillance activities rely on 9 main areas of expertise: biological risks, quality control, infectious agents for humans and animals, chemical hazards, physical hazards, health data, public health, health systems, and support in the event of a health crisis.

Through these nine areas of expertise, Sciensano works to protect the health of the population and livestock by assessing and monitoring a wide range of risks. We also monitor the quality of health products and services, assess the status of health and healthcare in Belgium, and actively contribute to prevention and health promotion initiatives.

AN INTERNATIONAL OUTREACH

As Belgium's focal point in a wide range of fields, Sciensano works with the main international organisations on research projects, on human and animal surveillance activities, as part of partnerships, and by providing scientific services.

IV. Pasteur Network

The Pasteur Network is an alliance of over 30 institutes which plays a crucial role in tackling global health challenges through science, innovation and public health. Its distinctive strength lies in the diversity and extensive geographic reach, spanning 25 countries across 5 continents, fostering a dynamic community of knowledge and expertise. The Pasteur Network plays a pivotal role in advancing scientific understanding and applying this knowledge to real-world health issues, with more than 5,000 scientific papers published annually.

The Pasteur Network is recognized as a WHO non-state actor, and members of the network are frequently embedded into local Ministries of Health. The PN sustains a global infrastructure encompassing 50+ national and regional reference laboratories, which includes multiple Biosafety Level 3 Laboratories, and 17 WHO Collaborating Centres.

The Pasteur Network's work is guided by four strategic pillars:

1. Epidemic Preparedness and Intelligence with a focus on Climate sensitive diseases: Addressing emerging health challenges through surveillance and research, particularly on climate-sensitive diseases.
2. Research, Development and Innovation: Advancing scientific understanding and technological innovation in public health and biomedicine.
3. Knowledge Communities: Fostering multidisciplinary collaboration and global knowledge exchange and enhancing expertise to empower the next generation of scientific leaders.
4. Good Governance and Equity: Establishing governance structures and practices that are both effective and equitable, with a focus on financial fairness and sustainable operations.

5. PROGRAMME OF THE EVENT

Day 1 - Wednesday, January 22nd, 2025

08:30	**Registration and coffee**
09:00	**Event opening**
	Dr Dominique Vandekerchove, One Health Coordinator, Belgian Biodiversity Platform - Sciensano
	Dr Hilde Eggermont, Director INBO (Research Institute for Nature and Forest), IUCN Vice President, Future For Nature Board member
09:05	**Welcome address**
	Dr Pierre Kerkhofs, Director General DG Environment, Service Health, Food Chain Safety and Environment

Session 1 - Biodiversity loss and Climate Change	
	Moderators
	Dr Davide Olchini, Médecins du Monde
	MSc Divija Jata, Belgian Biodiversity Platform
09:15	**Keynote: Integrated Approaches to Health: The Place of One Health and its Future**
	Prof Dr Jakob Zinsstag, Swiss Tropical and Public Health Institute (Swiss TPH), Allschwil, Switzerland
10:00	**One Health in Action: Balancing Livelihoods, Livestock, and Ecosystems Health in Central Asia**
	Dr Stephane Ostrowski, Senior Advisor of Temperate Asia Region & Associate Director of Wildlife Health Program, Wildlife Conservation Society (WCS), New York, U.S.A.
10:30	***Coffee break & Poster session***
11:00	**Environmental stressors and infectious diseases in the Arctic**
	Prof. Dr Jacques Godfroid, UiT - The Arctic University of Norway, Tromsø, Norway
11:30	**Climate and Biodiversity Crises: Threats to Human and Animal Health in Belgium and Beyond**
	MSc Pablo Sagredo Martín, One Health Officer, United Nations Environment Programme (UNEP), Brussels, Belgium
12:00	**'Your climate change is not my climate change': An eco-health perspective on research at the cutting edge of urbanization, climate change and health**
	MSc Stefanie Dens, Civil engineer, Architect and Urban designer for the Datahub, Eco- health group, Institute of Tropical Medicine (ITM), Antwerp, Belgium
12:30	***Lunch break & Poster session***

Session 2 - Impact of Wildlife trade and risks associated with Invasive Alien Species	
	Moderators
	Prof. Dr Olivier Vandenberg, School for Public Health, Free University Brussels (ULB)
	Prof. Dr Annick Linden, Health and pathologies of wildlife, Faculty of Veterinary Medicine, University of Liège (ULiège)
14:00	**Keynote: A regional and global perspective on pathogens at the animal-human-environ- mental interface**
	Prof. Dr Sascha Knauf, Institute of International Animal Health/One Health, Friedrich Loef- fler Institut, Federal Research Institute for Animal Health, Greifswald - Insel Riems and Jus- tus-Liebig-University, Giessen, Germany
14:45	**Reducing health risks in wildlife trade through a multidimensional approach**
	Dr. Michael Nagel, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn, Germany
15:15	**Operationalising a One Health approach in wildlife trade and disease risk management**
	MSc Justine Guiny, Senior Policy Manager TRAFFIC, Brussels, Belgium
15:45	***Coffee break & Poster session***
16:15	**Integrating Invasion science and One health: a pathway to more effective and sustain- able management of health and ecological challenges**
	Dr Sonia Vanderhoeven, Belgian Biodiversity Platform, Brussels, Belgium
16:45	**The management of biological invasions within the One Health concept**
	MSc Riccardo Scalera, IUCN Invasive Species Specialist Group (ISSG), Rome, Italy
17:15	**End of Day 1**

Day 2 - Thursday, January 23rd, 2025

Session 3 - Data and Surveillance	
	Moderators
	Dr Jorgen Stassijns, Crisis Coordination, Sciensano
	Dr Hein Imberechts, Project Manager, Sciensano
09:00	**Keynote: Preventing the emergence of zoonoses: from exploring pathogen transmission to implementation of public policies**
	Dr. Anne-Laure Bañuls, PREZODE Scientific Focal Point and IRD Director of Research
09:45	**Making sense of complexity - The role of AI in advancing One Health**
	M. Didier Verloo, European Food Safety Authority (EFSA), Parma, Italy
10:15	**Global biodiversity data as a resource for vector-borne disease research and policy**
	Prof. Dr Sylvie Manguin, French Research Institute for Sustainable Development (IRD), Montpellier, France
10:45	***Coffee break***
11:15	**Land systems data, pathogen vector data, are we on the same page?**
	Prof. Dr Sophie Vanwambeke, UCLouvain, Louvain-la-Neuve, Belgium
11:45	**Wildlife in focus: sources or victims of emerging zoonotic diseases? The importance of wildlife disease surveillance**
	Prof. Dr Dolores Gavier-Widén, Swedish Veterinary Agency, Uppsala, Sweden
12:15	***Lunch break***

Session 4 - Workshops and Panel discussion	
13:15	**Practical information on the afternoon activities**
	Dr Hein Imberechts, Project Manager, Sciensano
	Dr Sigrid De Keersmaecker, Transversal Activities in Applied Genomics, Sciensano
13:45	**Parallel workshops**
	- **Workshop 1: Biodiversity loss**
	Moderator: Prof Dr Jakob Zinsstag, Swiss Tropical and Public Health Institute
	Note taker: Dr Robbert Boudewijns, Research Coordinator, KU Leuven

	- **Workshop 2: Climate change**
	Moderator: Prof. Dr Jacques Godfroid, UiT - The Arctic University of Norway, Tromsø, Norway
	Note taker: MSc Sylvie Vekemans, Advisor Strategy, Sciensano
	- **Workshop 3: Wildlife trade**
	Moderators: *Dr. Michael Nagel, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)* *Prof. Dr Sascha Knauf, Friedrich Loeffler Institut*
	Note taker: Dr Marcella Mori, Veterinary Bacteriology, Sciensano
	- **Workshop 4: Invasive Alien Species / Biological Invasions**
	Moderator: Dr Sonia Vanderhoeven, Belgian Biodiversity Platform
	Note taker: MSc Maxime Coupremanne, Belgian Biodiversity Platform
	- **Workshop 5: Surveillance**
	Moderator: Prof. Dr Dolores Gavier-Widén, Swedish Veterinary Agency
	Note taker: Dr Thomas Janssens, Advisor Policy and Coordination, FPS Health, Food Chain Safety and Environment
15:15	***Coffee break***

15:45	**Panel discussion**
	Moderator: *- Prof. Dr Sascha Knauf, Friedrich Loeffler Institut*
	Panel members:
	- Prof Dr Jakob Zinsstag, Swiss Tropical and Public Health Institute
	- MSc Sylvie Vekemans, Advisor Strategy, Sciensano
	- Dr. Michael Nagel, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
	- MSc Riccardo Scalera, IUCN Invasive Species Specialist Group (ISSG)
	- Prof. Dr Dolores Gavier-Widén, Swedish Veterinary Agency
	- Prof. Dr Steven Van Gucht, Scientific Director Infectious Diseases in Humans, Sciensano
16:45	**Wrap-up & closing remarks**
	Dr Hein Imberechts, Project Manager, Sciensano
	Dr Dominique Vandekerchove, One Health Coordinator, Belgian Biodiversity Platform - Sciensano
17:00	**End of the event**

6. LIST OF PARTICIPANTS

#	First name	Last name	Affiliation	Country
1	Andrée	De Cock	Ghent University - Research Group Aquatic Ecology	Belgium
2	Anke	Meyers	Sciensano	Belgium
3	Anna	Heck	Belgian Biodiversity Platform (BBPf)	Belgium
4	Annick	Hus	Sigurdyr	Belgium
5	Annick	Linden	University of Liège (ULiège)	Belgium
6	Anouk	De Man	Sciensano	Belgium
7	Astha	Tiwari	Sciensano	Belgium
8	Babette	Muyshondt	Sciensano	Belgium
9	Barbara	Kovacs	Austrian Agency for Health and Food Safety	Austria
10	Bart	Rymen	Belspo	Belgium
11	Boudewijn	Vandenbossche	Belgium - FPS Foreign Affairs, Foreign Trade and Development Cooperation	Belgium
12	Bram	Renmans	Vogelbescherming Vlaanderen	Belgium
13	Carmen	Aalbers	Wageningen University and Research	The Netherlands
14	Catherine	Decouttere	KU Leuven	Belgium
15	Cato	Vangenechten	Institute of Tropical Medicine (ITM)	Belgium
16	Cecilia	Castillo	Pasteur network	France
17	Céline	Guillaume	Sciensano	Belgium
18	Charlotte	Sohier	Sciensano	Belgium
19	Cheng	Liu	Wageningen Food Safety Research	The Netherlands
20	Chiara	Magliozzi	Joint Research Centre of the European Commission	Italy
21	Constance	Wielick	University of Liège (ULiège)	Belgium
22	David	Fretin	Sciensano	Belgium
23	Davide	Ziveri	Humanity & Inclusion	Belgium
24	Davide	Olchini	Médecins du Monde	Belgium
25	Diallo	Aissatou	Askcare femtech	Senegal
26	Didier	Verloo	European Food Safety Authority (EFSA)	Italy
27	Divija	Jata	Belgian Biodiversity Platform (BBPf)	Belgium
28	Dolores	Gavier-Widén	Swedish Veterinary Agency	Sweden
29	Dominique	Vandekerchove	Sciensano / Belgian Biodiversity Platform (BBPf)	Belgium
30	Elena	Lucia Sassu	AGES	Austria
31	Eline	Vanuytrecht	Flemish Institute for Technological Research (VITO)	Belgium
32	Emilie	Goossens	University of Hasselt (UHasselt)	Belgium
33	Erik	Pottie	FPS Health, Food Chain Safety and Environment	Belgium
34	Erwan	Denné	FPS Health, Food Chain Safety and Environment	Belgium
35	Filip	Volckaert	KU Leuven	Belgium
36	Florence	Buytaers	Sciensano	Belgium
37	Géraldine	De Muylder	Sciensano	Belgium
38	Géraldine	Boseret	Sciensano	Belgium
39	Goele	Drijkoningen	FPS Health, Food Chain Safety and Environment	Belgium
40	Hannah	MacDonald	Science Advice for Policy by European Academies (SAPEA)	Belgium

41	Hein	Imberechts	Sciensano	Belgium
42	Helen	Panen	Sciensano	Belgium
43	Hilde	Eggermont	INBO	Belgium
44	Ines	Sopbue Kamguem	University of Namur	Belgium
45	Isabelle	Behaeghel	Sciensano	Belgium
46	Isra	Deblauwe	independent	Belgium
47	Jacques	Godfroid	The Arctic University of Norway	Norway
48	Jakob	Zinsstag	Swiss Tropical and Public Health Institute	Switzerland
49	Jan	Aerts	KU Leuven	Belgium
50	Jan	Paeshuyse	KU Leuven	Belgium
51	Jean-Baptiste	Hanon	Sciensano	Belgium
52	Jerôme	Vandebos	University of Liège (ULiège)	Belgium
53	João	Rato	University of Évora	Portugal
54	Jorgen	Stassijns	Sciensano	Belgium
55	Joris	Deberdt	FPS Health, Food Chain Safety and Environment	Belgium
56	Jotte	Rodrigues Bento	Sciensano	Belgium
57	Justine	Delbecque	Sciensano	Belgium
58	Justine	Guiny	TRAFFIC	Belgium
59	Karin	Troell	Norwegian Veterinary Institute	Norway
60	Karine	Lalaina Mahefarisoa	KU Leuven	Belgium
61	Karlien	Supré	Consultant	Belgium
62	Katie	Vermeersch	FPS Health, Food Chain Safety and Environment	Belgium
63	Kenny	Meganck	Belspo	Belgium
64	Kristof	Baert	Research Institute for Nature and Forest	Belgium
65	Laura	Cuypers	Royal Belgian Institute of Natural Sciences	Belgium
66	Laura	Derks	National Institute for Public Health and the Environment (RIVM)	The Netherlands
67	Laurence	Geebelen	Sciensano	Belgium
68	Léa	Fourchault	Free University Brussels (ULB)	Belgium
69	Lennie	Plaetinck	Belgian Biodiversity Platform (BBPf)	Belgium
70	Letizia	Cirasella	Istituto Zooprofilattico della Lombardia e dell'Emilia-Romagna	Italy
71	Lise	Goudeseune	Belgian Biodiversity Platform (BBPf)	Belgium
72	Lison	Cowez	Belgian Biodiversity Platform (BBPf)	Belgium
73	Lucette	Flandroy	FPS Health, Food Chain Safety and Environment (retired)	Belgium
74	Ludovic	Martinelle	University of Liège (ULiège), Faculté de Médecine vétérinaire	Belgium
75	Magali	Schotte	Instituut voor Tropische Geneeskunde (Be-cause health)	Belgium
76	Marcella	Mori	Sciensano	Belgium
77	Mare	Geraerts	University of Antwerp	Belgium
78	Marieke	de Cock	Rijksinstituut voor Volkgezondheid en Milieu	The Netherlands
79	Marion	Kluivers	Wageningen Environmental Research	The Netherlands
80	Maud	Istasse	FPS Health, Food Chain Safety and Environment	Belgium
81	Maud	Papageorges	Sciensano	Belgium
82	Maxime	Coupremanne	Belgian Biodiversity Platform (BBPf) / DEMNA	Belgium
83	Michael	Nagel	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Germany
84	Moira	Kelly	Sciensano	Belgium

