Session 2 - Impact of Wildlife trade and risks associated with Invasive Alien Species

The management of biological invasions within the One Health concept

Riccardo Scalera
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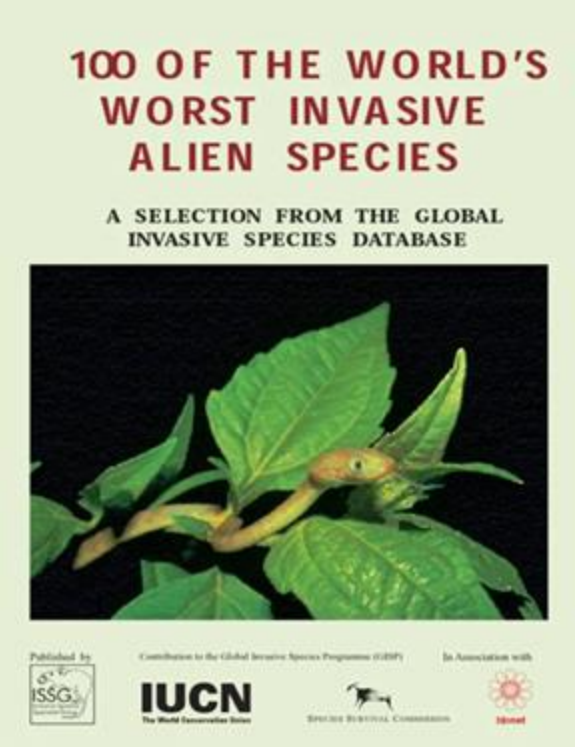
Ecosystems in the Balance. Supporting future policy and research

Brussels, Belgium
22-23 January 2025

Alien species include pathogens



100 OF THE WORLD'S WORST INVASIVE ALIEN SPECIES

MICRO-ORGANISM	
avian malaria	*(Plasmodium relictum)*
banana bunchy top virus	*(Banana bunchy top virus)*
rinderpest virus	*(Rinderpest virus)*
MACRO-FUNGI	
chestnut blight	*(Cryphonectria parasitica)*
crayfish plague	*(Aphanomyces astaci)*
Dutch elm disease	*(Ophiostoma ulmi)*
frog chytrid fungus	*(Batrachochytrium dendrobatidis)*
phytophthora root rot	*(Phytophthora cinnamomi)*
AQUATIC PLANT	
caulerpa seaweed	*(Caulerpa taxifolia)*
common cord-grass	*(Spartina anglica)*
wakame seaweed	*(Undaria pinnatifida)*
water hyacinth	*(Eichhornia crassipes)*
LAND PLANT	
African tulip tree	*(Spathodea campanulata)*
black wattle	*(Acacia mearnsii)*
Brazilian pepper tree	*(Schinus terebinthifolius)*
cogon grass	*(Imperata cylindrica)*
cluster pine	*(Pinus pinaster)*
erect pricklypear	*(Opuntia stricta)*
fire tree	*(Myrica faya)*
giant reed	*(Arundo donax)*
gorse	*(Ulex europaeus)*
hiptage	*(Hiptage benghalensis)*
Japanese knotweed	*(Fallopia japonica)*
Kahili ginger	*(Hedychium gardnerianum)*
Koster's curse	*(Clidemia hirta)*
kudzu	*(Pueraria montana var. lobata)*
lantana	*(Lantana camara)*
leafy spurge	*(Euphorbia esula)*
leucaena	*(Leucaena leucocephala)*
melaleuca	*(Melaleuca quinquenervia)*
mesquite	*(Prosopis glandulosa)*
miconia	*(Miconia calvescens)*
mile-a-minute weed	*(Mikania micrantha)*
mimosa	*(Mimosa pigra)*
privet	*(Ligustrum robustum)*
pumpwood	*(Cecropia peltata)*
purple loosestrife	*(Lythrum salicaria)*
quinine tree	*(Cinchona pubescens)*
shoebutton ardisia	*(Ardisia elliptica)*
LAND PLANT (CONTINUED)	
Siam weed	*(Chromolaena odorata)*
strawberry guava	*(Psidium cattleianum)*
tamarisk	*(Tamarix ramosissima)*
wedelia	*(Sphagneticola trilobata)*
yellow Himalayan raspberry	*(Rubus ellipticus)*
AQUATIC INVERTEBRATE	
Chinese mitten crab	*(Eriocheir sinensis)*
comb jelly	*(Mnemiopsis leidyi)*
fish hook flea	*(Cercopagis pengoi)*
golden apple snail	*(Pomacea canaliculata)*
green crab	*(Carcinus maenas)*
marine clam	*(Potamocorbula amurensis)*
Mediterranean mussel	*(Mytilus galloprovincialis)*
Northern Pacific seastar	*(Asterias amurensis)*
zebra mussel	*(Dreissena polymorpha)*
LAND INVERTEBRATE	
Argentine ant	*(Linepithema humile)*
Asian longhorned beetle	*(Anoplophora glabripennis)*
Asian tiger mosquito	*(Aedes albopictus)*
big-headed ant	*(Pheidole megacephala)*
common malaria mosquito	*(Anopheles quadrimaculatus)*
common wasp	*(Vespula vulgaris)*
crazy ant	*(Anoplolepis gracilipes)*
cypress aphid	*(Cinara cupressi)*
flatworm	*(Platydemus manokwari)*
Formosan subterranean termite	*(Coptotermes formosanus shiraki)*
giant African snail	*(Achatina fulica)*
gypsy moth	*(Lymantria dispar)*
khapra beetle	*(Trogoderma granarium)*
little fire ant	*(Wasmannia auropunctata)*
red imported fire ant	*(Solenopsis invicta)*
rosy wolf snail	*(Euglandina rosea)*
sweet potato whitefly	*(Bemisia tabaci)*
AMPHIBIAN	
bullfrog	*(Rana catesbeiana)*
cane toad	*(Bufo marinus)*
Caribbean tree frog	*(Eleutherodactylus coqui)*
FISH	
brown trout	*(Salmo trutta)*
carp	*(Cyprinus carpio)*
large-mouth bass	*(Micropterus salmoides)*
FISH (CONTINUED)	
Mozambique tilapia	*(Oreochromis mossambicus)*
Nile perch	*(Lates niloticus)*
rainbow trout	*(Oncorhynchus mykiss)*
walking catfish	*(Clarias batrachus)*
Western mosquito fish	*(Gambusia affinis)*
BIRD	
Indian myna bird	*(Acridotheres tristis)*
red-vented bulbul	*(Pycnonotus cafer)*
starling	*(Sturnus vulgaris)*
REPTILE	
brown tree snake	*(Boiga irregularis)*
red-eared slider	*(Trachemys scripta)*
MAMMAL	
brushtail possum	*(Trichosurus vulpecula)*
domestic cat	*(Felis catus)*
goat	*(Capra hircus)*
grey squirrel	*(Sciurus carolinensis)*
macaque monkey	*(Macaca fascicularis)*
mouse	*(Mus musculus)*
nutria	*(Myocastor coypus)*
pig	*(Sus scrofa)*
rabbit	*(Oryctolagus cuniculus)*
red deer	*(Cervus elaphus)*
red fox	*(Vulpes vulpes)*
ship rat	*(Rattus rattus)*
small Indian mongoose	*(Herpestes javanicus)*
stoat	*(Mustela erminea)*

Species were selected for the list using two criteria: their serious impact on biological diversity and/or human activities, and their illustration of important issues of biological invasion. To ensure a wide variety of examples, only one species from each genus was selected. **Absence from the list does not imply that a species poses a lesser threat.**

