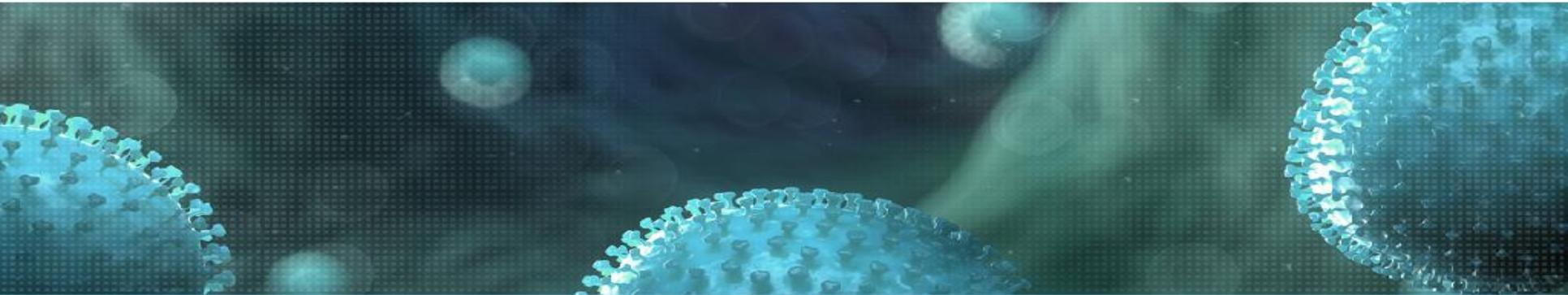


Erasmus MC



Viroscience lab

WHERE SKILLS MEET TO STUDY & PROTECT



Wildlife markets: can they stay open?

Thijs Kuiken

NCOH Annual Scientific Meeting, 29 October 2020

COVID-19 and wildlife trade: link to sea and fresh food market in Wuhan

(Huang et al. 2020 Lancet; Lu et al. 2020 Lancet)

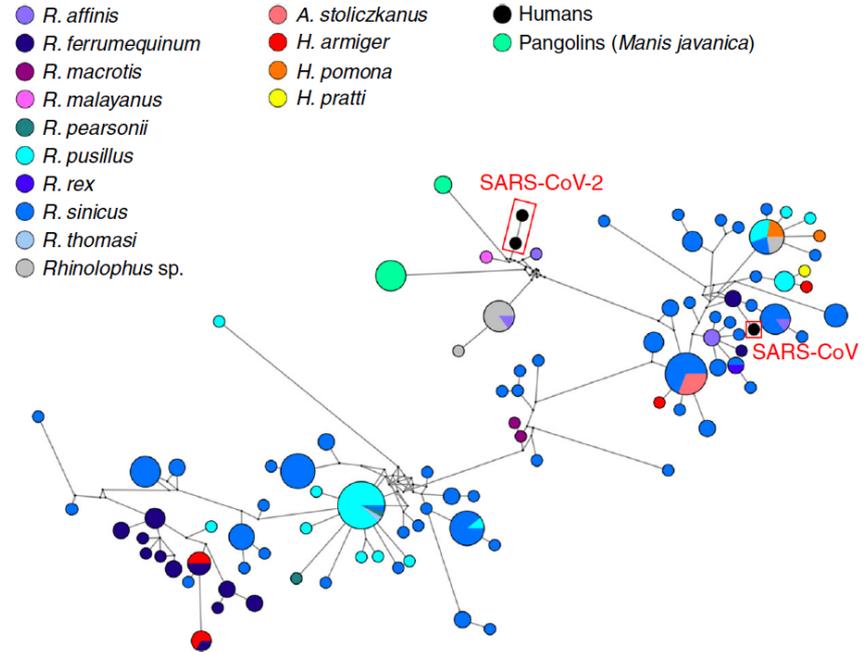
- 28 of 41 cases had link to sea food and fresh food market in Wuhan
- Huanan Seafood Wholesale Market reportedly sold >25 species of animals
- Most likely scenario: original virus reservoir in bats, with spill-over into humans directly or via intermediate animal species (wild or domestic)