85	Nastassia	Elst	Belspo	Belgium
86	Nick	De Regge	Sciensano	Belgium
87	Nicolas	Antoine-Moussiaux	University of Liège (ULiège)	Belgium
88	Olivier	Vandenberg	Free University Brussels (ULB)	Belgium
89	Pablo	Sagredo Martín	United Nations Environment Programme (UNEP)	Belgium
90	Peter	Demaeght	FPS Health, Food Chain Safety and Environment	Belgium
91	Philip	Martens	Nederlandse Voedsel- en Warenautoriteit (NVWA)	The Netherlands
92	Philippe	Gabant	Syngulon	Belgium
93	Pieter	Boets	University of Ghent (Ugent)	Belgium
94	Raf	Aerts	Sciensano	Belgium
95	Raphael	Janssens	Sciensano	Belgium
96	Riccardo	Scalera	International Union for the Conservation of Nature (IUCN)	Italy
97	Robbert	Boudewijns	KU Leuven - Leuven One Health	Belgium
98	Ruben	Schols	KU Leuven; RMCA	Belgium
99	Samuel	Vanden Abeele	Royal Belgian Institute of Natural Sciences	Belgium
100	Sandrine	Honnay	FPS Health, Food Chain Safety and Environment	Belgium
101	Sara	Wijburg	National Institute for Public Health and the Environment | RIVM	The Netherlands
102	Sascha	Knauf	Friedrich Loeffler Institut	Germany
103	Sébastien	Mary	Belgian Biodiversity Platform (BBPf)	Belgium
104	Sigrid	De Keersmaecker	Sciensano	Belgium
105	Solveig	Jore	Norwegian Institute of Public Health (FHI)	Norway
106	Sonia	Vanderhoeven	Belgian Biodiversity Platform (BBPf)	Belgium
107	Sophie	Gryseels	University of Antwerp	Belgium
108	Sophie	Vanwambeke	UCLouvain	Belgium
109	Stefan	Roels	Sciensano	Belgium
110	Stefanie	Dens	Institute of Tropical Medicine (ITM)	Belgium
111	Stephane	Ostrowski	Wildlife Conservation Society (WCS)	USA
112	Steven	Van Gucht	Sciensano	Belgium
113	Sylvie	Vekemans	Sciensano	Belgium
114	Sylvie	Manguin	French Research Institute for Sustainable Development (IRD)	France
115	Thomas	Janssens	FPS Health, Food Chain Safety and Environment	Belgium
116	Tine	Huyse	africamuseum	Belgium
117	Tine	Cooreman	Institute of Tropical Medicine (ITM)	Belgium
118	Tinne	Lernout	Sciensano	Belgium
119	Titouan	Teunens	Belspo	Belgium
120	Ute	Eilenberger	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	Germany
121	Valerie	Obsomer	SPW DNF Nature et Espaces verts	Belgium
122	Valérie	De Waele	Service Public de Wallonie	Belgium
123	Veronik	Hutse	Sciensano	Belgium
124	Wim	van der Poel	Wageningen University and Research	The Netherlands
125	Xavier	Hulhoven	Innoviris	Belgium
126	Yelyzaveta	Tokmakova	KU Leuven	Belgium

7. BIOGRAPHIES OF THE SPEAKERS & ABSTRACTS OF THEIR CONTRIBUTIONS

I. Speakers from the opening session and welcome address

***Dominique Vandekerchove**, One Health Coordinator, Belgian Biodiversity Platform - Sciensano, Belgium.*

Dominique Vandekerchove is a veterinary surgeon and epidemiologist who worked first as a veterinary practitioner (1992-1994) and later as a researcher in small stock animals and poultry (1995-2005) at Sciensano. After 14 years of scientific counselling at FPS Health, Food Chain Safety and Environment, she worked as a science officer for COST from 2019 to 2023, when she rejoined Sciensano, and joined the Belgian Biodiversity Platform and the Belgian One Health network as One Health Coordinator. She's also one of the co-pilots for Belgium in PREZODE (Preventing Zoonotic Disease Emergence initiative). Her expertise includes science-based policy support and European and global networking.

***Pierre Kerkhofs**, Director General DG Environment, Service Health, Food Chain Safety and Environment, Belgium.*

Pierre Kerkhofs holds a PhD in Veterinary Medicine from the University of Liège (1986) and earned a second doctorate in Sciences from the Free University of Brussels in 1999. That same year, he was appointed Head of the Virology Department at the National Institute for Veterinary Research (NIDO). In 2004, he completed the Middle Management Programme at the Vlerick Leuven Gent Management School. Since July 2006, he has served as Managing Director of CODA (the Veterinary and Agrochemical Research Centre), working closely with the Federal Public Service (FOD) for Health, Food Chain Safety and Environment, the Belgian Food Safety Agency (FAVV), and both

Belgian and international scientific communities. After assuming the role of Co-Director at Sciensano in April 2018—following the merger of the Scientific Institute of Public Health and CERVA—he has been Director-General of the Directorate-General for Environment at the Federal Public Service for Health since January 2019.

***Hilde Eggermont**, Director of INBO (Research Institute for Nature and Forest), Belgium and IUCN Vice President.*

Hilde Eggermont started as INBO Director on 1 November 2023. She also holds roles within IUCN, the International Union for Conservation of Nature (Councillor and Vice-president) and Future For Nature (Board member). Previously, she was active as coordinator of the Belgian Biodiversity Platform (2012-2023), a national science-policy interface for biodiversity. During that period, she was also the national focal point for the Intergovernmental Platform for Biodiversity & Ecosystem Services (IPBES) and coordinator/chair of Biodiversa, the European Partnership for Biodiversity. Hilde is a biologist by training, and worked as a researcher (PhD and postdoc) at Ghent University since 2012. Her research focused on climate reconstruction in tropical Africa using fossil insect larvae in lake sediments.

II. Speakers from the 1st session on: Biodiversity loss and climate change

***Jakob Zinsstag**, Swiss Tropical and Public Health Institute (Swiss TPH), Allschwil, Switzerland.*

Bio

Prof. Dr. Jakob Zinsstag is a veterinarian with a PhD in tropical animal health. He spent eight years in West Africa at the International Trypanotolerance Centre in The Gambia and four years as the director of the Centre Suisse de Recherches Scientifiques in Côte d'Ivoire. Since 1998 he heads a research group on human and animal health at the Swiss

Tropical and Public Health Institute. Since 2011 he is deputy head of department of Epidemiology and Public Health at Swiss TPH. He focuses on the control of zoonoses in developing countries and the provision of health care to mobile pastoralists using a One Health approach. He is past president of the International Association for Ecology and Health and former president of the scientific board of the Transdisciplinary network of the Swiss Academies.

He teaches One Health and Trandisciplinary theory and methods and is lead educator of massive open access online courses:

- One Health: Connecting Humans, Animals and the Environment
- Partnering for change: Link research to societal challenges

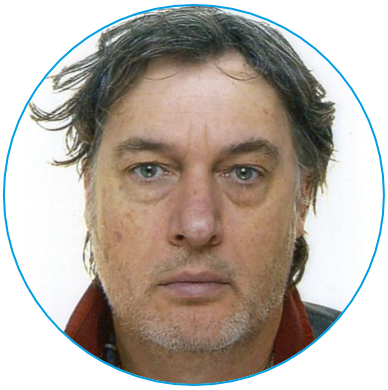
He is editor-in-chief of the CABI One Health resources.

He received the Meritorious Award by the World Organization of Animal Health (WOAH) in 2023. He is a member of the One Health High Level Expert Panel (OHHLEP).

Abstract

"Integrated Approaches to Health: The Place of One Health and its Future"

We compare the different paradigms of the integrated approaches to health: EcoHealth, One Health and Planetary health. For this we examine how they are embedded in public health and its most closely related sub-disciplines and how they relate to each other and possibly converge. Ecosystem approaches to health (EcoHealth) started in the late 1990s. EcoHealth applies the concept of health to ecosystems, recognizing the inextricable linkage of the health of humans, animals and the environment. One Health emerged in the early 2000s and is today defined as "an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent" (OHHLEP). Planetary health emerged in 2013 as an extension of Environmental health to the planetary level, still focused on human health but conceived of with a drive to better define and articulate the co-benefits of environmental stewardship. Integrated methods address sustainable management of resources and the health of all species simultaneously. Among the three integrated approaches, EcoHealth and Planetary health operate largely in academic networks. One health is currently operationalized at the level of the international organizations, regional organizations and national governments. Integrated approaches to health are pivotal for complex problem solving like pandemic prevention, climate change, biodiversity loss and antimicrobial resistance.



***Stéphane Ostrowski**, Senior Advisor of Temperate Asia Region & Associate Director of Wildlife Health Program, Wildlife Conservation Society (WCS), New York, U.S.A.*

Bio:

Stéphane Ostrowski has worked in the field of conservation since 1993 and joined the Wildlife Conservation Society in 2006 where he currently holds the positions of regional senior technical advisor and associate director of Wildlife Health Program. The Wildlife Conservation Society is an international non-governmental organization and a recognized One Health leader in natural ecosystems. It is one of the organizations that developed and advocated for The Manhattan Principles in 2004 and the The Berlin Principles in 2019, which proposed global recommendations for a more holistic approach of health.

Abstract

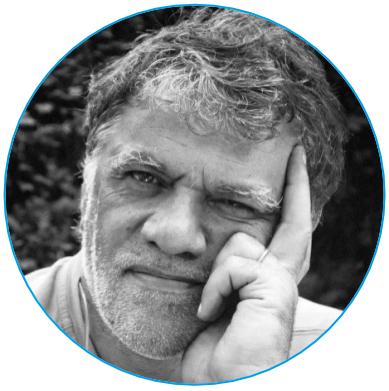
"One Health in Action: Balancing Livelihoods, Livestock, and Ecosystems Health in Central Asia"

Current unprecedented decline in biodiversity affects the risk of transmission of infectious diseases of humans, animals, and plants. One of the main drivers of biodiversity loss is the way people use their environment, including the overuse of natural resources and the conversion of land cover for agricultural and urban purposes. Reducing the risk of disease, particularly zoonosis, therefore relies in part on the conservation and restoration of ecosystems, the promotion of the sustainable use of natural resources and of sustainable and safe agricultural practices. The One Health concept integrates a wide range of biodiversity-health interconnections by considering the importance of the resilience of socio-ecological systems and ecosystem services. Even if the theory underlying this approach is increasingly accepted as valid on a global scale, its implementation on the ground remains strewn with pitfalls, particularly where the political will for a sustainable economy, responsibility and governance are insufficiently applied.

The 860,000 square kilometre Central Asian Mountains Biodiversity Hotspot includes parts of seven countries where health systems are generally poorly managed and supervised, often lack accountability, and where biodiversity conservation is rarely a priority over economic development. The region is home to around 70 million people and is experiencing spectacular changes, including an unprecedented increase in extensive livestock farming which is putting increased pressure on natural resources and unique biodiversity that is now largely threatened.

The Wildlife Conservation Society (WCS) has over 100 years of practical wildlife veterinary expertise and is a recognized global leader in One Health approaches in nature's most valuable ecosystems, addressing health threats such as Avian Flu, Ebola, and African Swine Fever. Using the examples of two field projects implemented by WCS in key biodiversity areas in northeastern Afghanistan and central Tajikistan respectively, we show how promoting the sustainable use of natural resources supports the

conservation and restoration of ecosystems and can reduce the risk of disease. In the absence of responsible and committed higher authorities, both projects relied on a bottom-up approach institutionalizing various local actors. In Central Asia, efforts to generate sustainable income independent of livestock can play a leading role in adopting more sustainable and safer economic practices, restoring ecosystems, and reducing the risk of pathogen transmission.



Jacques Godfroid, *UiT - The Arctic University of Norway, Tromsø, Norway.*

Bio

The Arctic Council is promoting cooperation, coordination, and interaction among Arctic states, Indigenous communities, and other Arctic inhabitants on common Arctic issues, particularly sustainable development and environmental protection. The work of the Arctic Monitoring and Assessment Programme (AMAP), a working group under the Arctic Council is crucial in understanding the unique health challenges faced by Arctic communities, where environmental changes have direct impacts on traditional lifestyles and well-being. AMAP conducts comprehensive assessments of environmental pollutants, such as mercury and persistent organic pollutants, which pose significant health risks to humans and wildlife in the Arctic, informing policies to mitigate their impact. Incorporating the One Health approach, AMAP examines the effects of climate change on the spread of zoonotic diseases and the health of Arctic ecosystems. AMAP integrates traditional knowledge with scientific research, ensuring culturally relevant and effective health interventions.

Challenges related to One Health approaches will be illustrated by our current knowledge on brucellosis in the Arctic, a zoonotic disease without pandemic potential. However, interventions still need to be designed. Such infectious diseases management requires community ecology to understand the complex interactions between hosts, pathogens, and their environments. If effective interventions are to be designed, the biological and the social realms should be seen as constituting a continuous space wherein these realms are entwined.

Abstract

“Environmental stressors and infectious diseases in the Arctic”

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***Pablo Sagredo Martín**, One Health Officer, United Nations Environment Programme (UNEP), Brussels, Belgium.*

Bio

Pablo is an experienced legal and international cooperation professional, currently serving as the One Health Officer for the United Nations Environment Programme (UNEP) in Brussels. In this role, he acts as UNEP's focal point for One Health in the Europe and Central Asia region, leading engagement with EU institutions and fostering collaboration within the Quadripartite (FAO, UNEP, WHO, and WOAH). Pablo brings extensive experience from previous roles at UNEP's Europe Office in Geneva, ACT Alliance in Brussels, and Oxfam in Madrid, with a strong focus on climate justice, global security, and development cooperation.

Abstract

"Climate and Biodiversity Crises: Threats to Human and Animal Health in Belgium and Beyond"

This presentation highlights the dual crises of climate change and biodiversity loss, exploring their profound impacts both globally and in Belgium. These interconnected challenges not only disrupt ecosystems but also threaten human health, food and water security, and societal resilience. In Belgium, rising temperatures, shifting precipitation patterns, and biodiversity decline are already exacerbating health risks, water scarcity, and vulnerabilities in energy systems, reflecting the broader global trends.

The link between climate change and biodiversity is clear: biodiversity loss reduces the resilience of ecosystems to adapt to climate change, while climate change accelerates biodiversity degradation. This feedback loop poses significant risks to human well-being, particularly for vulnerable populations. Addressing these crises requires integrated approaches that recognize the role of social, environmental, and economic drivers in shaping health outcomes. This has made clear by the latest IPBES Nexus report.