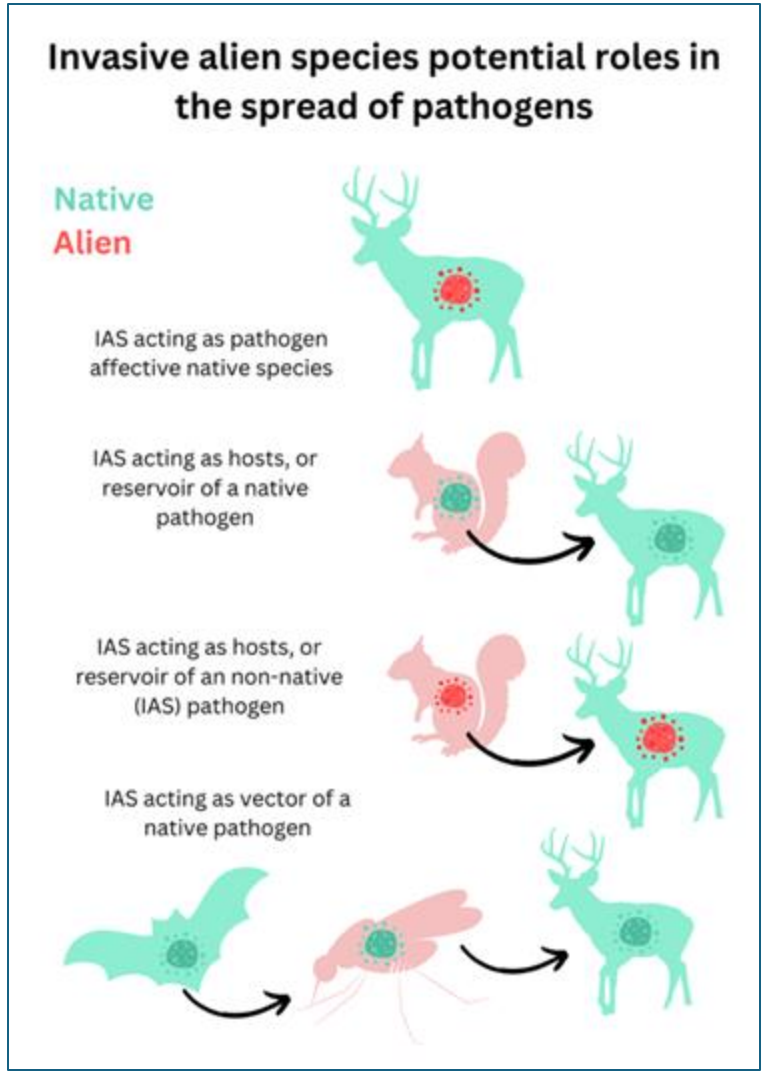
Development of the *100 of the World's Worst Invasive Alien Species* list has been made possible by the support of the Fondation d'Entreprise TOTAL (1998 - 2000).

For further information on these and other invasive alien species consult The *Global Invasive Species Database*:

www.issg.org/database

How do alien species impact biodiversity?

Impact mechanisms (IUCN)
1. Competition 2. Predation 3. Hybridisation 4. Disease transmission [vector/host] 5. Parasitism and pathogens 6. Poisoning/Toxicity 7. Bio-fouling 8. Grazing/Herbivory/Browsing 9. Rooting/Digging 11. Flammability 12. Interaction with other invasive species



Alien species pathways

Compared to wildlife trade, biological invasions are a more pervasive threat, because they entail the actual introduction and spread of species into the environment.

Whether it get established or not, once in the environment an alien species can infect other wildlife, even if it get extinct. If it get established, on the other hand, may change the epidemiological dynamics

	Category	Subcategory
Movement of COMMODITY	RELEASE IN NATURE	Biological control
		Erosion control/ dune stabilization (windbreaks, hedges, ...)
		Fishery in the wild (including game fishing)
		Hunting
		Landscape/flora/fauna "improvement" in the wild
		Introduction for conservation purposes or wildlife management
		Release in nature for use (other than above, e.g., fur, transport, medical use)
		Other intentional release
	ESCAPE FROM CONFINEMENT	Agriculture (including Biofuel feedstocks)
		Aquaculture / mariculture
		Botanical garden/zoo/aquaria (excluding domestic aquaria)
		Pet/aquarium/terrarium species (including live food for such species)
		Farmed animals (including animals left under limited control)
		Forestry (including reforestation)
		Fur farms
		Horticulture
		Ornamental purpose other than horticulture
		Research and ex-situ breeding (in facilities)
		Live food and live bait
		Other escape from confinement
	TRANSPORT – CONTAMINANT	Contaminant nursery material
		Contaminated bait
		Food contaminant (including of live food)
		Contaminant on animals (except parasites, species transported by host/vector)
		Parasites on animals (including species transported by host and vector)
		Contaminant on plants (except parasites, species transported by host/vector)
		Parasites on plants (including species transported by host and vector)
		Seed contaminant
		Timber trade
		Transportation of habitat material (soil, vegetation, ...)

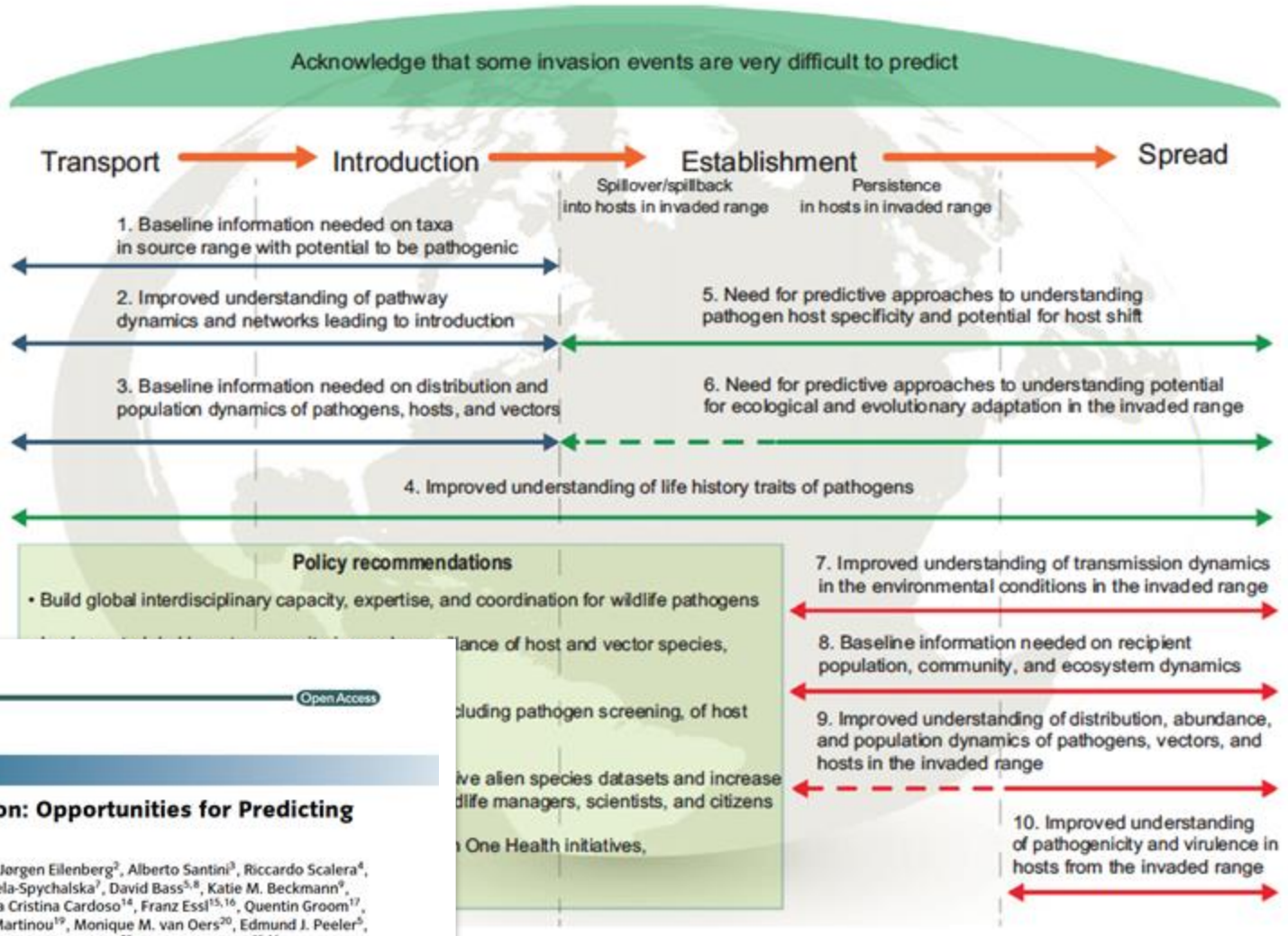
VECTOR	TRANSPORT - STOWAWAY	Angling/fishing equipment
		Container/bulk
		Hitchhikers in or on airplane
		Hitchhikers on ship/boat (excluding ballast water and hull fouling)
		Machinery/equipment
		People and their luggage/equipment (tourism)
		Organic packing material, in particular wood packaging
		Ship/boat ballast water
		Ship/boat hull fouling
		Vehicles (car, train, ...)
		Other means of transport
SPREAD	CORRIDOR	Interconnected waterways/basins/seas
		Tunnels and land bridges
	UNAIDED	Natural dispersal across borders of invasive alien species that have been introduced through pathways 1 to 5