COVID-19: Phylogenetics of beta-coronaviruses

(Latinne et al. 2020 Nature Commun)

- Polymerase sequences: SARS-CoV-2 most closely related to viruses sampled from horseshoe bats (*Rhinolophus malayanus*, *Rhinolophus affinis*) and from Malayan pangolins (*Manis javanica*)
- Full genome sequences: SARS-CoV-2 more likely to originate from horseshoe bats than from Malayan pangolins



Wildlife trade is a broad concept

- Reasons: include food, fur, fashion, medicine, pets, trophy hunting
- Local / international
- Legal / illegal
- Sustainable / unsustainable

Wildlife trade includes wildlife farming

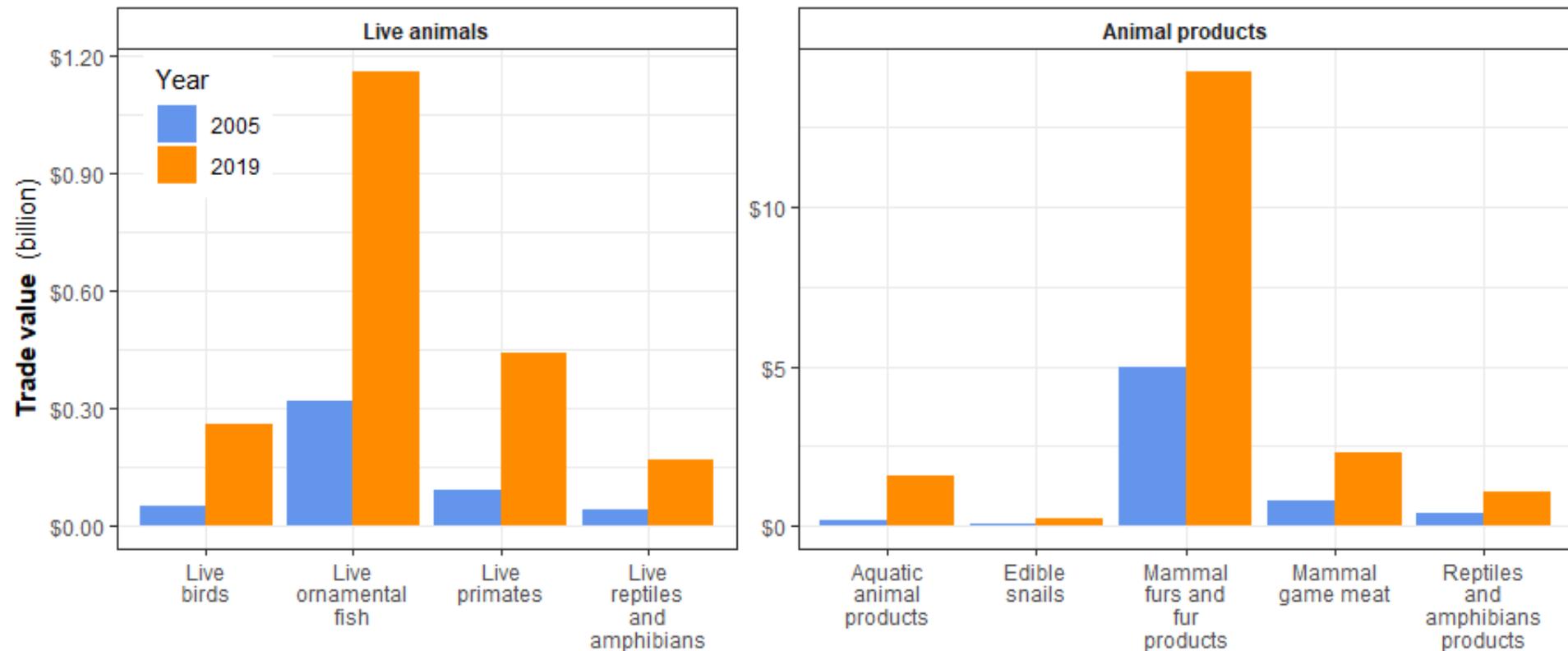
- Wildlife farming: captive breeding of traditionally undomesticated animals in agricultural setting
- Goals:
 - living animals (hunting, pets)
 - commodities (food, traditional medicine)
 - materials (leather, fur, fibre)