The presentation concludes by emphasizing the evolution of the One Health approach. Traditionally focused on zoonosis and AMR, One Health is now expanding to address upstream drivers of the crises we face. By preventing health risks at their source and embracing broader, multidisciplinary strategies, we can build resilience, ensure equity, and drive sustainable solutions to the interconnected challenges of climate change, biodiversity loss, and health.

***Stefanie Dens**, Civil engineer, Architect and Urban designer for the Datahub, Eco-health group, Institute of Tropical Medicine (ITM), Antwerp, Belgium.*

Bio

Stefanie Dens (ir.-arch. and urbanist) is a PhD candidate at the EcoHealth Unit, Institute of Tropical Medicine, Antwerp and the Department of Design Sciences, University of Antwerp. Her PhD situates in the field of urbanism, elaborating research methods for spatial aspects of infectious diseases transmission. Stefanie is intrigued by complex urban projects for which she pursues a tailor-made design (research) rooted in socio-cultural, economic, and spatial explorations on topics of natural hazards in urban contexts and urban climate change adaptation.

Websites:

- Profile at the ITM
- LinkedIn profile
- Website Maidan

About the EcoHealth Unit, Institute of Tropical Medicine:

We focus on two of the most cross-cutting global challenges, urbanization and climate change, and their impact on health.

We unite researchers with different perspectives from the fields of complexity, health systems, social sciences, urbanism and eco-epidemiology.

See: Website of the Institute of Tropcial Medicine

Abstract

"'Your climate change is not my climate change': An eco-health perspective on research at the cutting edge of urbanization, climate change and health"

In a warming world where climatic changes are very context-specific one might think we need locally tailored solutions. Being part of the 'Netherlands' – the low laying lands- makes us trained to watch the skies for rains and closely measure river levels for flooding, whilst counting on the highest dyke for shelter. Inhabitants of Americas Upper Midwest are programmed differently. There, the reliable menace is snow. They scan skies and lake effects, tuck in and hope the heating keeps going. Climate is part of our DNA, our language, our health patterns and the daily habits that feed our disciplinary thinking. Our climatic changes and their implications on health are structurally different, but your flood and my drought connected more than ever. Moreover, work in Belgium and across the world learns us that climatic events such as flash flooding in Ethiopia can inform approaches for similar events in Belgium. That approaches to drought and water shortage are more interchangeable than we think. This short talk will elaborate on different perspectives in research, health and disciplinary thinking through the case of urban malaria in Ethiopia, COVID-19 and Tuberculosis in Peru and their parallels in Belgium. We will illustrate how these perspectives, once found a common ground and lexicon, collaborate in an eco-health approach. With that, we aim for comprehensive, systemic approaches, addressing the current health challenges that emerge at the interface between humans, animals and their broader natural, social and political environments.

III. Speakers from the 2nd session on: Impact of wildlife trade and risks associated with Invasive alien species

***Sascha Knauf**, Institute of International Animal Health/One Health, Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, Insel Riems; Professorship for One Health/International Animal Health, Faculty of Veterinary Medicine, Justus Liebig University, Giessen, Germany.*

Bio

Prof Dr Knauf is the Director of the Institute of International Animal Health/One Health at the Friedrich-Loeffler-Institut and a full-Professor for One Health/International Animal Health at the Faculty of Veterinary Medicine at the Justus-Liebig-University of Giessen. He received his PhD in Veterinary Science at Justus-Liebig-University in Giessen, Germany, in 2011 and has worked for several internationally recognized research institutes such as the Fraunhofer Institute for Toxicology and Experimental Medicine or the Deutsches Primatenzentrum GmbH. He is a certified veterinary specialist in Wildlife Health and he habilitated in 2021 in "Wildlife Health and One

Health". Prof. Knauf's research interest focuses on the identification and characterisation of disease reservoir systems at the animal-human-environment interface and Neglected Tropical Diseases. Dr Knauf has long-term research and One Health capacity strengthening projects in Africa and Asia.

Abstract

"A regional and global perspective on pathogens at the animal-human-environmental interface"

The earliest human-animal relationships, e.g. during domestication, provided mutual benefits but also established pathways for the exchange of pathogens. Today, the link between human, animal, and environmental health is well recognised, which supports the transition from the One Medicine thinking towards One Health. Although wildlife is generally recognised as a source for pathogens that can infect livestock and humans, it is not the driving force for pandemics. Instead, farmed animals represent a much greater health risk for humans. Farming practices, particularly involving intensively reared animals, serve as amplifiers of pathogens, increasing the likelihood of pathogen spillover. The current HPAI panzootic is a pivotal example for the global spread of a disease with high pandemic potential. It originates in livestock and today infects wild birds that serve as a source of infection for mammals. While zoonotic diseases often dominate discussions, non-zoonotic diseases such as African Swine Fever or Food-and-Mouth Disease hold equally significant consequences for human health since humans rely on animals as a source of income and protein resource.

In the European Union, One Health strategies are integral to policy frameworks aimed at managing zoonoses, mitigating antimicrobial resistance, and promoting sustainable agricultural practices. Since 2020, EU research calls have been established to foster transdisciplinary and cross-sectoral collaboration and supporting the necessary One Health transformative processes in its member states. The data presented, highlight the need for a more holistic, evidence-based, and prevention-focused One Health approach to sustainably safeguard global health, addressing both zoonotic and non-zoonotic challenges at the animal-human-environment interface.

***Michael Nagel**, Head of the Programme ‚Support to the International Alliance against Health Risks in Wildlife Trade", Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Bonn, Germany.*

Bio

Dr. Nagel is a clinical bacteriologist and has been studying highly pathogenic organisms and modes of transmission for 15 years. He worked for many years as a laboratory director in West and Central Africa for various research institutes investigating hemorrhagic fevers and other outbreaks. Since 2016, he has been working

for GIZ, where he leaded the Taskforce on Outbreaks (SEEG). He then led a conservation project on the northwest coast of Madagascar (Mahajanga) and started working for the International Alliance against Health Risks in Wildlife Trade in July 2023.

Abstract

"Reducing health risks in wildlife trade through a multidimensional approach"

A multidimensional approach is urgently needed to reduce health risks in wildlife trade. Situated within the One Health approach, the International Alliance against Health Risks in Wildlife Trade offers multidimensional solutions to reduce the risks of zoonotic spillover and narrowing the gap between science and implementation. The work focus of the Alliance lies within preventative measures, deepening prevention at the source. The emergence of zoonotic pathogens from wildlife can be just as multidimensional as the responses it requires: From the wildlife-human interface, habitat destruction and land-use changes, climate change to weak health systems and surveillance. Additional issues such as lack of cooperation across sectors and disciplines or the science-policy gap highlight the need for multidimensional approaches that integrate interdisciplinary and international solutions on the ground, as well as on the global policy level. The Alliance unites multiple actors for a common vision and has multiple fields of action: funded projects working with local realities in over 20 countries, engagement in international policy developments, five working groups, and the provision of a broad variety of different knowledges through its diverse membership. Over the past four years, the Alliance network has grown to over 180 organizations and engages in multiple processes such as CITES, CBD GAP on Biodiversity and Health, the WHS or other high-level conferences. On the ground funded projects have generated concrete impacts from Social and Behavior Change to policy recommendations and the Alliance's governmental consultation facility CONTACT currently works with governmental partners in Benin, Guatemala, Bolivia and Peru to strengthen national policies to reduce health risks in wildlife trade.

***Justine Guiny**, Senior Policy Manager TRAFFIC, Brussels, Belgium*

Bio

Justine Guiny is the Senior Policy Manager for the TRAFFIC European Programme. She's a lawyer by training, and holds three Master's degrees which led her to specialise in environmental transition policies and the functioning of the European Union. For the past 9 years, she's been working on a series of complex cross-border environmental issues, from circular economy, sustainable fishing, nature restoration to wildlife trade. She now represents TRAFFIC in Europe on the multilayered issue that is wildlife trade

and crime, which is at the nexus between conservation and development challenges. She is currently developing a programme of work on the illegal trade of wild meat between Africa and Europe, and a series of interventions that look at better understanding and tackling the risks this trafficking pose for environment, animal and human health across these two regions, and beyond. She aspires at encouraging policies that embrace a systemic One Health approach to ensure safe, sustainable and legal trade of wildlife, including through increased cross-border collaboration.

Abstract

"Operationalising a One Health approach in wildlife trade and disease risk management"

TRAFFIC has been specialising on understanding the complexity of wildlife trade and trafficking and associated supply chains for nearly half a century. To address the drivers and risks associated with illegal, unsustainable and unsafe wildlife trade, it is essential to undertake a thorough and systemic mapping of those drivers and risks, and the relevant actors involved along the supply chain, in order to deploy adapted and sustainable solutions.

The COVID-19 pandemic has been a turning point in highlighting the health risks associated with wildlife trade, as it creates space for human-wildlife interface. TRAFFIC has been learning from this evolving context and applies now a One Health approach in its interventions to addressing illegal and unsustainable wildlife trade.

During this session, we will be presenting TRAFFIC's system-based analysis we have developed to map risks along the wild meat supply chain, where health risks are serious. This involves understanding the characteristics of this trade, the actors involved, the health risk points, and design interventions to mitigate those risks. We will also present TRAFFIC's convener approach in bringing a broad range of actors around the table to collaborate around those issues and introduce examples of how a variety of solutions, whether being policy change or private sector's actions, are all necessary component of the puzzle required to manage disease risk in wildlife trade.

See: TRAFFIC Project on Wildlife Trafficking Response, Assessment, and Priority Setting

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***Sonia Vanderhoeven**, Belgian Biodiversity Platform, Brussels, Belgium.*

Bio

Dr. Sonia Vanderhoeven is a plant ecologist specializing in biological invasions, evolutionary ecology, and evidence-based decision-making processes. She currently serves as a Science Officer at the Belgian Biodiversity Platform, where she facilitates

science-policy processes on biological invasions and biodiversity conservation. Alongside her role as a Science Officer, she teaches at the Université Libre de Bruxelles. She has been a lead author in the IPBES Invasive Alien Species Assessment.

Abstract

"Integrating Invasion science and One health : a pathway to more effective and sustainable management of health and ecological challenges"

Biological invasions are a growing global challenge with significant impacts on biodiversity, nature's contribution to people, and human well-being. The IPBES Invasive Alien Species (IAS) Assessment provides a comprehensive synthesis of the drivers, impacts, and management of invasive alien species, offering critical insights for policy and decision-making.

There have been previous efforts to integrate biological invasions within the One Health approach. However, despite the critical role invasive alien species can play on health including as reservoirs and vectors of zoonotic diseases the One Health approaches have yet to systematically integrate the threat and impacts of biological invasions into their analyses. However, the growing recognition of interconnected environmental, human, and animal health systems—encapsulated in the One Health approach—demands better integration between invasion science and multidisciplinary health frameworks.

This presentation will highlight key findings from the IPBES IAS Assessment, including the urgent need to strengthen prevention, control, and eradication strategies for IAS. Furthermore, it will explore how bridging invasion science with the One Health approach can enhance our capacity to better answer the societal challenges currently encountered. By leveraging synergies across disciplines and sectors, and better balancing the different components of health's, this integrated perspective can foster more holistic and effective solutions to address the complex challenges posed.

Riccardo Scalera, *IUCN Invasive Species Specialist Group (ISSG), Rome, Italy.*

Bio

Riccardo Scalera is a naturalist with over 20 years of experience in conservation biology, wildlife management, and vertebrate ecology. He has extensive expertise in European environmental policy and legislation, particularly in nature protection and biodiversity conservation (e.g., EU Regulation on Invasive Alien Species, Habitats and Birds Directives, Wildlife Trade Regulations). Riccardo has collaborated with several organisations and institutions of different countries, including the European Commission, the Council of Europe and the International Union for Conservation of

Nature (IUCN). Among his main achievements Riccardo has contributed to a number of papers and reports exploring the nexus between biological invasions and the spread of pathogens and diseases.

Abstract

"The management of biological invasions within the One Health concept"

Biological invasions refer to the process by which species—plants, animals, fungi, or microorganisms, including pathogens—are introduced outside their native geographic range as a result of human agency. Such species are called alien, and if they have some impact on either biodiversity, ecosystem services and economy—as well as on human health and wildlife health—they are referred to as invasive alien species (IAS). IAS can be moved around the globe through several pathways such as wildlife trade and international transport, and their spread can be exacerbated by other drivers of biodiversity loss, such as habitat destruction and climate changes. Because biological invasions are a complex phenomenon, their successful management requires a horizontal approach, which may entail a deep collaboration between different sectors and actors. It also requires the different policies and management tools available today to be flexible, adaptive, and duly integrated. This concerns also those IAS that cause diseases or may be vectors of pathogens, and whose introduction can contribute substantially to the spread of emerging infectious diseases. Despite this, wildlife pathogens, especially those carried by IAS, are not adequately addressed by the current animal, plant, and human health policies. In fact, the role of IAS in the transmission dynamics of pathogens (including zoonoses) is often overlooked, despite the rapid escalation in biological invasions globally. In recent years, different works have synthesised the available knowledge on the nexus between biological invasions and pathogen dynamics, assessing options for regional strategies and tools for management. A first step in this direction was undertaken by the Bern Convention on the Conservation of European Wildlife and Natural Habitats through the Report on Alien Pathogens and Pathogens Spread by Invasive Alien Species in Europe (T-PVS/Inf(2022)40). Based on this document, which identifies key knowledge and policy gaps as well as possible follow-up, the Council of Europe has adopted Recommendation No. 215 (2022), urging its 51 Parties, among which the European Union, to take priority actions in tackling these threats. Successively, at the 16th Conference of the Parties to the Convention on Biological Diversity (CBD COP16) held in Cali (Colombia) in 2024, the CBD Secretariat presented a Study on how approaches for the prevention, control, and management of invasive alien species may be usefully applied to biological invasions of pathogenic agents, in particular zoonotic pathogens (CBD/COP/16/INF/28). This document provides an overview of the problem, suggesting to the 196 Parties of this Convention possible measures to address the main challenges, alongside the relevant tools and resources needed. The need to adopt a One Health approach to address IAS, integrating different policies into a consistent framework, is now fully recognised, as discussed at the CBD COP16 and reiterated at the G7 Workshop on Invasive Alien Species, held in Rome (Italy) in 2024. For this purpose the interconnections between biodiversity loss, ecosystem degradation, and the risk of emergence and spread of zoonotic disease in relation to biological invasions need to be fully explored. There is also an urgent need for multisectoral and transdisciplinary collaboration across the domains of human, wildlife, and ecosystem health. This would require, for example, the identification of strategies and tools to mitigate the spread of alien-related pathogens and diseases (along with the risk of zoonosis) by reinforcing nature protection and habitat restoration initiatives. Incorporating the management of biological invasions into a One Health approach, and at the same time viewing alien species through a One Health lens, could be pivotal to developing strategies, identifying

synergies and optimizing the available resources, with a clear benefit on biodiversity and ecosystem health, as well as for human health.