The CBD pathways categorisation for the introduction of alien species (from UNEP/CBD/ SBSTTA/18/9/Add.1)

ALIEN Challenge

The **objective** was to help scientists, wildlife managers, and conservation practitioners to bridge the knowledge gaps, which affect the opportunities to take action, and hence inform policy and decision makers

10 key areas for research and action




Conservation Letters

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POLICY PERSPECTIVES

Alien Pathogens on the Horizon: Opportunities for Predicting their Threat to Wildlife

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Control wildlife pathogens too

Policies to control diseases caused by invasive alien species should be extended to cover endangered wild species, ecosystems and their services — not just humans, livestock and cultivated plants.

Of the 100 invasive alien species listed by the International Union for Conservation of Nature as the 'world's worst', one-quarter have environmental impacts that are linked to diseases in wildlife (M. J. Hatcher *et al. Front. Ecol. Environ.* **10,** 186–194; 2012). Identifying and managing this threat calls for coordinated interdisciplinary expertise.

Priorities are to collect baseline information on the distribution and population dynamics of pathogens, hosts and vectors; to determine the relative importance of invasion pathways; and to develop methods for predicting host shifts, pathogen–host dynamics and the evolution of alien pathogens (see also go.nature.com/ux4wpp).

This integrated strategy is geared towards the goals set by the Convention on Biological Diversity for managing invasives.

Helen Roy* *NERC Centre*

The Bern convention

COUNCIL OF EUROPE
CONSEIL DE L'EUROPE

CONVENTION DE BERNE
BERN CONVENTION

Convention on the Conservation of European Wildlife and Natural Habitats

- Negotiated at the Council of Europe
- Signed in Bern, Switzerland, in 1979
- In force since 1982
- 51 Contracting Parties
- Including the European Union, and extending to Africa and Asia

Main objectives:

- promoting national conservation policies,
- considering the impact of planning and development on the natural environment,
- promoting education and information on conservation,
- coordinating research

Obligations on IAS

Article 11, paragraph 2 requests Parties to: *«strictly control the introduction of non-native species»*

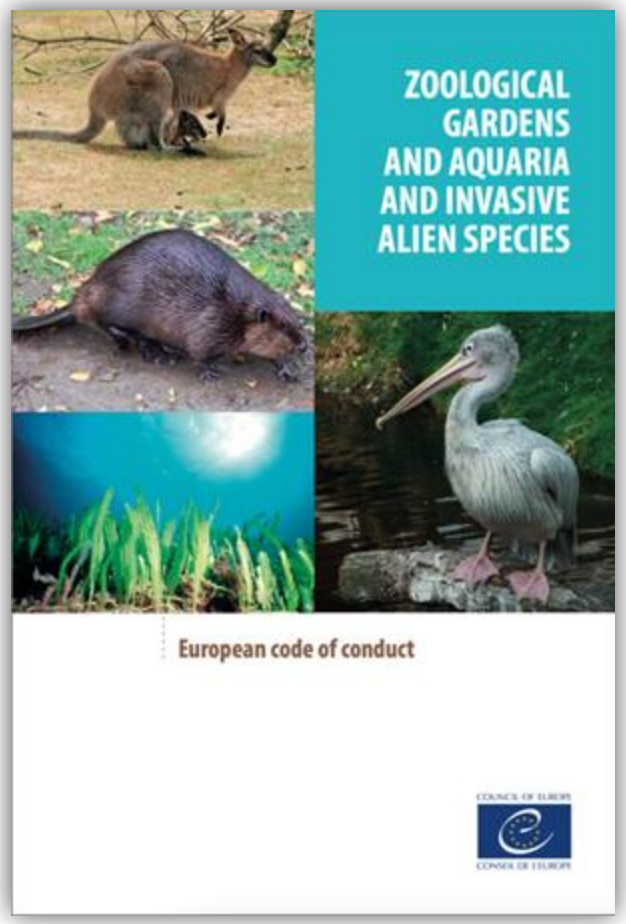
The Bern convention

Ways of action

- Reports,
- Recommendations
- Action Plans
- Guidance documents

Guidance documents, codes of conduct, actions plans and strategies

- Guidance on communication and IAS - T-PVS/Inf(2022)35
- Position paper on Invasive Alien Tree Species and Climate Change - T-PVS/Inf(2022)39
- Report on alien pathogens and pathogens spread by IAS - T-PVS/Inf(2022)40
- Guidance on e-commerce and IAS - T-PVS/Inf(2021)39
- European Code of Conduct on International Travel and Invasive Alien Species - T-PVS/Inf(2017)1
- European Code of Conduct for Invasive Alien Trees - T-PVS/Inf(2017)8
- European Code of Conduct on Recreational Boating and Invasive Alien Species - T-PVS/Inf(2016)13
- Guidance for governments concerning IAS pathways action plans - T-PVS/Inf(2016)10E
- The Bern Convention and EU Regulation 1143/2014 on the Prevention and Management of the Introduction and Spread of Invasive Alien Species - T-PVS/Inf(2015)14E
- European Code of Conduct on Recreational Fishing and Invasive Alien Species - T-PVS(2014)11
- European Guidelines on Protected Areas and Invasive Alien Species - T-PVS/Inf(2013)22
- European Code of Conduct on Hunting and Invasive Alien Species - T-PVS/Inf(2013)20corrigendum
- European Code of Conduct for Zoological Gardens and Aquaria on Invasive Alien Species - T-PVS/Inf(2011)26rev
- European Code of Conduct for Botanic Gardens on Invasive Alien Species - T-PVS/Inf(2012)1
- European Code of Conduct on Pets and Invasive Alien Species - T-PVS/Inf(2011)1rev
- Invasiveness of biofuel crops and potential harm to natural habitats and native species - T-PVS/Inf(2009)06E
- European Code of Conduct on Horticulture and Invasive Alien Plant - T-PVS/Inf(2008)2
- European Strategy on Invasive Alien Species - T-PVS/Inf(2004)1



Report on IAS and pathogens

Alien pathogens and **pathogens spread by invasive alien species**

with a specific focus on those having an impact on **wildlife**

Formally adoped through Recommendation No. 215 (2022)