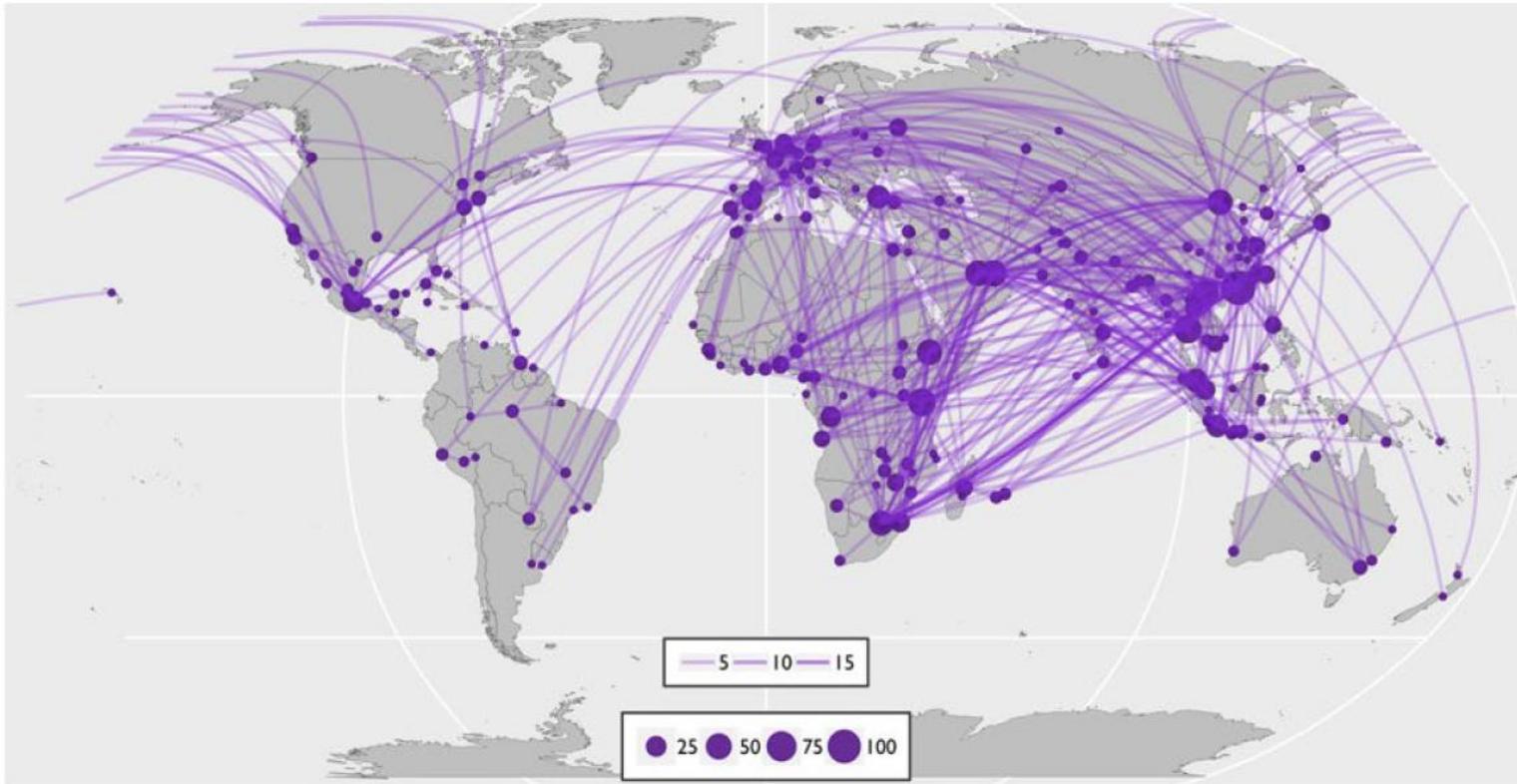
Mink farm, Northern Jutland, Denmark.
2,600 breeding females and 520 males