IV. Speakers from the 3rd session on: Data and surveillance

***Anne-Laure Bañuls**, PREZODE Scientific Focal Point and IRD Director of Research, Belgium.*

Bio

Dr. Anne-Laure Bañuls is a Director of Research at the IRD and serves as the Scientific Focal Point for the PREZODE initiative (https://prezode.org/), as well as the Regional Focal Point for Southeast Asia. She leads the PREACTS-AfriCam project in Cambodia.

Her research focuses on the ecology and evolution of infectious diseases, including zoonoses, by studying the various compartments in which pathogens evolve—hosts, environments, and vectors.

Using multidisciplinary approaches, her work aims to uncover modes of transmission, identify virulence factors, analyze drug resistance mechanisms, and assess the impact of zoonoses and other infectious diseases on human and animal populations.

Her research spans a variety of diseases, including leishmaniasis, tuberculosis, and bacterial infections, with a particular focus on the emergence of bacterial drug resistance and its transmission across different spatial and temporal scales.

Abstract

"Preventing the emergence of zoonoses: from exploring pathogen transmission to implementation of public policies"

Zoonoses are emerging at an increasing rate due to the profound impact of human activities on ecosystems. Preventing their emergence requires a comprehensive understanding of the complex interactions between humans, animals, and the environment to develop effective operational strategies. In this context, identifying local-level drivers alongside biodiversity shifts is crucial for assessing the risk of emergence.

In this talk, I present the PREZODE initiative and the international actions within its framework, which focus on developing prevention strategies (PREACTS program) and defining specific risk indicators (PREZODE-WHO joint Working Group). I emphasize how identifying local drivers and risks can provide critical insights to strengthen the implementation of prevention strategies and surveillance systems. Through these

efforts, we can better tackle the challenges posed by zoonotic diseases and work toward sustainable, long-term solutions

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***Didier Verloo**, European Food Safety Authority (EFSA), Parma, Italy.*

Bio

Didier Verloo currently serves as the Head of the Knowledge, Innovation, and Partnership Unit at the European Food Safety Authority (EFSA). Over the past 20 years, he has been at the forefront of advancing regulatory science by championing evidence-based risk assessment while driving the automation of these processes and managing the knowledge needed and generated while executing those processes.

This work has established a foundation of transparency, reproducibility, and rigor, ensuring that EFSA's scientific processes are meticulously planned, executed, verified, and reported to deliver unbiased, fit-for-purpose outcomes.

As EFSA embraces automation, this evidence-based framework is crucial for the integration of human-centric artificial intelligence and data-driven technologies, enabling the agency to process vast datasets efficiently while upholding its commitment to scientific excellence.

In addition to his role at EFSA, Didier serves as President of the Board of Trustees for the Evidence-Based Toxicology Collaboration (EBTC) at Johns Hopkins University, Baltimore. He is also a member of the Scientific Advisory Committee of the Centre for Alternatives to Animal Testing (CAAT-Europe) and the Global Society of Regulatory Science.

Abstract

"Making sense of complexity - The role of AI in advancing One Health"

One Health emphasizes the interconnected nature of human, animal, and environmental health, advocating for collaborative, interdisciplinary approaches to address complex global health challenges in an evidence based holistic way. As in systems thinking One Health focuses on how different components of the health system interact and influence each other, rather than analyzing them in isolation.

AI, particularly through machine learning (ML), differs from traditional statistical methods by autonomously identifying complex patterns and relationships in data, without relying on predefined models. This makes AI uniquely suited to handle the intricate and non-linear interactions often encountered in One Health contexts. For example, AI can analyze large datasets to predict disease outbreaks, optimize antimicrobial use, or enhance food safety monitoring.

AI applied to, and incorporated in, evidence-based decision-making are gaining traction. Examples are given on AI tools that support risk assessments, aligning with regulatory frameworks such as the EU Artificial Intelligence Act, which emphasizes trustworthy and human-centric AI.

Embracing AI-driven tools can significantly enhance the ability to manage complex, interconnected health challenges efficiently and effectively. By fostering innovation and collaboration, AI has the potential to transform One Health strategies into actionable, impactful solutions.

***Sylvie Manguin**, French Research Institute for Sustainable Development (IRD), Montpellier, France.*

Bio

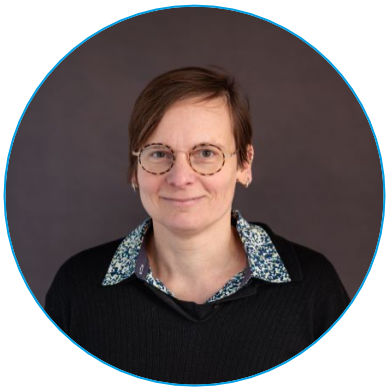
Prof Sylvie Manguin is a leading medical and molecular entomologist at IRD, working on mosquitoes and pathogen transmission responsible for malaria, dengue in a One Health context. Her research is done within a network from Southeast Asia (Thailand, Cambodia, Indonesia) and Africa (Angola). She is teaching in 3 universities, Montpellier (UM)-France, Kasetsart (KU)-Thailand as Adjunct Prof, and Gadjah Mada (UGM)-Indonesia. She is the Secretary General of IFTM (International Federation for Tropical Medicine).

Abstract

“Global biodiversity data as a resource for vector-borne disease research and policy”

GBIF — the Global Biodiversity Information Facility — is an international network and data infrastructure funded by the world's governments aiming at providing anyone, anywhere, open access to data about all types of life on Earth. Since 2020, the GBIF Secretariat established a task group composed of experts on vectors and data science to help improve the availability, access, and use of biodiversity data linked to human diseases. As part of the working group's efforts to mobilize vector data, in 2022 and 2023, a partnership between GBIF and TDR, the World Health Organization's special Tropical Disease Research and training program, was established to train early-career scientists in vector data sharing. In addition, two special issues of Gigabyte journal, sponsored by TDR, provided the opportunity to publish articles presenting biodiversity datasets linked to vectors and vector-borne diseases. To tackle disease control and possibly elimination, stakeholders must have access to a wide range of data openly shared under FAIR principles to support early detection, analyses and evaluation, and to be able to inform policy improvements and/or development. GBIF makes datasets available under the FAIR principles: ‘Findable’ by having being assigned a persistent

identifier (DOI) when registered on GBIF; 'Accessible' by being available for download in GBIF; 'Interoperable' because data is mapped and formatted with the widely used biodiversity standard (DwC); 'Reusable' as it is associated with detailed documentation on the data, as well as released under a Creative Commons license. A GBIF-commissioned landscape analysis produced a paper by Astorga et al. (2023), which compared studies related to human health that used GBIF-mediated data on biodiversity ("positive list") and a "negative list" that did not. The analysis showed that the positive list had more papers from biological and ecological sciences and incorporated data on host and vector species, while the negative list focused on medicine, public health and veterinary science, suggesting that data shared under the FAIR principles through GBIF contributes more to broad scale ecological analyses and less to health-related studies. In conclusion, the task group has improved the visibility of GBIF in the field of vector-borne diseases through an on-going effort to improve completeness, relevance and fitness-for-use of biodiversity data on vectors and vector-borne diseases shared through the GBIF network.



***Sophie Vanwambeke**, Earth and climate research center, Earth & Life Institute, UCLouvain, Louvain-la-Neuve, Belgium.*

Bio

Sophie Vanwambeke is a medical geographer, who graduated with a PhD in Sciences (geography) in 2005 in UCLouvain. She is a professor in the School of Geography and Earth & Life Institute in UCLouvain. Her research focuses on the geography of infectious diseases as a manifestation of spatial interactions between human societies and their environment. She has worked on mosquito-, tick- and rodent-borne diseases in temperate and tropical regions, both in the field of human and animal health.

Abstract

"Land systems data, pathogen vector data, are we on the same page?"

In the One Health perspective, understanding the complex webs of interactions between human, domestic and wild animals and the environment is a prerequisite to foster health. This holistic perspective has been a strong argument to adopt the One Health framework, but even though land features prominently (as one important component of ecosystems), it is often reduced to simplified considerations such as deforestation or agricultural intensification, even though land use trajectories are often more diverse and nuanced. We propose that the land systems framework as adopted in the land use community bears great potential in the context of One Health, with its considerations for, among other relevant elements, long term trajectories, teleconnections and trade offs in land use. A tighter consideration of how land and ecosystem characterization could be operationalized in studying pathogen ecology,

including spillover and disease emergence would greatly improve our capacity to identify, generalize and diversify our understanding of the role of land use and land use change in One Health. We will present the land systems framework and its relevant as a lens onto One Health related issues and how to document them.

Dolores Gavier-Widén, *Swedish Veterinary Agency, Uppsala, Sweden.*

Bio

Prof. Dolores Gavier-Widén is a veterinarian and wildlife pathologist, she is the head of the Department of Pathology and Wildlife Diseases at the Swedish Veterinary Agency and adjunct professor at the Swedish University of Agricultural Sciences. Her PhD and MSc degrees are from the university of California, Davis.

Dolores has a long experience on infectious diseases of wildlife and wildlife disease surveillance, with focus on Europe. She is a member of the World Organisation for Animal Health (WOAH) Working Group on Wildlife and co-chairs the project A European wildlife network for wild mammals and birds within the European Partnership on Animal Health and Welfare.

Dolores is past president of the Wildlife Disease Association (WDA), past chair of the European WDA and received the WDA Ed Addison Distinguished Service Award in 2020. She has a long publication record, is first editor of the book Infectious Diseases of Wild Mammals and Birds in Europe and co-editor and co-author of several book and book chapters.

Dolores professional aspiration is to contribute to wildlife health and sustainable and integrated wildlife disease management, recognising the critical role that wildlife has in the health of ecosystems, and thus, the health of the whole planet.

Abstract

"Wildlife in focus: sources or victims of emerging zoonotic diseases? The importance of wildlife disease surveillance"

Accelerating anthropogenic changes have devastating effects on ecosystems, causing climate change and loss of habitat, impacting the health and survival of wildlife. One Health (OH) recognises the interconnectedness of health across people, the environment and animals, wild animals being an important component, maintaining balance of ecosystems and as sentinels of ecosystem health. However, wildlife is often attributed as the source of emerging infectious diseases, which can be misunderstood and lead to negative perceptions of wildlife, threatening their protection and biodiversity.

Political will and the awareness of citizens recognising the importance of OH and of preserving biodiversity and the health of ecosystems has led to important EU initiatives and OH strategic developments across Europe, including enhanced wildlife disease surveillance (WDS). The WOAH statement “Ensuring that wildlife health is adequately monitored and managed with the same diligence as domestic animal health is vital for taking a One Health management approach by Veterinary Services” clearly highlights the importance of WDS. Objectives of WDS are, among others, early detection of diseases, to determine presence and distribution of a disease or demonstrate absence of a disease, to monitor trends, to obtain data for risk analysis and to facilitate control of diseases. Communication of surveillance results so that they can be used for appropriate wildlife management and risk mitigation is of utmost importance.

In summary:

- Anthropogenic activities are the main cause of biodiversity loss and emergence of disease
- Wildlife is a victim of human behaviour
- Wildlife disease surveillance is essential for One Health management
- Wildlife management needs broad, multi-sectoral integrated approaches and sustainable solutions

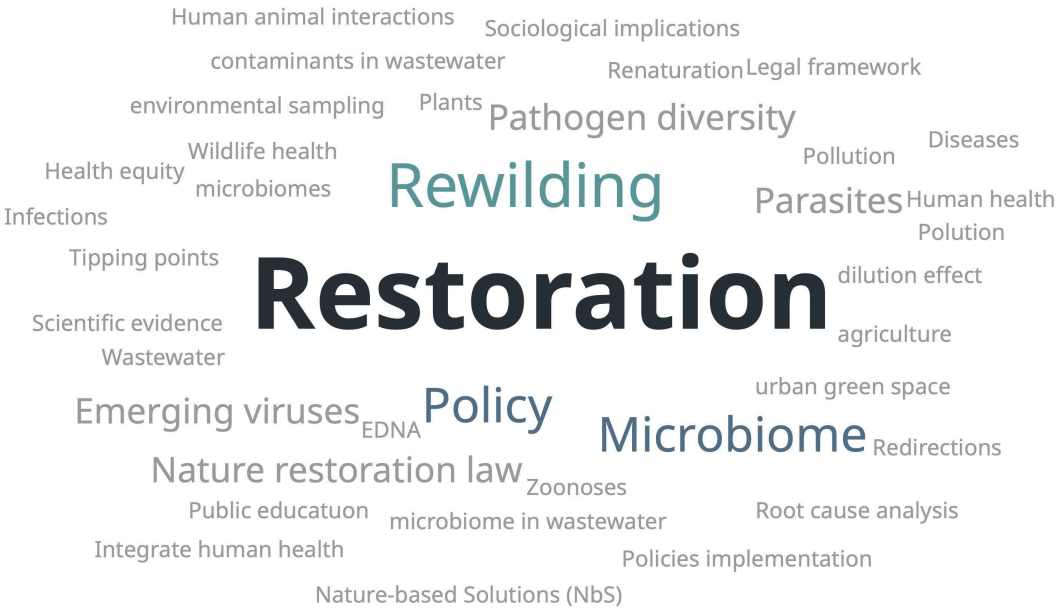
8. WORKSHOPS TOPICS & KEY FINDINGS

After a day and a half of presentations, the participants were divided into five group to discuss five key topics related to One Health.

This section presents the word clouds generated on Slido reflecting the participants' inputs on the topics they wished to address in each group, alongside those already listed by the moderators.

Below each word cloud, the key ideas that emerged from the discussions are summarised.

I. Working group on Biodiversity Loss



KEY FINDINGS

1. Expanding the evidence base

- Dilution effect + identify the contexts where the "amplification effect" takes place.
- Monetary value of environment and ecosystem services.
- Role of microbiome and its connection to macrobiome.
- Nature restoration efforts:
    - Identifying aims.
    - Identifying ecosystem services that support these aims.
    - Identifying the roles of species in these ecosystem services.

2. Ethical considerations in One Health

- Normative discussions on the value of human health vs. animal health.
- "Invasive alien species" as a controversial topic, with nationalist undertones.