Strasbourg, 3 August 2022 T-PVS/Inf(2022)40

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

Standing Committee

42nd meeting
28 November - 2 December 2022

REPORT ON
ALIEN PATHOGENS AND PATHOGENS SPREAD BY INVASIVE ALIEN SPECIES IN EUROPE

THIRD DRAFT

August 2022

Report prepared by
Mr Riccardo Scalera

The opinions expressed in this work are the responsibility of the author and do not necessarily reflect the official policy of the Council of Europe

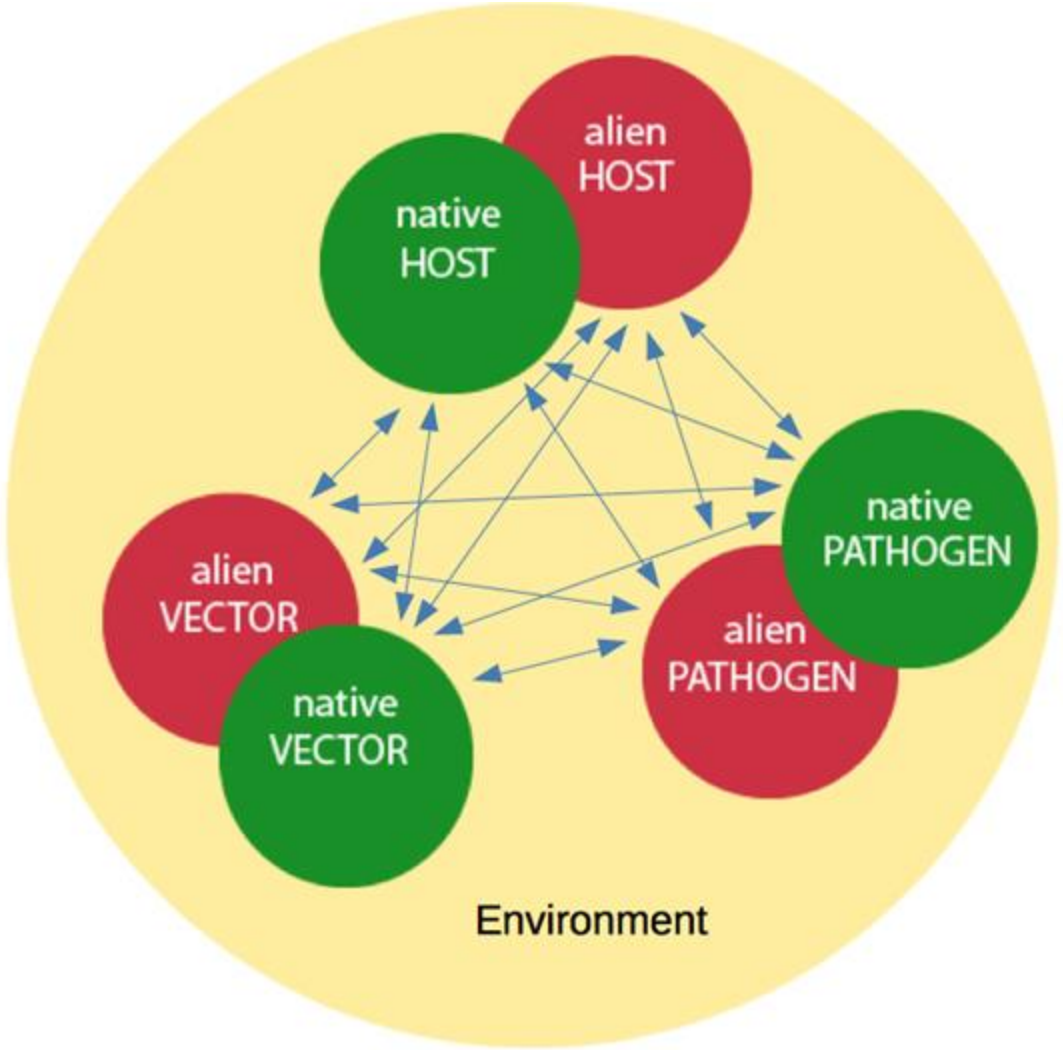
Report on IAS and pathogens - Objectives

- The aim is to provide Member States of the Council of Europe with an overview of the issues at stake in relation to alien pathogens and pathogens spread by IAS.
- The main gaps in knowledge, science, policy and legislation (including at the EU level) which may have an impact on the conservation objectives set by the Bern Convention are highlighted.
- This overview should set the basis for a larger discussion in the relevant scientific bodies of the Bern Convention, on the conservation actions (including research priorities) and possible policy and legislative recommendations that could be promoted

Overview on alien pathogens and pathogens spread by IAS

IAS can act in different ways:

- as pathogens themselves,
- as vectors of:
  - Native/alien pathogens
- as host of:
  - Native parassites acting as vectors of:
    - Native/alien pathogens
  - Alien parassites acting as vectors of:
    - Native/alien pathogens
- as facilitators of hosts and/or vectors of pathogens



May alter the epidemiology of local pathogens, e.g. by introducing changes in the vector-host-parasite relationship

Studies confirmed that alien pathogens affecting wildlife have received little attention, despite the magnitude of their impact

Policy and legislation framework

- The Bern Convention
- The Convention on Biological Diversity
- The World Health Organization
- The World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures
- The World Organization for Animal Health
- The International Plant Protection Convention

- The European and Mediterranean Plant Protection Organization
- The EU Regulation No. 1143/2014 on Invasive Alien Species
- The EU Animal Health Law
- Animal health conditions of aquaculture animals and products
- The EU Plant Health Law

- One Health

Case study - *Batrachochytrium salamandrivorans*

2013 - *Batrachochytrium salamandrivorans* identified and described (Martel, Blooi, Bossuyt and Pasmans, 2013)

2015 - Recommendation No. 176 (2015) on the prevention and control of the *Batrachochytrium salamandrivorans* chytrid fungus

2017 - *Batrachochytrium salamandrivorans* listed in OIE Aquatic Animal Health Code

2017 - EU project aimed at “Mitigating a new infectious disease in salamanders to counteract the loss of European biodiversity” (900,000 euro)

2018 - Commission Implementing Decision (EU) 2018/320 of 28 February 2018 on certain animal health protection measures for intra-Union trade in salamanders and the introduction into the Union of such animals in relation to the fungus *Batrachochytrium salamandrivorans*


L 69/12 EN Official Journal of the European Union 26.2.2021

COMMISSION IMPLEMENTING DECISION (EU) 2021/361

of 22 February 2021

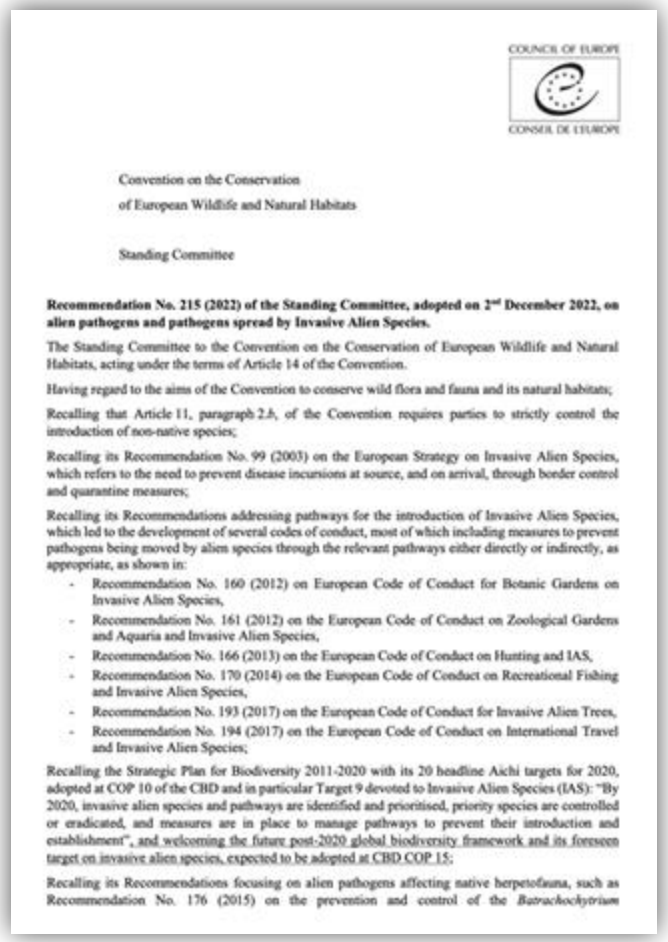
laying down emergency measures for movements between Member States and the entry into the Union of consignments of salamanders in relation to infection with *Batrachochytrium salamandrivorans*