Legal wildlife trade expanding rapidly *(Roe 2008: Trading nature.*

TRAFFIC International; UN 2020, United Nations. UN Comtrade Database; IPBES 2020)



Illegal trade is about 25% of legal trade (www.traffic.org)



Air trafficking routes for illegal wildlife trade, 2016 to 2018 (*Runway to extinction: Wildlife trafficking in the air transport sector, 2019*)

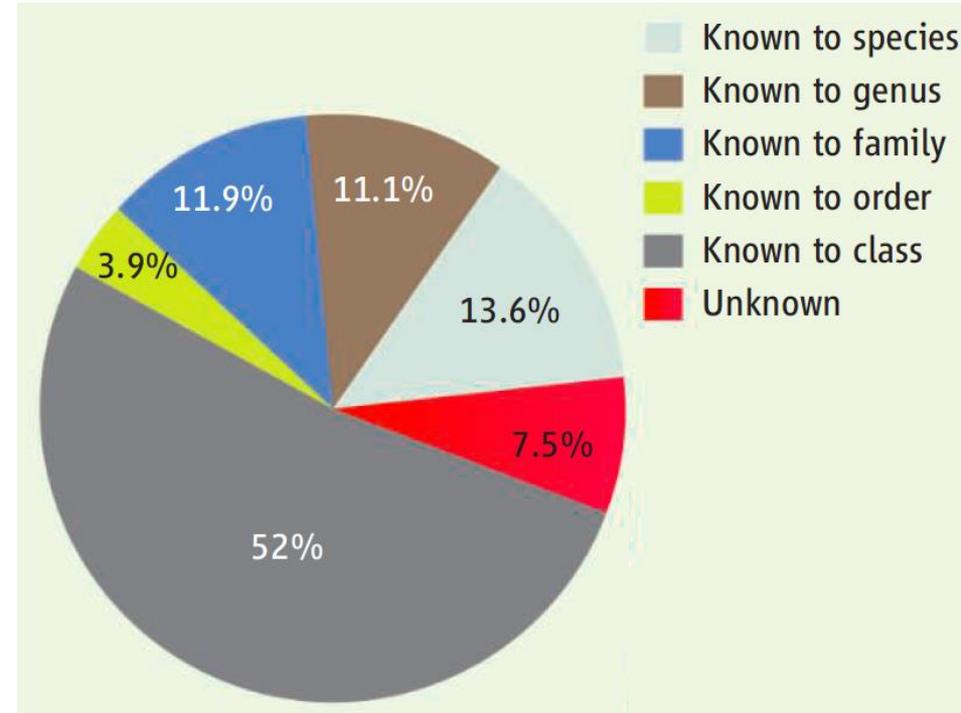
Wildlife trade drives emergence of zoonoses

(Karesh et al. 2005 Emerg Infect Dis; Karesh et al. 2012 Lancet; Morse et al. 2012, Lancet)

- Risk factors
 - More intimate contact wildlife/livestock/humans
 - Increased numbers and density farmed animals
 - Increased volume and longer distance of transport
- Examples:
 - Ebola virus disease
 - HIV/AIDS
 - Monkeypox
 - SARS
 - COVID-19

Wildlife trade lacks pathogen surveillance

- Lack of appropriate taxonomic information (*Smith et al. Science 2009*)
- Most regulatory oversight of wildlife trade aimed at conservation, rather than prevention of disease incursion (*Smith et al. 2017 Ecohealth*)



Percentage of live wildlife shipments imported into USA, 2000–06, identified to given taxonomic level (*Smith et al. 2009 Science*)