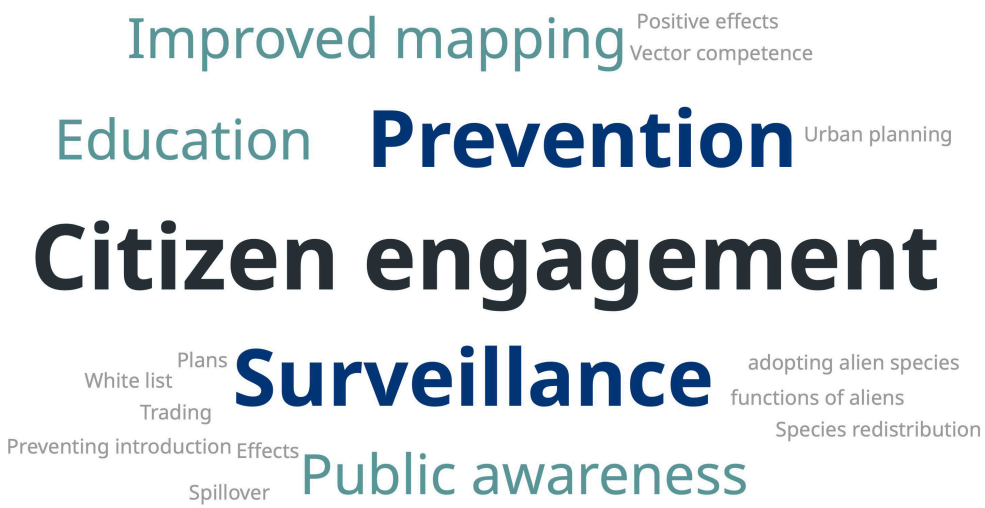
- The Global North telling the Global South about One Health & conservation, while there are still many issues in Europe.
- Need for a One Health philosophy of science.
- Equity issues: who has access to tools (e.g., AI) and data?

3. Prioritisation of efforts

"*If you had €2M, what would you do?*"

- Top answers:
  - Education and awareness (citizens, doctors, politicians, etc.).
  - Inclusion of citizens/local communities/stakeholders in research and priorisation process.
  - Studying the dilution effect.

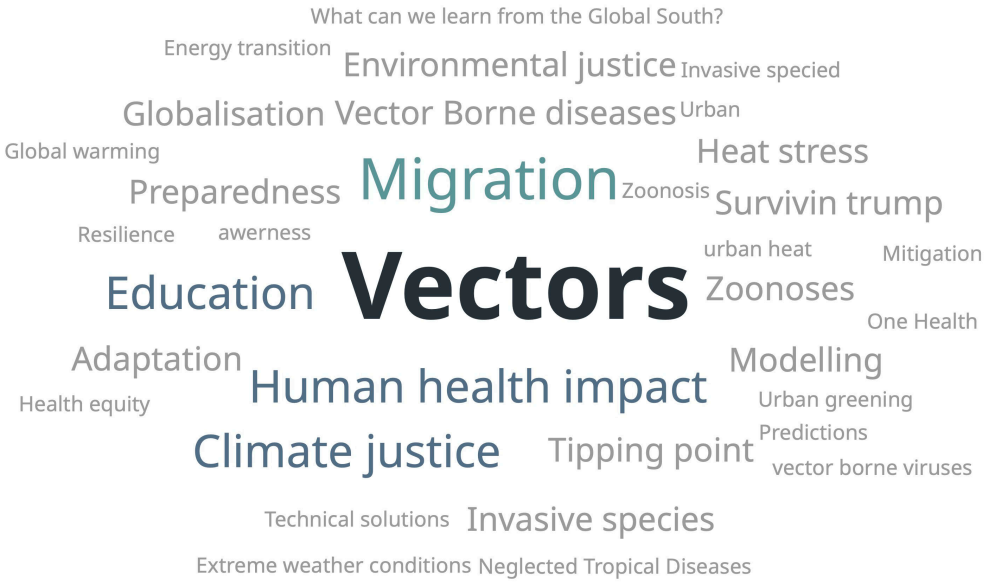
II. Working group on Biological Invasions



KEY FINDINGS

- Towards better integration between biological invasions and One Health. This requires addressing communication issues around concepts and terminology, and how they are perceived and used.
- Discussion on the "Knowledge gaps and priority areas" of the CBD.
- More ecology.
- Open baseline data in IAS, pathogens, and interactions.
- Use of predictive approaches and models.
- Transdisciplinary research to inform management.

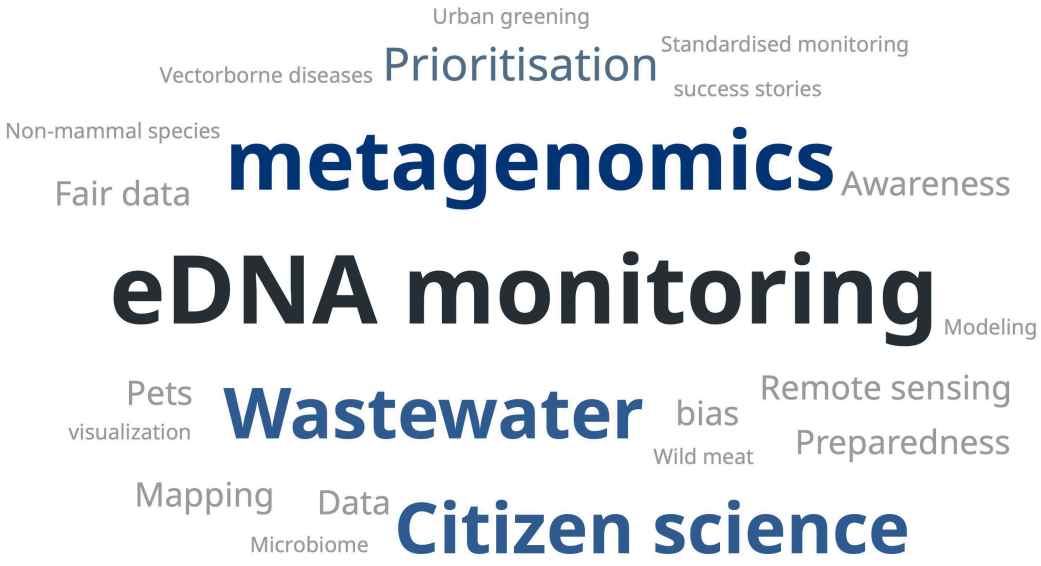
III. Working group on Climate Change



KEY FINDINGS

- **Equity and justice need more of a spotlight**
  - Advocate for change rather than resilience.
- **Better cooperation between different sectors**
  - Need for a paradigm shift to break silos.
  - Need for a One Health way of working within different competencies based on different narratives.
  - Importance of trust.
  - Focus on transformative change.
- **Better education about One Health**
  - Prevention of disinformation.
  - Less scientific communication, more storytelling.
  - More holistic way of working, considering all perspectives.
  - Better incorporation of citizen science and inclusion of different cultural dimensions.
  - Improved communication with policymakers - approaching them as citizens rather than decision-makers.

IV. Working group on Surveillance

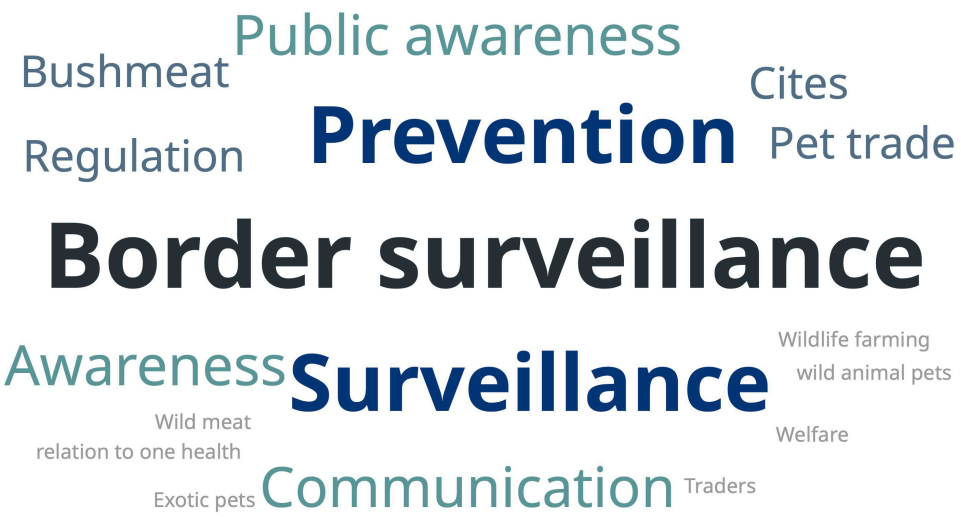


KEY FINDINGS

Priority topics:

- Ways to improve and implement coordination of (integrated) surveillance (systems).
- Data harmonisation and sharing (across actors and sectors).
- Better integration of environmental health in surveillance efforts.
- Community involvement in surveillance (methods/effectiveness).
- Evidence of (cost)effectiveness of specific surveillance methods.

V. Working group on Wildlife Trade



KEY FINDINGS

- Lack of data needed for evidence-based risk analysis.
- Need for One Health capacity strengthening in the Global South (e.g., awareness, law enforcement, biosecurity), including aspects of social sciences and economy in all trade-related aspects.
- Legal harmonised fit-for-purpose legislation, and address lack of regulation in wildlife trade, including pet trade.

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9. POSTER PRESENTATIONS

1. Leuven One Health - the KU Leuven Institute for One Health

Robbert Boudewijns, Leuven One Health - the KU Leuven Institute for One Health, Leuven, Belgium.

As KU Leuven institute, Leuven One Health is an interdisciplinary platform that wants to connect researchers from within and outside of our university. Our mission is to strengthen interdisciplinary collaboration, networking and exchange of knowledge and experiences between researchers and other stakeholders, and to initiate and coordinate research projects and other collaborations in the realm of One Health.
We have identified three thematic research lines, based on international priorities with lasting relevance, and the available expertise within KU Leuven:
1) pandemic prevention and preparedness,
2) antimicrobial resistance, and
3) the link between environment and health. Additionally, two transversal lines focus on systems thinking and the exchange of resources, knowledge and experience.

2. The biodiversity inside us: the human microbiome as a One Health indicator of health and environmental exposure

Florence E. Buytaers (Transversal activities in Applied Genomics, Sciensano), Nicolas Berger (Health information, Sciensano), Johan Van der Heyden (Health information, Sciensano), Nancy H. C. Roosens (Transversal activities in Applied Genomics, Sciensano), Sigrid C. J. De Keersmaecker (Transversal activities in Applied Genomics, Sciensano), Brussels, Belgium.

Human beings can be considered as holobionts, or meta-organisms, living in the presence of thousands of microbes on different parts of the body, such as the gut, skin, mouth and nose. These micro-organisms constitute our second genome and have a symbiotic interaction with our bodies, playing an important role in our health. Our microbial diversity begins to expand in infancy after the introduction of solid foods and then continues to vary according to health, including infections, behavior, but also our environment, including exposure to pollution and environmental contaminants, the biodiversity in the surrounding landscape.
Information on the microbiome composition can be obtained from non-invasive samples such as feces, saliva and nasal swabs, which are analyzed at large scale through advanced genomic techniques, including metabarcoding and shotgun sequencing. The microbiome data can then be linked to other data such as environment or health. Associations have previously been reported for smaller population groups, but not yet at large scale. The collection of data on the microbiome could be included in population-based health studies such as food consumption surveys, human biomonitoring studies related to environmental chemical exposure (measurement of chemical concentrations in human samples), mental health assessments or projects related to climate change and environmental biodiversity alterations.
This approach would be particularly promising for understanding how variations in environmental biodiversity influence microbiome diversity and, by extension, human health, including through the emergence of new infectious agents. Studies have shown that exposure to biodiverse environments, like green spaces, can impact mental and physical health, but also influence the microbiome. The diversity of the human microbiome may then serve as a measure of environmental health. Moreover, infection by a pathogen has also been associated with changes in the microbiome, and the microbiome can even predict the efficiency of vaccines on the infection. These recent findings suggest that microbiome data should be included in population-based epidemiological studies through biological sampling. This approach would allow researchers to assess the impact of environmental changes, such as those caused by climate change and pollution, on population health. It could also help evaluate the effects of mitigation actions taken in response to these challenges. Additionally, such studies could identify population groups at risk or track the emergence of diseases.
We will present results of a mini-review on the potential of including the microbiome as biomarker in population-based health studies i.e., a kind of proxy or measurable indicator of health and exposure determinants in the general population and how this would provide

relevant authorities with important insights to drive a proactive public health policy, based on a One Health approach linking health and the environment.

3. Exotic animals as a pet: how these alien species can be a risk for infectious diseases?

Letizia Cirasella (Istituto zooprofilattico sperimentale Lombardia ed Emilia-Romagna (IZS LER) Forlì), Perulli S. (IZS LER Forlì), Massella E. (IZS LER Piacenza), Fiorentini L. (IZS LER Forlì), Tosi G. (IZS LER Forlì), Siclari C. (IZS LER Forlì).

Introduction: Petaurus breviceps (PB), also called sugar glider, is normally distributed in New Guinea and Australia, Suricata suricatta (SS) is a smaller of other Herpestidae widespread in South Africa and Chinchilla lanigera (CL) is a wild small-sized rodent of the family Chinchillidae, native to South America. Due to the growing worldwide trend of keeping exotic animals as pets, PB, SS and CL have been gradually domesticated over the last decade. However, little is known about these alien species extrapolated from their environment and infectious diseases they could harbour, representing a potential risk to their owners. Here we present, to the best of our knowledge, three cases study of an alien species exported from Thailand and sold in Italy as pets with a systemic infection caused by rispectivelly Salmonella Typhymurium (ST), Salmonella Stanley (Ss) and Listeria monocytogenes (Lm).
Materials and methods: During 2024, PB, SS and CL carcasses were committed to the IZSLER Laboratory of Forlì. Necropsy were performed according to standard protocols. Bacteriological exam was performed for routine samples. The antimicrobial profile was determined with broth microdilution method with Minimal Inhibitory Concentration (MIC) analysis interpreted according to CLSI or, when not present, EUCAST breakpoints. Salmonella spp. serogroup and serotype identification was performed according to ISO/TR 6579-3:2014. Lm identify according ISO 11290-1:2017.
Results: Necroscopy revealed plurivisceral congestion. Salmonella in PB and SS and Lm in CL was isolated from all the organs. Salmonella serotype identification detected ST to PB and Ss to SS. ST MIC results reported resistance to Amoxicillin + Clavulanic Acid, Ampicillin, Amikacin, Cefalexin, Cefazolin, Doxycycline, Gentamicin, Kanamycin and Tetracycline. Ss MIC results shows resistance to Amikacin, Cefalexin, Cefazolin, Gentamicin and Kanamycin. Lm MIC result shows resistance to Clyndamicin.
Discussion and conclusion: This case-report described how zoonotic bacteria reported also in human infection outbreaks it's possible to find in exotic pet animals. The real question to suggest us to reflect is: how do alien species become infected? By the food or environment, they may be in contact during their long journey? This could lead to increase controls related to the sanitary conditions of food, water and the environment to prevent the introduction of antibiotic-resistant zoonotic bacteria or revise the import of alien species.