(notified under document C(2021) 1018)

(Text with EEA relevance)

Animal Health Law (Regulation 2016/429) since April 21, 2021

Recommendation No. 215 (2022)



COUNCIL OF EUROPE
CONSEIL DE L'EUROPE

Convention on the Conservation
of European Wildlife and Natural Habitats

Standing Committee

Recommendation No. 215 (2022) of the Standing Committee, adopted on 2nd December 2022, on alien pathogens and pathogens spread by Invasive Alien Species.

The Standing Committee to the Convention on the Conservation of European Wildlife and Natural Habitats, acting under the terms of Article 14 of the Convention.

Having regard to the aims of the Convention to conserve wild flora and fauna and its natural habitats;

Recalling that Article 11, paragraph 2.b, of the Convention requires parties to strictly control the introduction of non-native species;

Recalling its Recommendation No. 99 (2003) on the European Strategy on Invasive Alien Species, which refers to the need to prevent disease incursions at source, and on arrival, through border control and quarantine measures;

Recalling its Recommendations addressing pathways for the introduction of Invasive Alien Species, which led to the development of several codes of conduct, most of which including measures to prevent pathogens being moved by alien species through the relevant pathways either directly or indirectly, as appropriate, as shown in:

- Recommendation No. 160 (2012) on European Code of Conduct for Botanic Gardens on Invasive Alien Species,
- Recommendation No. 161 (2012) on the European Code of Conduct on Zoological Gardens and Aquaria and Invasive Alien Species,
- Recommendation No. 166 (2013) on the European Code of Conduct on Hunting and IAS,
- Recommendation No. 170 (2014) on the European Code of Conduct on Recreational Fishing and Invasive Alien Species,
- Recommendation No. 193 (2017) on the European Code of Conduct for Invasive Alien Trees,
- Recommendation No. 194 (2017) on the European Code of Conduct on International Travel and Invasive Alien Species;

Recalling the Strategic Plan for Biodiversity 2011-2020 with its 20 headline Aichi targets for 2020, adopted at COP 10 of the CBD and in particular Target 9 devoted to Invasive Alien Species (IAS): "By 2020, invasive alien species and pathways are identified and prioritised, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment", and welcoming the future post-2020 global biodiversity framework and its foreseen target on invasive alien species, expected to be adopted at CBD COP 15;

Recalling its Recommendations focusing on alien pathogens affecting native herpetofauna, such as Recommendation No. 176 (2015) on the prevention and control of the *Batrachochytrium*

1. Identify all concerned actors…
2. Improve knowledge on alien pathogens and pathogens spread by IAS…
3. Analyse existing measures, policy and legislation…
4. Prioritise the management of introduction pathways.
5. Increase awareness…

Recommendation No. 215 (2022) – Follow up

1. Identify all concerned actors, including but not limited to experts on invasive alien species and emerging infectious diseases and authorities competent for dealing specifically with wildlife pathogens and relevant pathways.

Creation of a horizontal working group on wildlife pathogens under the umbrella of the Bern Convention

Collaboration between
- Group of Experts on invasive alien species
- Group of Experts on the Conservation of Amphibians and Reptiles

Recommendation No. 215 (2022) – Follow up

3. Analyse existing measures, policy and legislation to assess gaps, constraints and barriers which prevent effective management of alien pathogens and pathogens spread by IAS affecting wildlife.

- Analysis of the current policy and legislation relevant to all Bern Convention parties
- Analysis of current gaps which prevent an effective management of the problem

Circulation of questionnaires to Contracting Parties to assess needs and expectancies for future activity on wildlife pathogens in relation alien species

Strasbourg, 8 August 2022 T-PVS/Inf(2022)41

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE AND NATURAL HABITATS

Standing Committee

42nd meeting
29 November - 2 December 2022

ANALYSIS OF REPLIES TO QUESTIONNAIRE ON RELEVANT LEGISLATION OF BERN CONVENTION NON-EU CONTRACTING PARTIES ON WILDLIFE PATHOGENS SPREAD BY ALIEN SPECIES AND ON ALIEN SPECIES AFFECTING WILDLIFE BY ACTING AS PATHOGENS.

-REPORT ON ALIEN PATHOGENS AND PATHOGENS SPREAD BY INVASIVE ALIEN SPECIES IN EUROPE
T-PVS/Inf(2022)40-

Report prepared by
Mr Riccardo Scalera

CBD study on IAS and pathogens

UN environment programme

CBD/COP/16/INF/28

Distr.: General
1 October 2024

English only

Convention on Biological Diversity

Conference of the Parties to the Convention on Biological Diversity
Sixteenth meeting
Cali, Colombia, 21 October–1 November 2024
Item 21 of the provisional agenda*
Invasive alien species

Progress on requests to the Executive Secretary from decision 15/27 on invasive alien species**

CBD/COP/16/INF/28

Annex I

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

Compiled by: Riccardo Scalera (IUCN SSC ISSG), Kevin Smith (IUCN)

Review: Inter-Agency Liaison Group on Invasive Alien Species - François Diaz (WOAH), Claire Cayol (WOAH), Paolo Tizzani (WOAH), Artur Shamilov (IPPC), Roger Day (CABI), Arne Witt (CABI); Secretariat of the Convention on Biological Diversity - Marianela Araya Quesada; IUCN SSC Wildlife Health Specialist Group (WHSG) - Catherine Machalaba, Tiggy Grillo; IUCN SSC ISSG – Helen Roy, Ana Isabel Gonzalez.

The present document was developed with the generous support from the Japan Biodiversity Fund