Wildlife trade is risk factor for species extinction

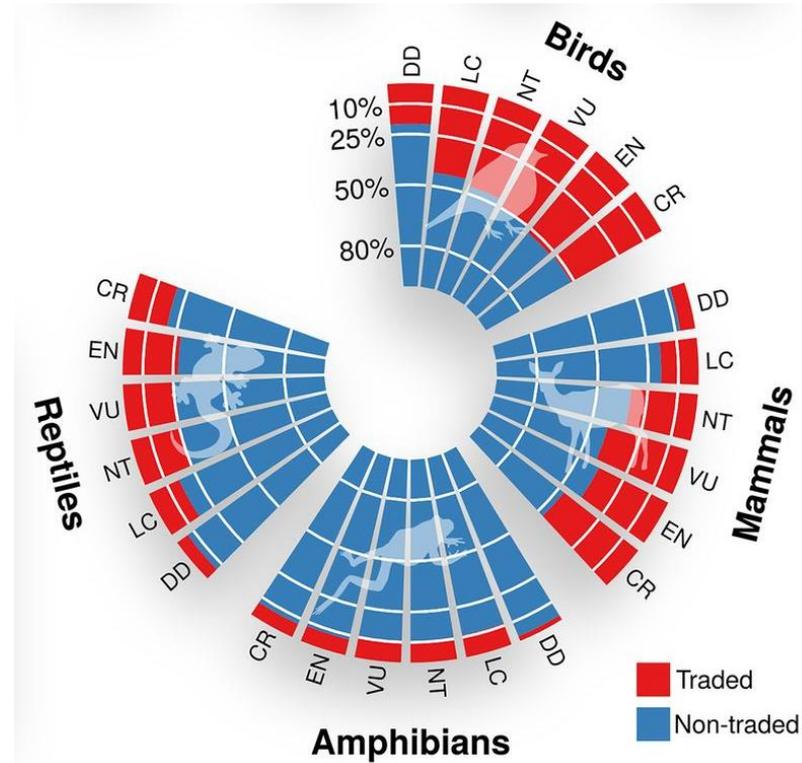
Poll: Which percentage of terrestrial wild birds, mammals, amphibians, and reptiles (total about ca. 31,500 species) is traded globally?

- a. 1%
- b. 10%
- c. 25%

Wildlife trade is risk factor for species extinction

(Scheffers et al. 2019 Science)

- 24% of terrestrial birds, mammals, amphibians, and reptiles (7638 of ca. 31,500 species) traded globally
- Traded species in higher categories of threat than nontraded species
- Bird and mammal species at extra risk



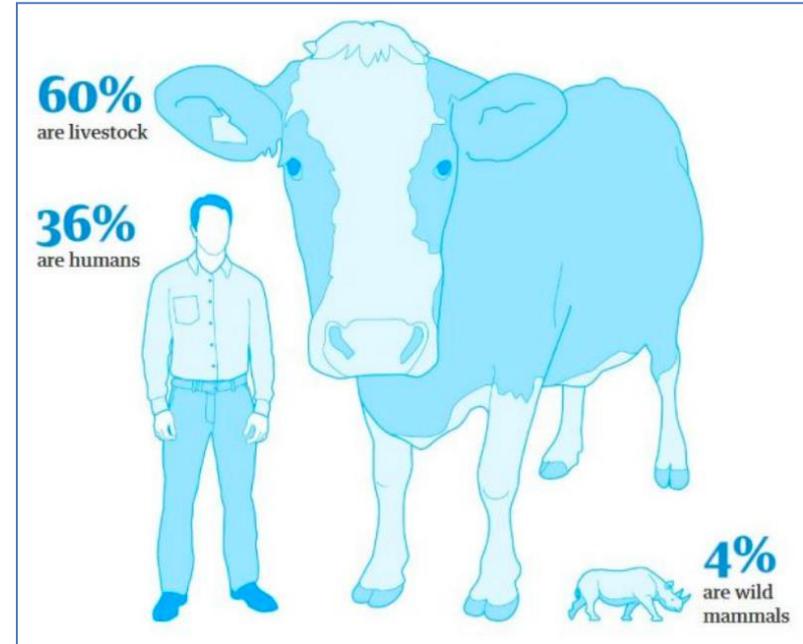
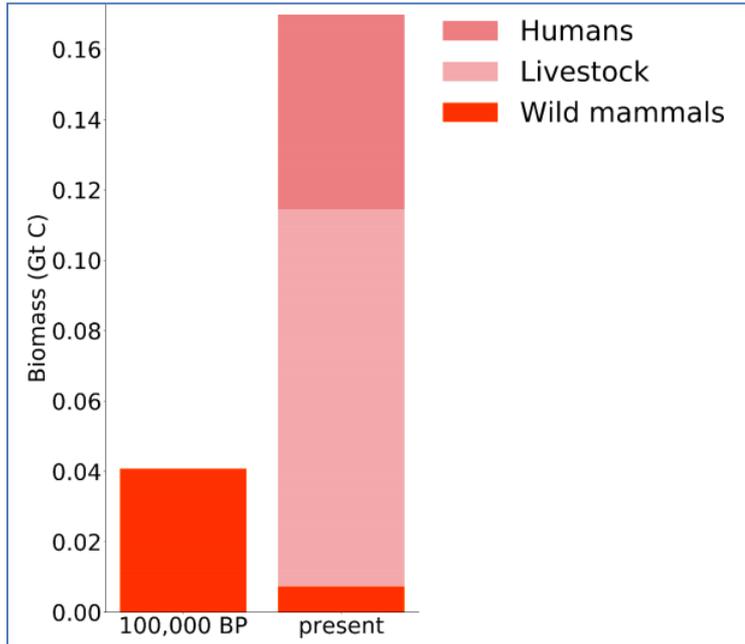
IUCN threat status codes: data deficient, DD; least concern, LC; near threatened, NT; vulnerable, VU; endangered, EN; and critically endangered, CR.