4. Monitoring the wild meat trade through DNA barcoding and pathogen screening of passenger-imported meat

Laura N. Cuypers (Royal Belgian Institute of Natural Sciences, Brussels (RBINS); Evolutionary Ecology Group, University of Antwerp, Antwerp (EEG UA), Kratz F. (Royal Museum for Central Africa, Tervuren (RMCA)), Geraerts M. (EEG UA), Fourchault L. (RBINS), Smitz N. (RMCA), Vanden Abeele S. (RBINS), Segers B. (RBINS), Burelli P. (RBINS), Terryn S. (Sciensano, Brussels), Verheyen E. (RBINS, EEG UA), Gryseels S. (RBINS, EEG UA).

The INTERCEPT project maps the current situation of monitoring (exotic) animal product imports from third countries into Belgium, highlighting both the legal and illegal aspects of the trade and its implications for public and animal health. Recommendations are being drafted to move towards a more robust framework for long-term monitoring including a centralized database that integrates data from various federal services and agencies to gain a better overview of the trade and to promote the dissemination of crucial information among federal services, agencies, and stakeholders. The project also aims to introduce a secure and efficient sampling method for officials, along with a molecular species identification pipeline for researchers, which will enable rapid DNA-based identification of illegally imported meat. During this project, over 600 specimens have been sampled from intercepted meat from passenger's luggage at Brussels Airport, of which more than 500 samples have so far been identified using

DNA barcoding and screened for orthopoxviruses. Metagenomic DNA and RNA sequencing is ongoing for a selection of samples pooled per DNA-confirmed species, preparation method (raw vs. cooked), and, when possible, region of origin. By fostering collaboration among scientific institutions and federal agencies, this initiative aims to inform border control measures and will support future research into pathogens carried by both domestic and exotic meat, allowing better characterisation of the health risks associated with the illegal import of meat from third countries.

5. Increasing detections of the invasive mosquito Aedes albopictus in Belgium

Justine Delbecque (Department of Epidemiology of Infectious Diseases (EID), Sciensano, Brussels, Belgium), M.R.G. Hermy (EID, Sciensano), I. Deblauwe (The Unit of Entomology, Dept. Biomedical Sciences, Institute of Tropical Medicine (U Ento, ITM), Antwerp), A. Schneider (U Ento, ITM), N. Smitz (Royal Museum for Central Africa (Barcoding Facility for Organisms and Tissues of Policy Concern), Tervuren), A. Vanderheyden (Institute of Natural Sciences (Barcoding Facility for Organisms and Tissues of Policy Concern), Brussels), T. Lernout (EID, Sciensano), R. Müller (U Ento, ITM), W. Van Bortel (U Ento, and Outbreak Research team, ITM), J. Rebolledo (EID, Sciensano) Belgium.

Aedes albopictus is an invasive mosquito species expanding its territory in Europe, posing a health risk as the species is a competent vector of dengue, chikungunya and Zika virus. In European countries autochthonous transmission of these viruses are reported in localities where the species is established. In Belgium the introduction of Ae. albopictus was first monitored through active surveillance at Points of Entry (PoEs). Since 2018, the increased observation of Ae. albopictus at parking lots located along the highways suggested a rise in introduction through route traffic. Hence, in 2022, a passive surveillance based on citizen science was implemented to complement the active surveillance and expand the coverage of the monitoring countrywide. We present the current situation for Ae. albopictus in Belgium based on the results of both active and passive surveillance.

Via an online platform (web/app), citizens uploaded pictures of potential Ae. albopictus specimens after answering filtering questions about morphological characteristics of the mosquito related to its size, color and stripes on the hind legs. Subsequently, pictures were then analysed to determine whether or not it is Ae. albopictus. When Ae.albopictus was confirmed on the picture, a field inspection was performed. This inspection included larval sampling and the set-up of ten oviposition traps for one or two weeks around the notification point. Additionally, in 2022 and 2023, ten oviposition traps were set-up at eight parking lots between May and October. In 2023, a longitudinal surveillance was also implemented to monitor overwintering and potential spread at two locations where the presence of Ae. albopictus was confirmed in 2022. In 2024, overwintering monitoring happened through larval sampling at four locations where Ae. albopictus was detected in 2023. DNA-based validation of all life stages of Ae. albopictus collected during field visits from several locations was performed to validate the identification of the species, and to investigate the haplotype composition of the population.

We received 12 notifications of Ae. albopictus from citizens from nine locations in 2022, 29 from 15 new locations in 2023 and 47 from 12 new locations in 2024. Overall, Ae. albopictus was detected at 36 locations in Belgium over these three years. Further, the exotic species was detected in 2022 at three, and in 2023 at seven parking lots. Longitudinal surveillance in 2023 confirmed the presence of Ae. albopictus at two locations, indicating local establishment and overwintering. In 2024, overwintering was confirmed at another three locations.

Prior to 2022, Aedes albopictus was in the early stage of its invasion process in Belgium, with confirmed occurrences limited to PoEs. Since 2022, the implementation of citizen surveillance has led to a steep increase in detections, including in residential areas, alongside numerus findings at parking lots. Additionally, the confirmation of overwintering at five locations, indicates that the species is being increasingly imported into Belgium via ground vehicular traffic and has become locally established in recent years.

6. Echinococcus multilocularis contamination of commercially grown berries and infection of foxes in the Dutch province of Limburg

Laura Derks (RIVM), Kees van der Ark (RIVM), Chesley van Buuren (RIVM), Wesley Mocking (RIVM), Fanny Bastien (ANSES), Gérald Umhang (ANSES, France), Joke van der Giessen (RIVM), Marieke Opsteegh (RIVM), The Netherlands.

Echinococcus multilocularis, the fox tapeworm, has been recognized as the most important food-borne parasite in Europe. Foxes are the main definitive hosts and humans can accidentally get infected by ingestion of eggs. This may cause the life-threatening disease alveolar echinococcosis (AE), where the larval stage of the parasite develops into a tumor-like structure in the liver with the potential to metastasize. After the first detection of E. multilocularis in foxes in the provinces of Limburg and Groningen (in The Netherlands) in 1996, the prevalence in foxes and the number of human cases have increased. Since ingestion of eggs might cause AE, it is important to not only monitor the presence of E. multilocularis in foxes, but also in food. This is especially important in produce that is eaten raw, since cooking will inactivate the eggs. Results from the European-wide MEmE project (2022) showed that some soft fruit samples from the province of Limburg contained E. multilocularis DNA, so a study was set up in 2024 to investigate the contamination rate on a larger scale.
To assess the prevalence and associated risk factors of E. multilocularis on fresh produce in the Dutch province of Limburg, 220 soft fruit samples consisting of 100 grams of fruit were collected directly from 22 farm plots on 14 different farms during the harvest season. Additionally, fruit producers were interviewed and 2 camera traps were placed on each farm. The fresh fruit was tested for the presence of E. multilocularis DNA using a washing and centrifugation protocol, followed by DNA isolation and an E. multilocularis-specific qPCR targeting the 12S mitochondrial gene. Results were confirmed by COX1 PCR and sequencing.
In the 2022 MEmE study, E. multilocularis DNA was found on 1/8 strawberry and 1/6 blueberry samples from Limburg. In our 2024 study, 10/220 (4.5%) soft fruit samples tested positive for E. multilocularis DNA, but only in low concentrations. Additionally, foxes were captured by the camera traps on 6/14 farms and seem to deliberately enter farm plots to forage fruits. These results confirm the potential contamination of commercially grown soft fruits in Limburg, but the implications for food safety remain unclear.
Follow-up: Soil samples (50g) were taken from the same locations as the fruit samples used in this study. These soil samples will also be tested for E. multilocularis DNA to estimate the contamination rate of the environment in which the produce grows. Data analysis, using the questionnaire data combined with qPCR results, will follow when all samples have been analyzed. Additionally, the current endemic area as well as the prevalence and worm burden of E. multilocularis in the fox population will be estimated by a large field study sampling foxes in Limburg in 2024-2026. These results will contribute to estimating the public health risk of E. multilocularis and the development of prevention strategies.

7. Leveraging ecosystem restoration for zoonotic spillover risk mitigation

Léa Fourchault (Royal Belgian Institute of Natural Sciences, Université Libre de Bruxelles), Sophie Gryseels (Royal Belgian Institute of Natural Sciences, Antwerp University), Behara Satyanarayana (Universiti Malaysia Terengganu), Farid Dahdouh-Guebas (Université Libre de Bruxelles), Belgium.

As disease regulation is a key ecosystem service, it is crucial that we better understand the role that restoring landscapes can play in reducing disease risks. Ongoing One Health studies suggest that declining biodiversity and increasing zoonotic pathogen spill-over risk are linked. Restoration processes normally aim at increasing species diversity, wherefore it is assumed that pathogens will be diluted in restored ecosystems, hence reducing the risk of zoonotic spillover. Nonetheless, the developing species composition during restorative processes will impact dilution-amplification effects. To estimate the threshold beyond which a restored ecosystem can be considered to have reached the pathogen dilution phase, it is crucial to characterise the communities of hosts, and the prevalence of pathogens, at the different stages of recovery of an ecosystem. Using interdisciplinary methods, this project has the dual aim of examining the amplification-dilution of zoonotic pathogens in a mangrove forest of the western Peninsular Malaysia, and to estimate the frequency and duration of exposure of local communities to this hazard, so as to best mitigate the risk of zoonotic pathogen spillover.

8. The surveillance of tick bites on humans and additional research opportunities through citizen science in Belgium

Geebelen Laurence (Sciensano, Belgian Institute for Health, Brussels (Sciensano)), Hermy M.R.G. (Sciensano), Tersago K. (Division of Preventive Health Policy, Flemish Department of Care, Environmental Healthcare, Brussels), Philippe C. (Sciensano), Mori M. (Sciensano), Rousseau R. (Sciensano), Lernout T. (Sciensano), Belgium.

Ticks are known to carry a wide variety of tick-borne pathogens (TBP), posing a potential health risk to humans. In 2015, a citizen science surveillance platform, TekenNet, was launched in order to better understand the risk of tick bites on humans in time and space in Belgium.
Through a website (www.tekennet.be) or an application for mobile phones, citizens report tick bites and information on the dates and probable geographical locations of the bites. Since the launch of the platform, over 65,000 tick bites have been reported, during more than 40,000 reporting events. Between years, important variations in the number of reported tick bites were observed where variations in weather conditions (e.g. dry summers) but also in exposure of the population (e.g. increased outdoor activities during COVID-19 epidemic) play an important role. Each year, tick bites mainly occurred between March and September, with a peak in June, and close to home, in the garden or the forest, while doing leisure activities.
As the platform has shown to allow efficient collection of robust data across the whole country, it has been used to carry out additional research projects on ticks and TBP. Based on tick bite reports, a risk map for the Belgian municipalities has been created using Bayesian modelling, taking into account environmental predictors (related to hazard and exposure). This risk map classified Belgian municipalities within one of three risk classes, providing a tool to support the implementation of local prevention measures by municipalities. Additionally, every four years, citizens are invited to send ticks removed from their skin to Sciensano, where they are analyzed for the presence of TBP. The prevalence of TBP tested for in the nymphs and adult ticks collected in 2017 (n=1515) and 2021 (n=928) ranged between 0% (for TBEV in both years) and 13.9% (for Borrelia burgdorferi s.l. in 2017).
The presence of a continuous and stable surveillance system for human tick bites allowed a better understanding of tick bite risk and of the prevalence of TBP in Belgium. Forthcoming, the impact of weather conditions on the number of tick bites will be investigated in detail. Additionally, from 2025 onwards, the platform will be used for a new citizen science study in which citizens will be invited to collect ticks in their gardens. This will allow us to better research the impact of weather conditions and vegetation types on the density of ticks.

9. Metagenomic screening of African wild meat unveils a wide diversity of viruses

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The processes involved in acquiring, trading, preparing, and consuming wild meat pose significant risks for the emergence of zoonotic infectious diseases. Several major viral outbreaks have been directly linked to the wild meat supply chain, yet our knowledge of the virome in many mammals involved in this chain remains limited and disproportionately focused on certain mammalian taxa and pathogens.
This report presents the findings of a metagenomic viral screening of 99 specimens belonging to 27 wild African mammal species and one domesticated species, all traded for their meat. The study focuses on tissue and swab samples collected from various regions in the Democratic Republic of the Congo and in Brussels, Belgium.
A total of fifteen virus strains were detected, belonging to the families Arteriviridae, Retroviridae and Sedoreoviridae (primates), Picobirnaviridae (primates and rodents), Picornaviridae (rodents), Hepadnaviridae (hyrax), Orthoherpesviridae (artiodactylid and carnivore) and Spinareoviridae (carnivore). Several strains were detected in mammalian hosts for the first time, expanding their host range and genetic diversity. Of note is the presence of viruses genetically related to recognised zoonotic pathogens, i.e., human picobirnavirus (Orthopicobirnavirus hominis) (primates and rodents), simian foamy viruses (Simiispumavirus) (primates), and rotavirus A (Rotavirus alphagastroenteritidis) (primates). The presence of these viruses in primates is concerning as non-human primates are phylogenetically closely related to humans, which can facilitate interspecies viral transmission.
These findings underscore the high diversity of mammalian viruses and the potential risk of human infection through cross-species transmission during the close interactions with wildlife in the wild meat supply chain.

10. Vector competence of Belgian Culex pipiens and Anopheles plumbeus mosquitoes for West Nile Virus under different temperature conditions

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An increased circulation of West Nile virus (WNV) has been reported in Europe during the last decade. Although there have thus far been no reported cases of WNV infections in Belgium, several neighboring countries reported WNV cases in animals and humans, making risk assessments of high importance with regard to a preparedness plan. Therefore we determined the vector competence of field-collected Culex pipiens and Anopheles plumbeus mosquitoes for WNV. Both species could significantly contribute to WNV transmission upon an introduction of the virus due to their proven competence in other countries (Cx. pipiens) and their biting behavior (An. plumbeus). Mosquitoes were exposed

to a blood meal containing 7.1×10^7 PFU/mL WNV (strain Israel 98, lineage 1) and incubated for 14 days at either a constant temperature of 25°C, or a day/night temperature gradient of 25/20°C or 25/15°C. All mosquitoes were kept at 80% relative humidity, and a 16L:8D cycle. Subsequently, infection rates (IR), dissemination rates (DR) and transmission rates (TR) were determined by detection of viral RNA via qRT-PCR in abdomen, head-wings-legs and saliva, respectively. Results indicated that at a constant 25 °C, Cx. pipiens had an IR of 28%, DR of 53%, and TR of 50%. Similar IR (25%) and DR (60%) were found for An. plumbeus although the TR was lower and only 11%. Applying the temperature gradients had no significant impact on the IR, DR and TR rates of Cx. pipiens for WNV compared to the 25°C condition, and virus was detected in the saliva of some mosquitoes in all conditions. In An. plumbeus, no effect was seen of the temperature gradients on the IR, but the DR was significantly reduced at the 25/15°C condition (10%) and lower at the 25/15°C condition (31%) compared to the constant 25°C condition. No WNV could be detected in saliva in any of the An. plumbeus mosquitoes at the gradient temperature conditions. These findings suggest that both mosquito species are competent vectors for WNV at 25°C, with overall transmission efficiencies of 5.6% and 1.6%, respectively. When day/night temperature gradients are introduced which are more representative for current Belgian summer conditions, An. plumbeus loses its vector competence for WNV. In contrast, Cx. pipiens remains a competent vector at both the 25/20 °C and 25/15°C gradient with transmission efficiencies of 1,4% and 7.8%, respectively. These data indicate that Cx. pipiens would be a more important vector for WNV transmission upon its introduction under the current climate conditions, whereas An. plumbeus would only have a limited role in its spread. Our results provide valuable insights into the dynamics of WNV transmission and are informative for the development of effective preparedness and control strategies to mitigate the risk of WNV outbreaks in Belgium.