Convention on Biological Diversity

IUCN

Japan Biodiversity Fund

Requested by Parties in COP Decision 15/27

Developed with the generous support from the Japan Biodiversity Fund

CBD study on IAS and pathogens

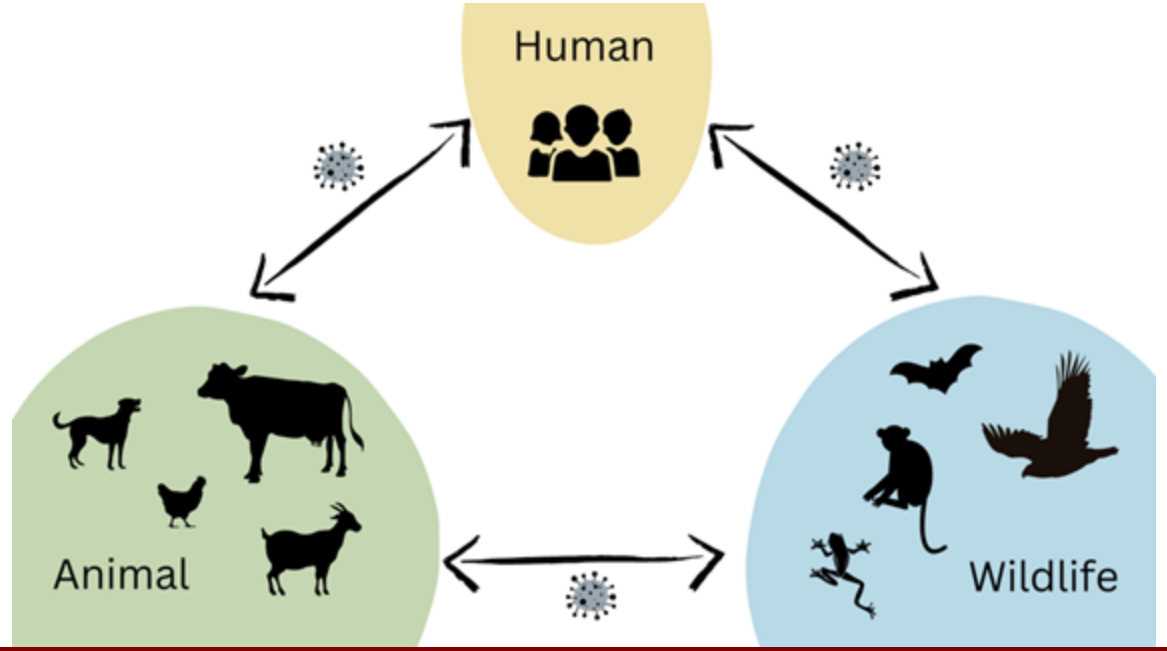
The study covers the following aspects:

(i) the **linkages between IAS and pathogenic** agents

(i) gaps in knowledge, monitoring, and management of emerging infectious diseases affecting biodiversity and human health that relate to or are facilitated by IAS, and

(i) proposed measures for mitigating and minimizing the negative effects of pathogenic agents on biodiversity and human health and preventing the further introduction and spread of relevant IAS

(i) identification of relevant **tools and resources** that could be of use to stakeholders.



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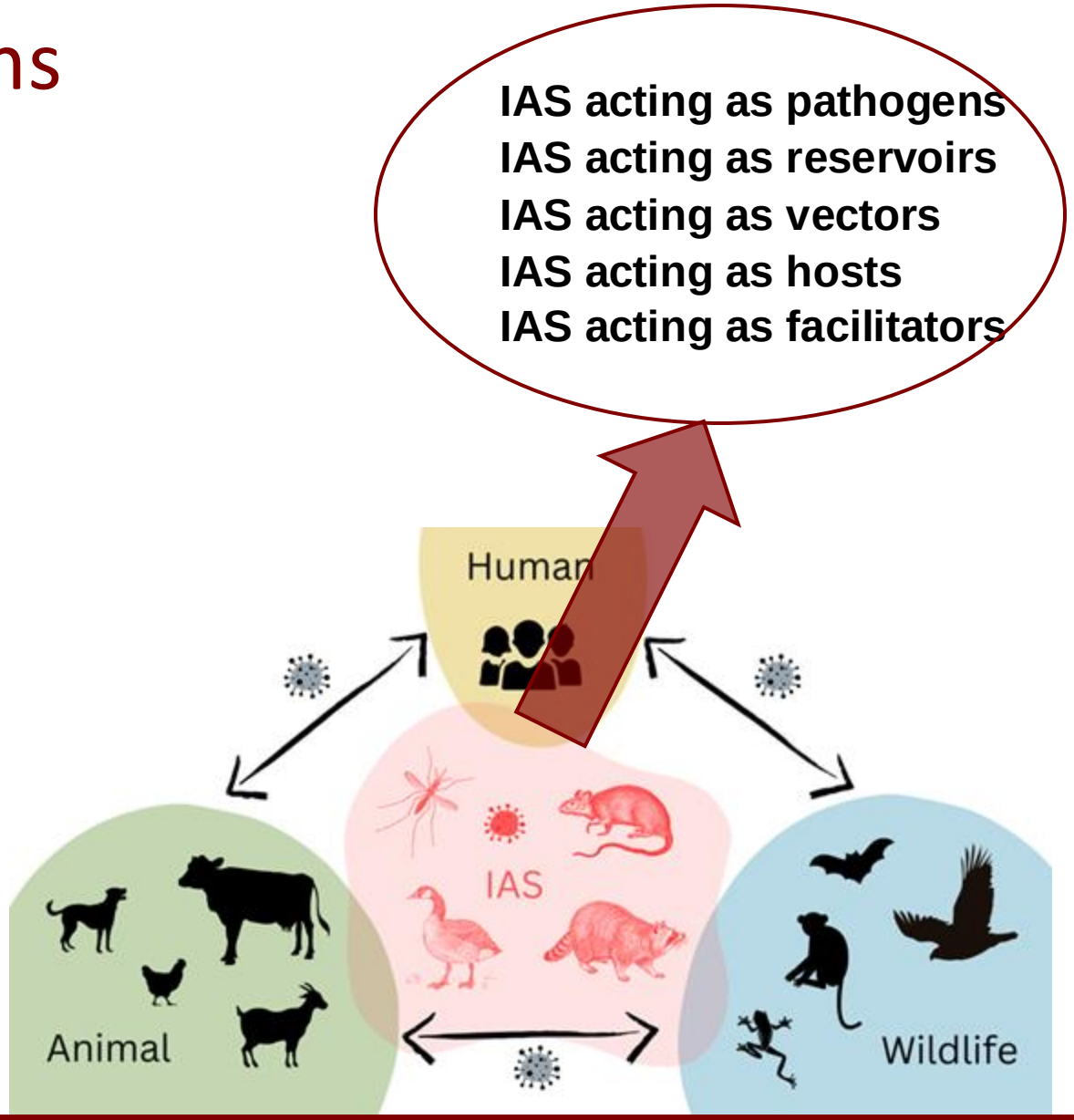
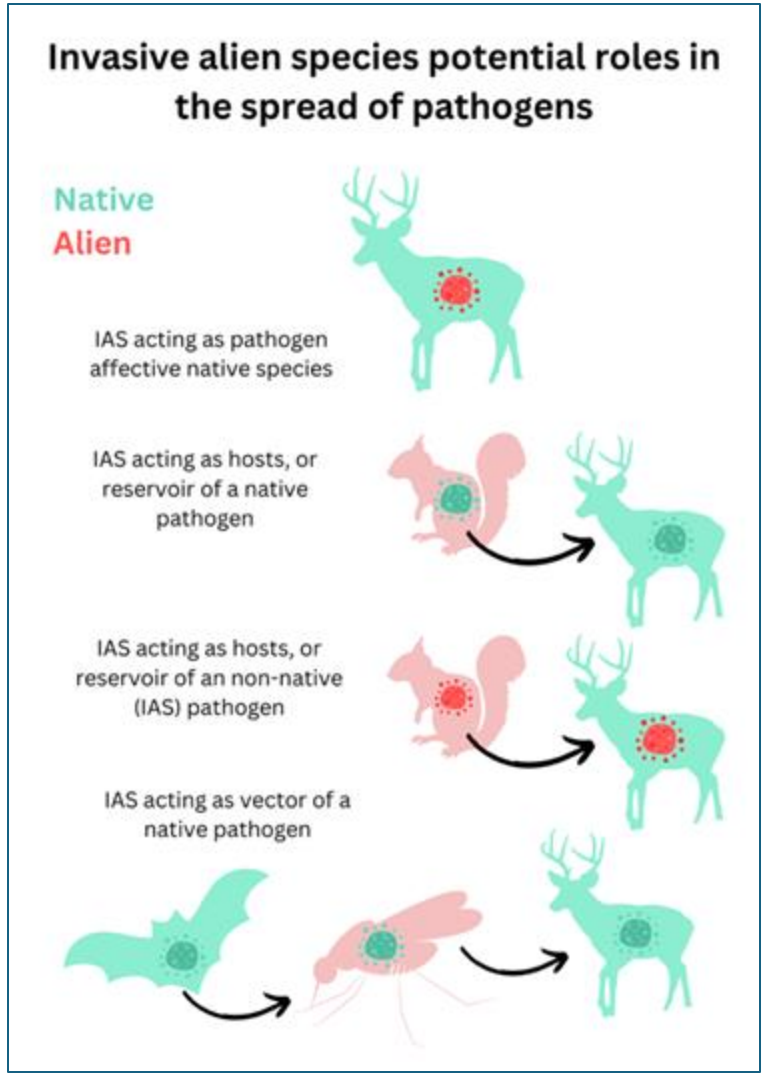