The impact of human civilization on the global biomass of wild mammals

Poll: Which percentage of the global biomass of mammals (wildlife, livestock, humans) is wild?

- a. 5%
- b. 25%
- c. 75%

The impact of human civilization on the global biomass of mammals *(Bar-On et al. 2018 PNAS)*



Present division of global mammalian biomass
(Image Credit: Adobe Stock and The Guardian)

<https://ipbes.net/global-assessment>



Science and Policy
for People and Nature

Global assessment on biodiversity and ecosystem services

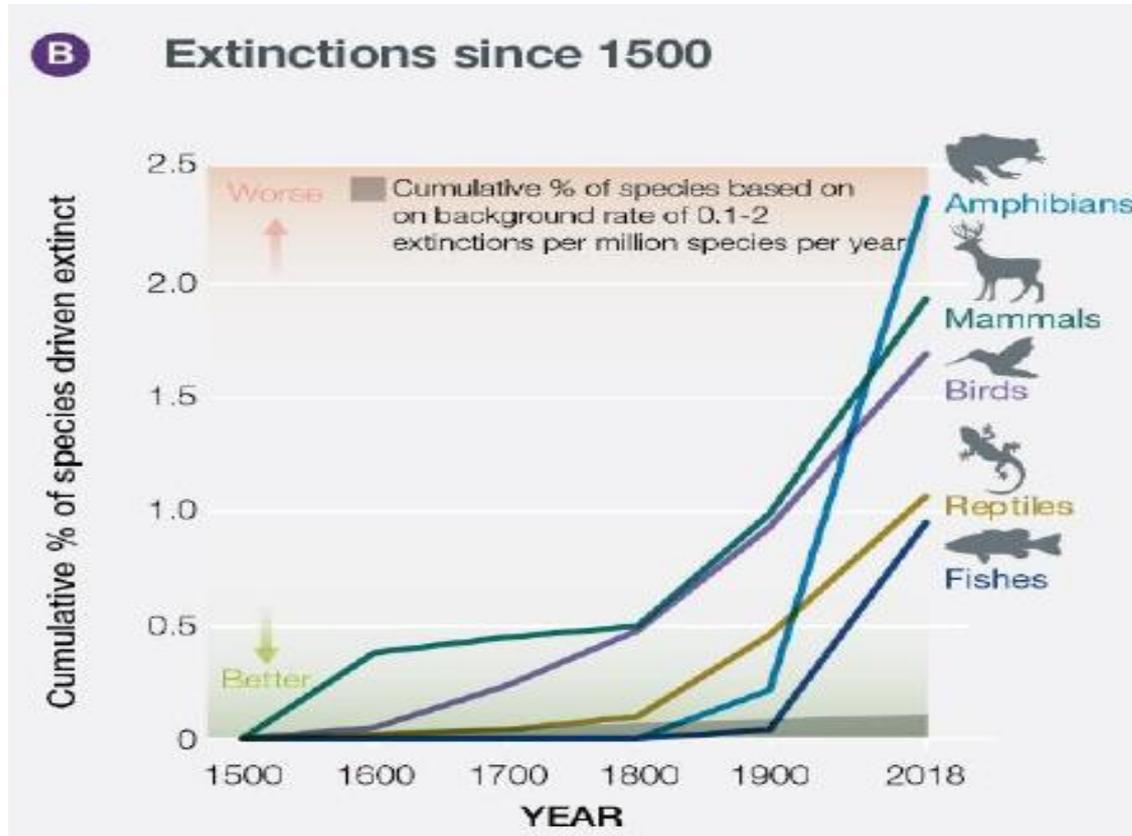


Food and Agriculture
Organization of the
United Nations



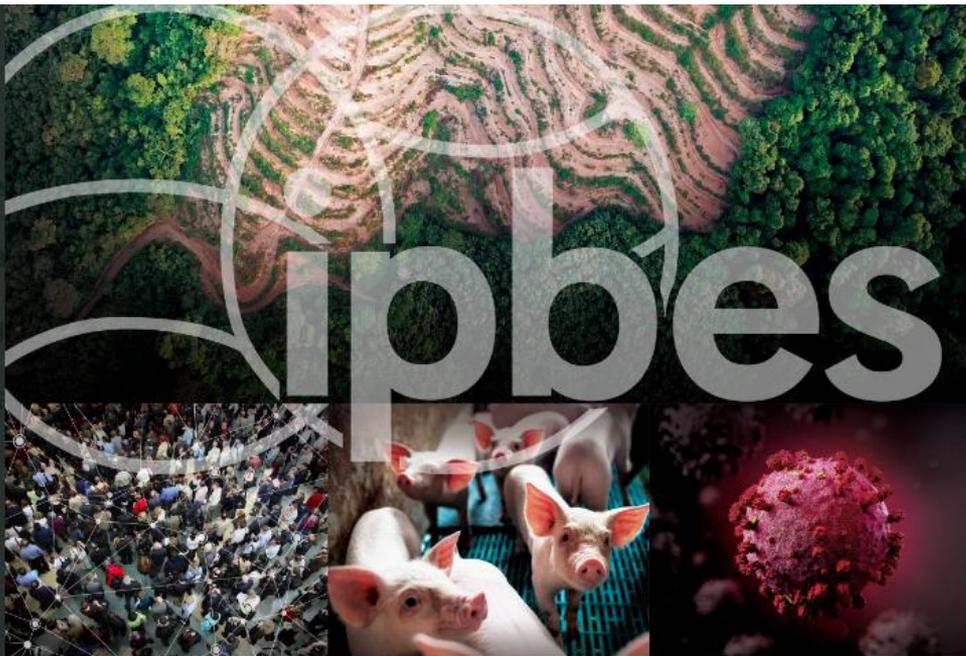
Current rate of vertebrate species extinction is 10s to 100s times higher than average, and is accelerating

(IPBES, 2019)



Key messages from IPBES report on global assessment on biodiversity and ecosystem services *(IPBES, 2019)*

- “Goals for conserving and sustainably using nature and achieving sustainability cannot be met by current trajectories, and goals for 2030 and beyond may only be achieved through transformative changes: *a fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values*”
- “A key constituent of sustainable pathways is the evolution of global financial and economic systems to build a global sustainable economy, steering away from the current limited paradigm of economic growth ... It would also entail a shift beyond standard economic indicators such as gross domestic product to include those able to capture more holistic, long-term views of economics and quality of life.”



IPBES WORKSHOP ON BIODIVERSITY AND PANDEMICS

WORKSHOP REPORT



The [@IPBES](#) [#PandemicsReport](#) will be launched on 29 October!