11. Human disturbance, biodiversity loss and the dynamics of snail-borne parasites

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Human-mediated environmental changes are driving unprecedented biodiversity loss. A major, but often overlooked part of this biodiversity includes parasites, which play important roles in the ecosystem but can also form a significant threat to human and veterinary health. While biodiversity may be a source of parasite species diversity, biodiversity can also lower parasite infection levels and thus disease risk through several biological mechanisms, termed the “dilution effect”. However, the generality of this relationship is still debated and some studies suggest even amplification effects or a combination of both. Understanding the generality of these dilution effects is crucial for projecting disease risk in response to human-driven biodiversity loss. Therefore, we will investigate the relationship between human disturbance, biodiversity loss, and parasite diversity and infection levels using snail-borne parasites of small mammals as a model system. To this end, we will collect snails and small mammals along the 80 km-long Megatransect in Yangambi, Democratic Republic of Congo, spanning a disturbance gradient from pristine forest to secondary forest, plantations, and villages. We will then link host diversity, parasite diversity, and infection levels to the disturbance and biodiversity gradient. Snail-borne parasites, which are mostly parasitic worms (helminths), have long been understudied, and especially those infecting wildlife, which has left us with large knowledge gaps regarding their diversity, life cycle, and zoonotic potential, certainly in Central Africa. To facilitate wildlife parasite research, we will also develop a non-invasive metabarcoding tool to detect all infecting flatworm species in a single wildlife stool sample. Preliminary results suggest a high prevalence of nematodes and cestodes in rodents in the study region. Given the important role that parasites play in ecosystems, but also in disease emergence, our results will be particularly relevant in the Congo Basin, a hotspot of endemic and threatened biodiversity under increasing anthropogenic pressure.

12. New routes of Hyalomma to Austria: an unwanted souvenir

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Introduction. Hyalomma marginatum is an invasive tick species capable of transmitting pathogens that cause severe diseases such as Crimean-Congo hemorrhagic fever. In Austria, H. marginatum occurs sporadically, and migratory birds are believed to bring H. marginatum from distant regions. Austria does not yet have a comprehensive surveillance for H. marginatum.
Method. As part of an ongoing One Health EU-project (OH SURVector, funded by the European Union, No. 101132974), which started in January 2024, AGES (Austrian Agency for Health and Food Safety) and its partners are establishing a nationwide tick-monitoring program. Through a citizen science approach, we encourage participants to report and send in any ticks to monitor the circulating species in Austria, their distribution, and to investigate them for different pathogens. In case of H. marginatum the initial identification of the ticks is most often based on pictures sent electronically. Upon confirmation and receiving the ticks, we analyze them for the presence of Crimean-Congo haemorrhagic fever virus (CCHFV) as well as Rickettsia spp., and collect for each case relevant information, such as detailed travel itineraries.
Results. As of November 27th, 2024, a total of 1,235 ticks were sent to us and identified. Of 11 confirmed Hyalomma reports eight ticks were available for laboratory analysis. All of them were identified as H. marginatum (three males and five females) and analyzed for CCHFV and Rickettsia spp. None of the tested ticks was positive for CCHFV but three contained R. aeschlimannii (37.5 %). Six cases involving nine imported ticks were described in detail (April-June 2024) and had in common that H. marginatum was imported by travelers in private cars from Croatia to Austria. The reports state that in all six cases the ticks were crawling in the car during the travel home or were found after returning home.
Conclusion. As presented for the first time in Austria, tourist traffic may play a significant role in the northward expansion of H. marginatum aside from introduction by birds.

13. Intercropping dashboard: Fostering food safety and quality

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Climate change and biodiversity loss have continuously challenged our food production system, driving the need to transition towards a more sustainable food system. Biodiversity-positive cropping systems are considered a potential strategy to achieve such a transition, for example intercropping, which is growing multiple crops on the same field at the same time. Past studies mainly focused on the benefits of intercropping on productivity and the environment. However, changing a cropping system may also have further implication on the food supply chain, including on food quality and safety. To our knowledge, this study is the first that explores the impacts of intercropping on food quality and safety parameters. A case study was designed involving wheat as a main crop grown with a range of companion crops (faba bean, peas, lupins, oats, barley, black rape seed, grass clover, and potato). Findings from literature studies were limited and qualitative data were mainly collected from expert interviews. Quality parameters and potential safety hazards that

could change (decreased, increased, new or eliminated) in strip cropping or mixed cropping compared to monoculture wheat were discussed and knowledge gaps were identified. Our results showed that different food quality parameters (e.g., gluten quality and nitrogen content) and safety hazards (e.g., plant toxins, mycotoxins, allergens, pesticide residues) could be a concern at pre-harvest and post-harvest stages, depending on the crop combination. These results were visualized in a knowledge database dashboard envisioned as a decision-making support tool for stakeholders (e.g., policy makers, farmers). While our investigation was focused on quality and safety aspects, integrating other aspects (e.g., cost estimation, consumer studies, and legislation) would be valuable to provide a holistic overview of the proposed transition. To conclude, our study provides initial findings on the impacts of intercropping to food quality and safety and highlights the importance to consider these aspects upfront when proposing a transition in food production. Finally, a transition to a sustainable and biodiversity-positive food system should require a supply chain analysis and navigating such transition should consider a balance between mitigating climate change, reversing biodiversity loss, and providing safe and nutritious food.

14. Mapping the threat: invasive alien species and pathogen risks across Europe

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Invasive alien species (IAS) can also serve as carriers for alien pathogens. As such, their introduction may facilitate the spread of pathogens, potentially affecting both wildlife and human populations. IAS establishment is at the interface between the initial introduction of a species and its spread into ecological communities. This transitional phase is very difficult to detect because available IAS data is limited in time and space by monitoring capacity and reporting bias. Similarly, it is difficult to gauge widespread transmission and establishment of pathogens evolving in a self-sustaining population to new vectors. Should risk management also consider presence of pathogens when planning measures against IAS?
This study examines the spatiotemporal trends of IAS of Union concern, as defined by Regulation (EU) 1143/2014, throughout Europe. It aims to identify areas of establishment and assess the potential risk posed to human health and wildlife by the pathogens carried by IAS, using a combination of spatial and temporal analysis techniques alongside ecological insights. The findings reveal that 3% of areas across Europe (922,200 km^2) are characterized by established IAS of Union concern, while many regions display IAS occurrences without consistent presence over time and space. More than half of these areas have experienced a sharp increase in occurrences followed by a sudden decrease in recent years, involving species such as Impatiens glandulifera, Trachemys scripta, Ondatra zibethicus, Heracleum mantegazzianum, and Myocastor coypus. In 43% of the areas with established IAS, there is a potential pathogenic risk, with up to 283 associated pathogens per 100 km^2. Among these, 79% of pathogens have shown impacts on animal health, 45% on human health, and 21% on plant species. These findings can guide the prioritization of areas for IAS and pathogen management, emphasizing the importance of evidence tracking for effective prevention.

15. Environmental, animal and human health: a “One Health” approach to protected area management and governance in Madagascar

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Our research is based on the "One Health concept," emphasising collaboration and integration across various sectors, including human, animal, and environmental health. Due to anthropogenic disturbances, wildlife habitats gradually shrink, increasing interactions between wildlife, humans, and their domestic animals. Therefore, our research focuses on identifying potential zoonotic pathogens (viruses, bacteria, and protozoa) in endemic lemur species in Madagascar. We compared the microbiome of lemur populations in disturbed and intact environments.
Faecal and blood samples were collected from lemurs in disturbed and intact environments in four different protected areas. Metagenomic analysis, including shotgun sequencing to detect specific pathogens and 16S amplicon sequencing, was performed to characterise microbial communities.
Our results showed differences in the microbiome composition between lemurs living in disturbed and undisturbed environments. Lemurs from disturbed environments had higher microbial diversity than those from undisturbed environments. We tested if certain microbial groups (opportunistic pathogens) associated with environmental degradation were more abundant in the microbiomes of lemurs from disturbed environments.
These initial findings suggest that anthropogenic pressures significantly impact the microbiome composition of lemurs, which could potentially affect the health of the hosts. Furthermore, the detection of (re)emerging infectious diseases could pose a threat to public health. Understanding how microbes respond to environmental disturbances is crucial for conservation efforts to preserve biodiversity. Finally, early detection of potential (re)emerging infectious diseases will help prevent future pandemics.

16. ZooBiodiv project: supporting the development of a Belgian One World, One Health (OWOH) vision for preventing the emergence of zoonotic infectious diseases

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Over recent decades, the frequency of zoonotic disease outbreaks has risen significantly worldwide, with their emergence and re-emergence increasingly acknowledged to be closely tied to human-driven environmental pressures. These include biodiversity loss, land-use changes, wildlife exploitation, climate change, pollution, and the introduction of invasive alien species. These factors disrupt the complex transmission dynamics of numerous pathogens and parasites, often creating conditions conducive to their spread. The risk of epidemics is further exacerbated by globalization, amplifying the urgency to address these drivers.
At the Belgian level, efforts are ongoing to develop a Belgian One World One Health (OWOH) vision for preventing the emergence of zoonotic diseases at national scale.
In support of this, a 12-month collaborative project between Sciensano and the Federal Public Services (FPS) Public Health, Food Chain Safety and Environment, called ZooBiodiv, was initiated in April 2024.
This project has two distinct objectives: first, it explores the links between anthropogenic environmental changes, including climate change, and the risk of zoonotic disease emergence within a Belgian context. This analysis is conducted through a comprehensive, though not exhaustive, review of literature, encompassing peer-reviewed articles and 'gray' literature from relevant institutions and organizations. In doing so, the project aims to provide a general overview of the current knowledge of how five major anthropogenic drivers of zoonotic disease emergence, namely climate change, land use change, pollution, invasive alien species, and globalization, impact key variables, such as reservoir host and vector populations, that drive zoonotic risk. The focus lies on the Belgian context, which includes regions with similar climatic and socio-economic conditions.
The second objective involves the descriptive mapping of all stakeholders and their associated projects, initiatives, and existing databases, involved in the prevention and control of zoonotic diseases in Belgium. Through online research and consultations with selected key informants, this mapping document includes a range of stakeholders,

including institutions focused on animal, human and environmental health, as well as relevant administrative authorities, academic institutions, laboratories, and networks. For each stakeholder, the main characteristics are outlined, such as their area of expertise, scope of intervention, key partners, funding sources, and the types of outputs they generate.
This comprehensive approach will ensure a broad and inclusive representation of key actors involved in all of the areas of intervention, including prevention, surveillance, diagnostics, preparedness, and response.
These objectives highlight the critical importance of closing the knowledge gaps in our understanding of how environmental disturbances drive zoonotic risks. They also highlight the necessity of extensive multisectoral collaboration, involving a diverse array of stakeholders within a One Health framework, to effectively predict and prevent future outbreaks in our country. This holistic approach is essential for addressing the complex and interconnected challenges posed by zoonotic diseases.

17. Are turtles a suitable pet or a disguised threat? Potential disease-causing agents in imported pet turtles in Europe

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The introduction of exotic freshwater turtles (FTs) into Europe has raised significant concerns about their impacts in native species. However, the co-introduction of diseases, their role in native diseases dynamics and their impact in both wildlife and human health have been poorly studied. We conducted a literature review to assess the likelihood of disease introductions and disease sharing between native and non-native FTs and also to search for new potential diseases that infect commonly traded exotic turtles. For that we used Trachemys scripta, the most widely distributed invasive FTs species, and Graptemys pseudogeographica, Mauremys reevesii, and Mauremys sinensis, that are among the most imported pet FTs species in Europe. For these non-native species, we scan the diseases reported both in their native range and in the introduced areas across the globe. We identified 235 disease-causing agents among native and non-native populations of the four exotic FTs and of the European FTs. These include a mix of parasites, bacteria, viruses and fungus, with 75 agents detected exclusively in native populations of exotic FTs, 46 in non-native population of exotic FTs, and 54 in European FTs. 15 agents are shared among all three groups, indicating potential for cross-species transmission. The exotic FT populations in the native and European ranges share a total of 6 disease agents, while the native and non-native populations of exotic FTs and European FTs share 14 and 25 disease agents, respectively. We found that T. scripta hosts 155 disease-causing agents, including zoonotic pathogens, such has Salmonella sp. and Mycobacterium sp., with 92 of those identified in the non-native range. G. pseudogeographica hosts 23 disease-causing agents, including parasites, bacteria, and viruses, many of which are zoonotic, such as Salmonella sp. and Cryptosporidium parvum that were identified in the non-native range. M. reevesii harbors 22 agents, predominantly bacteria, which includes Salmonella spp. in the non-native range. Finally, M. sinensis carries fewer pathogens and only Mycobacterium sp. and Serpinema microcephalus were identified outside the native range. Emys orbicularis, the most widely distributed European FTS, shares 44 disease agents with exotic FTs, suggesting that the transmission of pathogens to European FTs is closely linked to habitat overlap. It has been shown that 15 disease agents, have potentially been co-introduced with exotic FTs into European FTs. However, 6 disease agents moved with exotic FTs to Europe but where not detected in native FTs, which may indicate some host specialization. The 30 disease agents absent from native population of exotic FTs, may have spilled over to the invasive populations. 14 disease agents that are present in native population of exotic and European FTs may occur globally or may not have yet been reported in non-native population of FTs. While most pathogens are reported in the FTs native ranges, their

absence in non-native ranges may reflect insufficient research rather than absence. These findings underscore the risks posed by both the wildlife trade and invasive species introductions. Non-native turtles act as new hosts and vectors of new diseases, altering the native diseases dynamics.

18. Coordinated effort for the surveillance of zoonotic influenza in Austria

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Within the framework of the United for Surveillance initiative (2023–2025), co-funded by the EU under the EU4Health Program (Project ID 101102070), Austria has enhanced its surveillance efforts for zoonotic influenza through a series of targeted activities coordinated by the National Reference Laboratory for Avian Influenza (NRL-AI). By engaging in international and national collaborations, the initiative aims to strengthen zoonotic influenza surveillance across multiple domains.

The project began with a stakeholder analysis and gap assessment, followed by a workshop to prioritize pilot studies. This resulted in the identification of four focus areas: active surveillance in wild birds, surveillance in domestic pigs, monitoring of zoonotic influenza in wild mammals other than pigs and improving communication between veterinary and public health authorities.