The introduction of alien species represents a potential driver of change in pathogen ecology and distribution

Work in recent years have highlighted the role of IAS in the introduction and spread of pathogens and diseases …but:

- Little is known about the epidemiology of alien pathogens (including microbes and parasites) in association with vectors and wildlife hosts, therefore assessing the risk of entry, establishment and spread of IAS related pathogens is very difficult
- Given the paucity of data on the links among IAS-related pathogens, their relevant vectors and hosts causing zoonotic diseases, the magnitude of risks and impacts arising from invasive pathogens on human health are difficult to discern



Role of IAS in zoonotic events

- Number of zoonotic events increases with richness of alien hosts (mammals/birds)
- IAS facilitate introduction of NEW EIDs and may amplify impacts from existing zoonotic pathogens
- Role of IAS in disease transmission (incl. zoonotic) may exceed that of native wildlife
- IAS may alter the current epidemiological dynamics (which may have unpredictable impacts)
- There are quite a few good r**easons why the role of IAS in the spread of zoonotic pathogens should rise concern** (see Hulme 2014)

Overlap and parallels in fields of IAS and EIDs

- The overlaps and parallels in the fields of IAS and EIDs concern both the invasion process and the management response
- They are similar phenomenon, which may have implications for the analysis of knowledge and management gaps, as well as for the identification of appropriate response measures and possible policy follow up.
- Risk of new EIDs due to biological invasions need to be addressed by collaboration across both fields
- It highlights the need to take One Health approach – integrating human, animal and wildlife sectors
- The increasing capacity to respond to IAS will consistently and mutually benefit the health of both biodiversity and people, both technically and financially.

Knowledge gaps and priority research areas

- Need **ecological studies** of interactions between native and alien hosts, people, and pathogens
- Need **baseline data** on IAS related pathogens, distribution, pathways, and impacts – often missed in IAS databases and human/animal health databases
- Need **predictive approaches** to support pathogen-host specificity and ecological and evolutionary adaptation in the invaded range
- Need **interdisciplinary research and expertise** to help identify and manage risks from IAS related pathogens

Management and monitoring gaps

- **IAS related pathogens are often overlooked** in management of IAS
- **Role of IAS often is not considered** when assessing and addressing risks from EIDs
- Both ‘sectors’ use common approaches – there is a need for collaboration to develop **agreed set of management actions across ‘invasion stages’**
- There is a need to **monitoring and surveillance tools**, and **risk analysis that** cover EIDs and IAS – to address IAS related pathogens
- **Invest in prevention** - One Health frameworks should include IAS related pathogens (e.g. within ‘One Biosecurity’) – as this would ensure mutual benefit to human health, animal and plant health, and biodiversity

Response measures

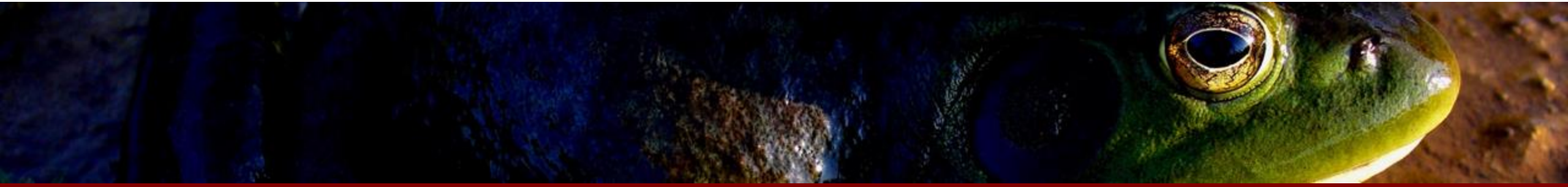
- Build **global interdisciplinary capacity, expertise, and coordination** for IAS-related pathogens, and include pathogens in relevant IAS datasets, IAS risk analysis.
- Implement **global long-term monitoring and surveillance of IAS acting as hosts and vectors,** to facilitate detection and evaluation of threats.
- Implement **global long-term health surveillance**, including pathogen screening, of populations of IAS acting as hosts/vectors/reservoirs to inform pathway management.
- Increase **awareness among policy and decision makers**, wildlife managers, scientists, and citizens that IAS can present threats associated with pathogens to both native wildlife and humans.
- Improve **representation of biological invasions within One Health initiatives**, legislation, policy, and management frameworks, for how concerns IAS acting as pathogens, or IAS acting as hosts/vectors/reservoirs affecting wildlife health and human health.

Tools and resources

The assumed similarities between IAS and EIDs can be of help in supporting the identification of tools and resources that can be of use for managing the threat of IAS-related pathogens affecting wildlife health and human health.

Approaches for management of both IAS and EIDs are similar in both fields, with the following elements being key to address this threat:

- Databases
- Predictive models
- Risk analysis
- Management options
- Ecosystem restoration



Short-term actions

- Organise **interdisciplinary conferences or workshops** on interconnections between biological invasions and EIDs and their impacts on human health and wildlife
- Promote the development of **dedicated network of experts** on wildlife health, human health, and biological invasions
- Ensure that **guidance on surveillance and monitoring** to consider IAS related pathogens – for IAS and EIDs
- Plan **awareness raising** campaign – e.g. identification and circulation of a **list of IAS** which represent a threat to wildlife health and human health – "100 of the worst…."
- Develop **tools to support prioritisation** of IAS based on risk of pathogen transmission
- Support the **mobilisation of data** (accessible via platform) on IAS related pathogens – interoperable with existing IAS and other databases

One Health governance in the EU

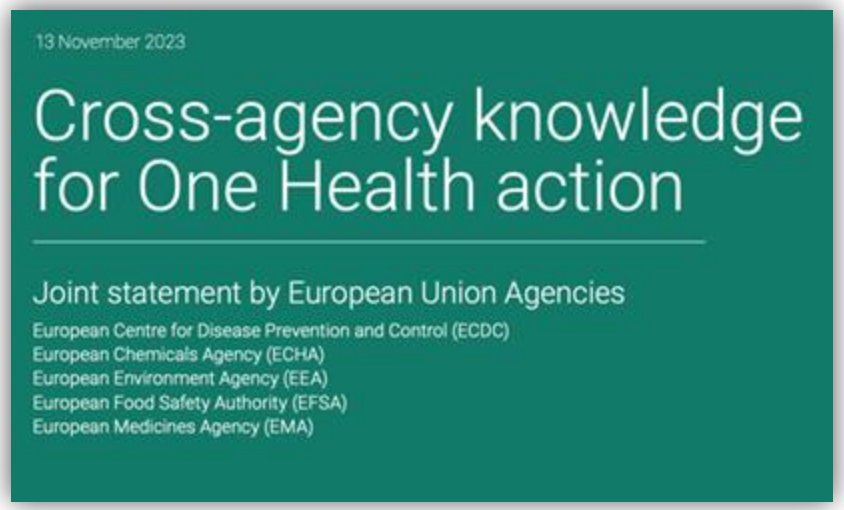
Report published by the Scientific Advice Mechanism to the European Commission:

- It provides recommendations to support the successful implementation of EU policies deriving from a One Health approach.
- It focuses on the forms of management and governance that are best suited for encouraging collaboration across the different sectors that make up One Health whilst minimising any unintended consequences that might result from such new in approach.
- It recognises that all too often, policy areas like agriculture, biodiversity and crisis management are treated in isolation, rather than in recognition of their place as part of a larger, interconnected ecosystem.