Based on these results, four pilot studies were implemented:

1. Active Surveillance in Wild Birds: A trinational surveillance project at Lake Constance, involving Austria, Germany, and Switzerland, began in 2024 within the framework of an EFSA-funded project (2024-2027, funded under EUBA-EFSA-2023-BIOHAW-06; Project ID 101185054). This study aims to improve early warning systems and deepen knowledge of circulating highly pathogenic avian influenza (HPAI) viruses at Lake Constance. To achieve this, year-round collection and analysis of samples from asymptomatic wild birds as well as environmental sources is conducted over three years.
2. Surveillance in Domestic Pigs: A network of national veterinary stakeholders was established to submit samples tested PCR-positive for swine influenza virus (SIV) to the NRL for sequencing and subtyping. Retrospective analysis was also conducted using frozen clinical samples from 1997 to 2024. Since the project's initiation in 2023, the number of SIV-positive samples submitted for sequencing has increased significantly.
3. Monitoring of Wild Animals and Mammals other than Pigs: Surveillance of zoonotic influenza in wildlife, including mammals other than pigs such as bats, foxes and wild boars, was strengthened through parallel testing in existing national monitoring programs and increased collaboration with the University of Veterinary Medicine Vienna, Vetmeduni (Research Institute of Wildlife Ecology).
4. Improving communication between veterinary and public health authorities: The One Health Working Group for the Surveillance of Zoonotic Influenza (OHFLÜ) brings together representatives from veterinary and public health authorities and the respective national reference laboratories. Its mission is to enhance cross-sectoral communication and foster coordinated future actions. A key initiative is the Horizon Scanning platform, which issues monthly reports on the global zoonotic influenza situation and promotes knowledge exchange between veterinary and public health authorities.

Overall, the project has established a strong multi-sectoral network, enhancing Austria's capacity to monitor zoonotic influenza. The growing number of SIV-positive samples submitted to the NRL for sequencing and increased stakeholder interactions confirm the network's effectiveness.

This coordinated effort highlights the importance of a multi-sectoral approach to manage zoonotic disease surveillance and provides a platform for national and international knowledge exchange, data sharing and rapid response to emerging threats.

19. Expanding the swimmer's itch pool of Belgium: a first record of Trichobilharzia regenti

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Introduction: Swimmer's itch (or cercarial dermatitis) is caused by avian and mammalian blood flukes, a parasitic infection affecting people worldwide. In particular, avian blood flukes of the genus Trichobilharzia, including Trichobilharzia regenti, are known for causing swimmer's itch. While these parasites typically infect waterfowl as final hosts, incidental infections in humans by cercariae can occur. Such infections trigger immune responses leading to painful, itchy skin lesions. In experimental animals, T. regenti has however shown the ability to evade immune responses, causing neuroinflammation. Recent decades have witnessed an increase in swimmer's itch cases across Europe, turning it into an emerging zoonosis.
Methods: Following a swimmer's itch case in Kampenhout (Belgium) in 2022, a malacological and parasitological survey was conducted at the transmission site, consisting of a private pond and adjacent creek.
Results: Six snail species were collected, including Ampullaceana balthica, a common intermediate host for Trichobilharzia parasites. Shedding experiments and DNA barcoding identified one snail specimen infected with T. regenti, a new species record for Belgium. This finding further strengthens the link between T. regenti and cercarial dermatitis. Additionally, Echinostomatidae sp. and Notocotylus sp. were isolated from other A. balthica specimens. However, the absence of reference DNA sequences hindered genus- and species-level identification for these parasites.
Conclusions: The presence of T. regenti in Belgium may have significant clinical implications, emphasizing the need for heightened diagnostic awareness among medical professionals. The lack of species-level identification for other parasite species underscores the need for comprehensive DNA databases for trematodes. These findings reveal the necessity for a Belgian framework to promptly detect and monitor zoonotic outbreaks of trematode parasites within the One Health context.

20. Climate Justice and Health Equity - The ongoing challenge for the Planetary Health Working Group of the Be-cause health network

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"Don't sit back and read and think and wait for you to have achieved the perfect theory to develop the perfect strategy for action: Get out there. Interfere. Talk to people. Try like all heck to change bits and bobs of the systems that surround you. As you'll try, you'll learn, and as you'll learn, your chances of success will expand extraordinarily". Julia Steinberger ("Individuals and social pressure: how to change the world", Julia Steinberger, in: Medium Jan 23, 2022).
The Planetary Health Working Group (WG) of the Be-cause health (BCH) platform emerged from the lessons learnt of the "Climate Justice and Health Equity Conference" held in 2021, one of the first events in Belgium to call a diversity of actors for sharing experiences and building knowledge on the topic.
Due to the complexity and relevance of the climate crisis and environmental degradation impact on health at global and local levels, transdisciplinary networks are a fruitful mechanism for understanding and tackling the multiple effects of such web of phenomena.

The environmental-health nexus emerged quite recently in the global health field, in the policy landscape, in the media and among civil society organizations and movements.
Therefore, we acknowledge an urgent need for developing a common language, shared vision, and experimenting and scaling concrete solutions among academia, health actors, policy decision-makers, humanitarian and development NGOs, as well as individual engaged citizens without discrimination.
The ultimate goal of the WG is contributing to climate justice and health equity. In line with Be-cause health principles of social protection and equitable access to good quality responsive health services for all, and strong, resilient and sustainable health systems, this WG aims to create a space for technical exchange and to facilitate joint initiatives.
In terms of ambitions, this WG wishes to be positioned as the central Belgian climate and health network, promoting meaningful participation of diverse range of actors from Low and Middle Income Countries and underrepresented and marginalized voices.
In addition to Human Rights and professionalism, the WG highlights or reminds few key values that actively drive the WG. Considering that those values cannot be treated as a checklist, but they call for respect and implementation and they are processes, this WG is engaged in promoting: Inclusion - Transparency - Decoloniality.

21. West Nile virus monitoring in Flanders (Belgium) during 2022-2023 reveals endemic Usutu virus circulation in the wild bird population

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Introduction and objectives. Recently, an increased number of cases of West Nile virus (WNV) and Usutu virus (USUV) has been reported in Europe. Wild birds, serving as key reservoirs for WNV and USUV, often act as crucial indicators for the introduction and spread of these viruses. Currently, there is no durable large scale monitoring for WNV in Belgium, and specific monitoring for USUV is lacking. In Flanders, passive WNV monitoring in wild birds has been in place for many years, while active monitoring efforts started in 2022. Here, we present the results of a limited study conducted during the vector seasons of 2022 and 2023 in Flemish wild bird populations to actively and passively monitor the prevalence of WNV and additionally assess the presence of USUV.
Methods & results. Several RT-qPCR's were employed for virus detection, revealing the absence of WNV-RNA during both vector seasons. Conversely, USUV-RNA was identified in 2022 through active surveillance, affecting two (5.5%) out of 36 birds (Corvus corone) and in passive surveillance, impacting eight (72.7 %) out of 11 birds (Turdus merula (6) and Rhea pennata (2)). WGS and phylogenetic analysis of the virus in the positive Rhea pennata indicated its placement with the Africa 3 lineage. In 2023, active surveillance was more extensive and identified 16 (7.2 %) USUV-RNA positive birds (Buteo buteo (1), Turdus merula (14) and Athene noctua (1)) out of 222 examined birds, while passive surveillance detected two (7.1 %) positive birds (Turdus merula (1), and Larus marinus (1)) out of 28.
Discussion & conclusion. This restricted WVN monitoring effort in Flanders did not reveal WNV presence, but found indications of an endemic USUV circulation in Belgium. It is crucial to intensify monitoring efforts for WNV in the coming years, considering its endemic status in several European countries and its expanding geographical range in northern Europe.

22. Supporting the One Health approach in Belgium: identification of policy-relevant organisms and tissues by BopCo

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Accurate species identification is crucial in the One Health framework because it underpins the ability to effectively monitor, prevent, and mitigate the emergence and spread of human and animal infectious diseases and zoonoses. Moreover, misidentification can lead to inadequate risk assessments, allowing infectious agents or invasive alien species to spread undetected, thereby threatening biodiversity, ecosystem stability, and public health. BopCo is a Belgian research unit that provides such accurate identifications of organisms and biological tissues with relevance for policy and decision-making processes. It is jointly run by the Royal Belgian Institute of Natural Sciences and the Royal Museum for Central Africa, and has access to extensive reference collections, expert taxonomists, and a comprehensive research infrastructure. BopCo uses morphology and DNA-based approaches to handle on-demand species identification requests, and it is a partner on various projects within the One Health context.
In this framework, BopCo contributes to identifying the introduction pathways and dispersal dynamics of two invasive mosquito species in Belgium, Aedes albopictus and Ae. japonicus, as part of the MEMO+ project in collaboration with Sciensano and the Institute of Tropical Medicine. Using various DNA identification techniques, BopCo verifies the species identity of the exotic mosquitoes collected at multiple points of entry. Similarly, the Medical Component of the Belgian Armed Forces is investigating the Culicidae mosquito biodiversity at foreign deployment sites. BopCo takes part in this project by providing DNA-based identifications to support the Laboratory for Vector-Borne Diseases of the Queen Astrid Military Hospital. Accurate identification of the various mosquito species is important since they are known vectors of pathogens of significant public health concern such as Western Nile virus, Plasmodium parasites, and dengue virus.
Furthermore, BopCo is involved in the monitoring of (exotic) animal product imports into Belgium within the INTERCEPT project, in collaboration with the University of Antwerp. Within this project, meat intercepted from passenger's luggage at Brussels Airport was sampled and identified using DNA barcoding to prevent the import of transmittable animal diseases and the introduction of invasive alien species.
Finally, BopCo contributed to the discovery of the first occurrence of Trichobilharzia regenti in Belgium, a blood parasite of birds, which may try to infect humans, triggering painful skin lesions known as "swimmer's itch". Following a reported case in Kampenhout, Belgium, researchers at the Royal Museum for Central Africa and KU Leuven captured freshwater snails (the intermediate hosts) and performed a shedding experiment, after which BopCo used a DNA analysis to identify the shed parasites, unveiling the presence of T. regenti.
BopCo continually seeks partnerships with research institutes and government agencies to deliver accurate species identifications within a One Health framework and other policy-relevant research contexts.

23. Restoring nature's health: Investigating the effects of ecosystem restoration on zoonotic disease risk

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Emerging infectious diseases (EIDs) pose a significant threat to global public health. Among the factors contributing to the increase of EIDs today, habitat degradation stands out as a

prominent driver, exerting both direct and indirect influences on disease dynamics. While it is commonly assumed that simply reversing ecosystem degradation will restore disease regulation mechanisms, such a presumption may oversimplify the complex response involved. My PhD project aims to delve deeper into the mechanisms underlying the impact of ecosystem restoration on zoonotic disease risk by examining terrestrial small mammal (TSM) and microparasite diversity within sampling sites following a chronosequence of ecosystem restoration in the Congo Basin. Through comprehensive sampling methods, including the capture of TSMs, and collection of iDNA and acoustic samples, the project will investigate how small mammal and microparasite diversity and prevalence evolve over time post-restoration. An emphasis will be placed on a subset of vector-borne and directly transmitted microparasites associated with African TSMs frequently found in the Congo Basin (i.e. Hepaciviruses, Paramyxoviruses, Orthonairovirus, Leptospira, Bartonella, and Anaplasma). The findings of this study will help unravel the complex interactions between ecosystem restoration, biodiversity, and zoonotic disease risk, offering crucial insights for the improvement and safeguarding of human, animal, and ecosystem health.
This research is situated within the framework of the RESTOREID project (Horizon Europe; PI: Herwig Leirs), which aims to investigate the role of landscape restoration in mitigating disease risk using various field sites in Europe and Africa.

24. Ecosystem Accounting to support decision-making for infectious disease control

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Natural Capital Accounting (NCA), also known as ecosystem accounting, is a standardized framework (e.g., the internationally adopted SEEA EA) designed to assess the value of nature. It quantifies ecosystems by their presence (or spatial extent) and condition, as well as by the services they provide to humans and the economic value thereof. NCA supports the assessment of provisioning, regulating, cultural, and supporting ecosystem services, including those essential for biodiversity preservation, climate change regulation, and infectious disease control. By doing so, it enables informed decision-making towards a more sustainable future (see for example [1]).
At VITO, our NCA research enables us to deliver geo-spatial solutions to map habitat extent and ecosystem condition, as well as their dynamic changes, using Earth Observation data [2] and Artificial Intelligence. For instance, this approach supports the European Commission's INCA tool [3]. Our developed geo-spatial models quantify the flow from nature to economy or human health, representing ecosystem services in both bio-physical and monetary terms [4]. These tools allow to monitor changes in natural capital, biodiversity and ecosystem services over time, while also enabling to assess and predict potential future shifts.
The widespread availability and extensive coverage of Earth Observation data, combined with VITO's advanced data analysis techniques, allows to generate precise information on habitat extent and condition, and ecosystem services. These data are instrumental in risk assessments related to infectious disease control and can guide effective responses.
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25. Vulnerable and detected? Assessing surveillance of wildlife diseases by determining mammal species vulnerability to climate change

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Climate change is one of the drivers of wildlife-borne disease emergence, as it can affect species abundance and fitness, host immunocompetence, and interactions with pathogens. To detect emerging wildlife-borne diseases, countries may implement general wildlife-disease surveillance systems. Such surveillance exists in the Netherlands. However, it is unclear how well it covers host species vulnerable to climate change and consequently disease emergence in these species. Therefore, we performed a trait-based vulnerability assessment (TVA) to quantify species vulnerability to climate change for 59 Dutch terrestrial mammals. Species' vulnerability was estimated based on the magnitude of climatic change within the species' distribution (exposure), the species' potential to persist in situ (sensitivity), and the species' ability to adjust (adaptive capacity). Using these vulnerability categories, we identified priority species at risk for disease emergence due to climate change. Subsequently, we assessed the frequency of occurrence of these priority species compared to other mammal species examined in general wildlife disease surveillance during 2008–2022. We identified 25% of the mammal species to be highly exposed, 24% to be highly sensitive, and 22% to have a low adaptive capacity. The whiskered myotis and the garden dormouse were highly vulnerable (i.e., highly exposed, highly sensitive, and low adaptive capacity), but they are rare in the Netherlands. The Western barbastelle, the pond bat, and the Daubenton's myotis were potential adapters (highly exposed, highly sensitive, and high adaptive capacity). Species vulnerable to climate change were relatively poorly represented in current general surveillance. Our research shows a comprehensive approach that considers both exposures to climate change and ecological factors to assess vulnerability. TVAs, as presented in this study, can easily be adapted to include extra drivers and species, and we would therefore recommend surveillance institutes to consider integrating these types of assessments for evaluating and improving surveillance for wildlife-borne disease emergence.