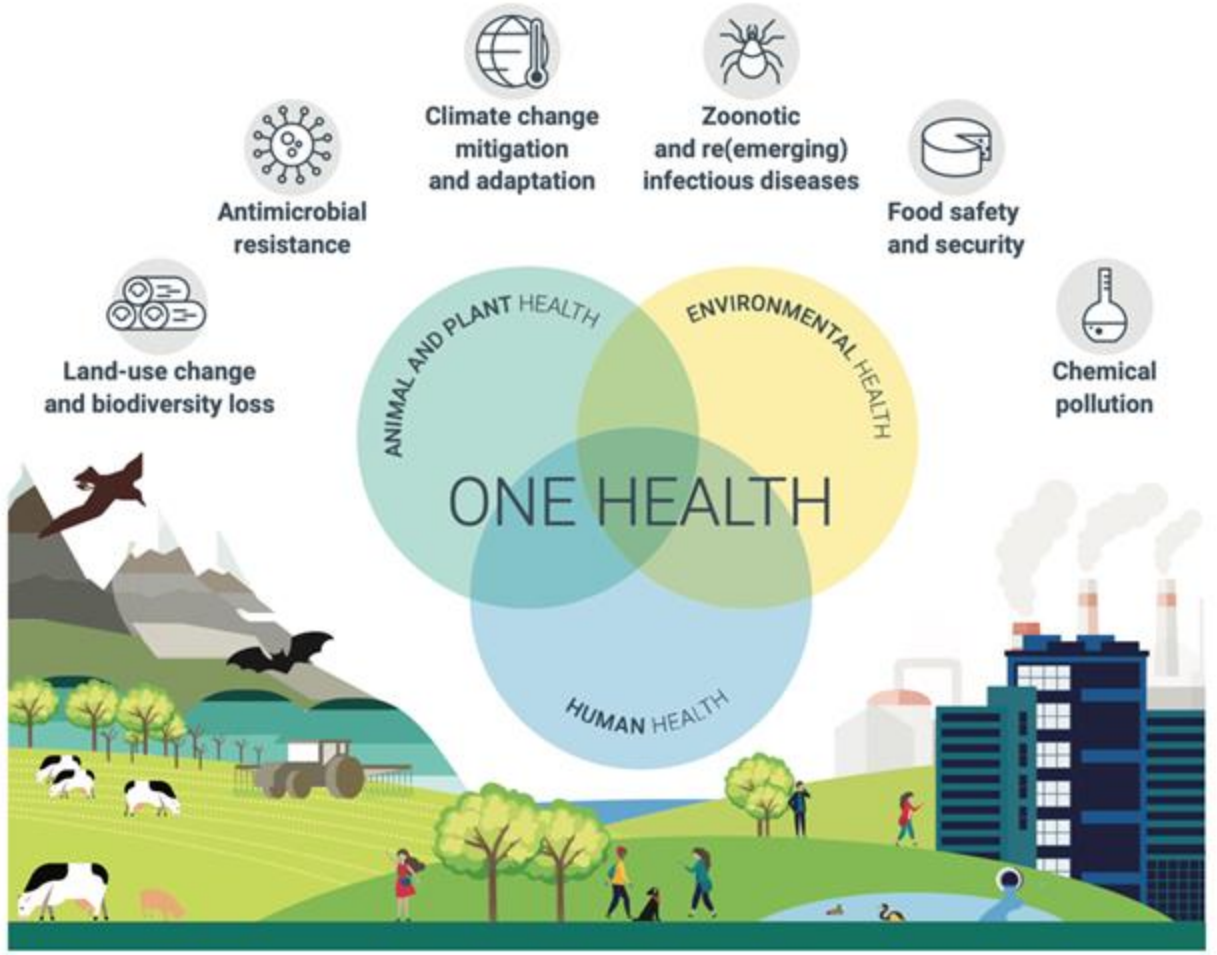
One Health governance in the EU

The pivotal importance of the multifaceted biodiversity-related disciplines and their contribution to the One Health approach is not always as obvious as it may seem, and still needs to be properly emphasised in some scientific and policy arena

Beyond IAS: viewing biological invasions through a One Health lens



Urgent need for multisectoral and transdisciplinary collaboration across the domains of human, wildlife and ecosystem health



Beyond IAS: viewing biological invasions through a One Health lens

- Both changes in human-wildlife interactions and ecosystem change are proven to influence human exposure to existing and emerging pathogens.

- By reinforcing nature protection and habitat restoration initiatives, it is therefore possible to mitigate the risk of zoonosis, with a clear benefit for human health, as well as for biodiversity and ecosystem health.

Article

A meta-analysis on global change drivers and the risk of infectious disease

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Anthropogenic change is contributing to the rise in emerging infectious diseases, which are significantly correlated with socioeconomic, environmental and ecological factors[1]. Studies have shown that infectious disease risk is modified by changes to biodiversity[2–6], climate change[7–11], chemical pollution[12–14], landscape transformations[15–20] and species introductions[21]. However, it remains unclear which global change drivers most increase disease and under what contexts. Here we amassed a dataset from the literature that contains 2,938 observations of infectious disease responses to global change drivers across 1,497 host–parasite combinations, including plant, animal and human hosts. We found that biodiversity loss, chemical pollution, climate change and introduced species are associated with increases in disease-related end points or harm, whereas urbanization is associated with decreases in disease end points. Natural biodiversity gradients, deforestation and forest fragmentation are comparatively unimportant or idiosyncratic as drivers of disease. Overall, these results are consistent across human and non-human diseases. Nevertheless, context-dependent effects of the global change drivers on disease were found to be common. The findings uncovered by this meta-analysis should help target disease management and surveillance efforts towards global change drivers that increase disease. Specifically, reducing greenhouse gas emissions, m anaging ecosystem health, and preventing biological invasions and biodiversity loss could help to reduce the burden of plant, animal and human disease s, especially when coupled with improvements to social and economic determinants of health.

"Given the limited funds for infectious disease management, these results suggest that controlling or mitigating biodiversity loss, introduced species and climate change might be particularly important for infectious disease control."

Conclusions

- Biological invasions need to be fully incorporated into the One Health concept

- Once IAS are fully recognised as a key component of the One Health concept, there are **synergies between the management of biological invasions and of EIDs** that may be actively promoted, e.g. biosecurity, or eradicating IAS will remove important hosts/vectors of pathogens resulting in **one health benefits**

- **Promote synergies between existing organisations** – WOAH and IPPC (remit for pathogens to wild animals and plants) and CBD

The need to adopt a One Health approach to address IAS, integrating different policies into a consistent framework, was duly recognised at CBD COP16

Conclusions

Invasive alien species are:

- ☑ part of the problem
- ☑ part of the solution

Next Steps: Developing a global, cross-disciplinary network and addressing policy gaps are crucial steps to effectively manage IAS-related disease threats and ensure coordinated action at the global scale.

Experts in both biological invasions and epidemiology need to recognize the connection between invasive alien species (IAS) and emerging infectious diseases (EIDs).

Biological invasion experts should be aware of key epidemiological concepts and screen IAS for pathogens

Epidemiologists should understand how IAS affect ecosystems and how managing them can help prevent the spread of diseases and zoonoses.

Thank you for your attention!

Your are welcome to contact me here

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