Join [#IPBES](#) ExecSec Dr. Anne Larigauderie and report chair Dr. [@PeterDaszak](#) for a brief presentation and media Q&A

Streaming live at 3pm CET Thursday:

bit.ly/PandemicsRepor...

3:01 PM · Oct 27, 2020 · Twitter Web App

100 Retweets 19 Quote Tweets

243 Likes



Policy options to reduce pandemic risk from wildlife trade

(IPBES 2020, Workshop on Biodiversity and Pandemics)

- Establish an intergovernmental health and trade partnership, building on collaborations among OIE, CITES, and others
- Reduce or stop trade in high-risk wildlife species, esp. mammals and birds
- Improve welfare and sanitation throughout the trade chain
- Educate communities about health risks associated with wildlife trade
- Enhance law enforcement of illegal wildlife trade

Policy options to foster a role for all sectors of society in reducing pandemic risk *(IPBES 2020, Workshop on Biodiversity and Pandemics)*

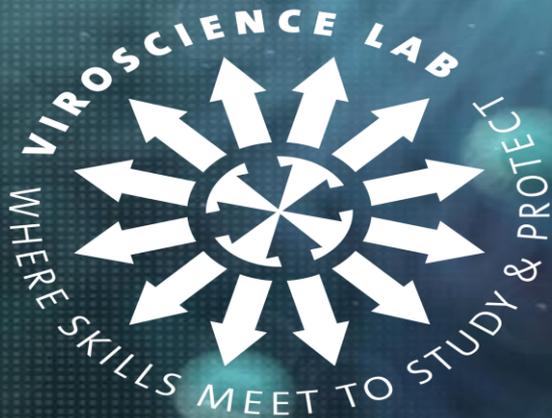
- Educate and communicate with society about the origins of pandemics
- Identify, rank, and label high pandemic risk consumption items (e.g. fur from farmed wildlife) to provide incentives for alternatives
- Increase sustainability of agriculture to meet food requirements from currently available, and subsequently reduced, land
- Promote transition to more sustainable diets, including responsible meat consumption
- Promote mechanisms for more food security and less consumption of wildlife
- Provide sustainability incentives for companies involved in high pandemic risk land use change, agriculture, and wildlife trade

Question:

- *Wildlife markets: can they stay open?*

Answer:

- *No, not like they are now.*
- *We need changes in wildlife markets/trade to lower zoonotic risk.*
- *We need to fundamentally change our attitude towards wildlife/nature.*



Email: t.kuiken@erasmusmc.nl



Raccoon dog farm, China 2015; Humane Society International

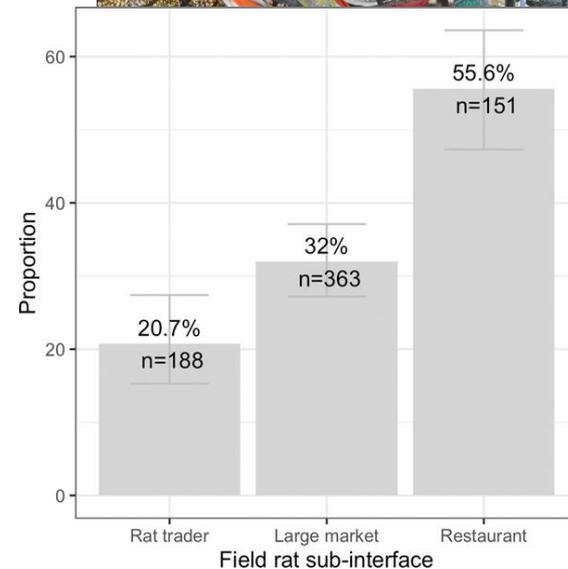
Wildlife trade is important risk factor for emergence of zoonoses

- Intimate contact among wildlife, livestock and humans facilitates spillover, amplification and spread of novel pathogens.
- Increased numbers and density of farmed animals (wild and domestic) allow infections to spread more easily and drive bigger outbreaks.
- Increased volume of trade and efficiency of long-distance transport along the wildlife trade value chain drives the movement of pathogens across large distances to contact populations that may not have had prior infection by them.

Wildlife trade drives emergence of zoonoses

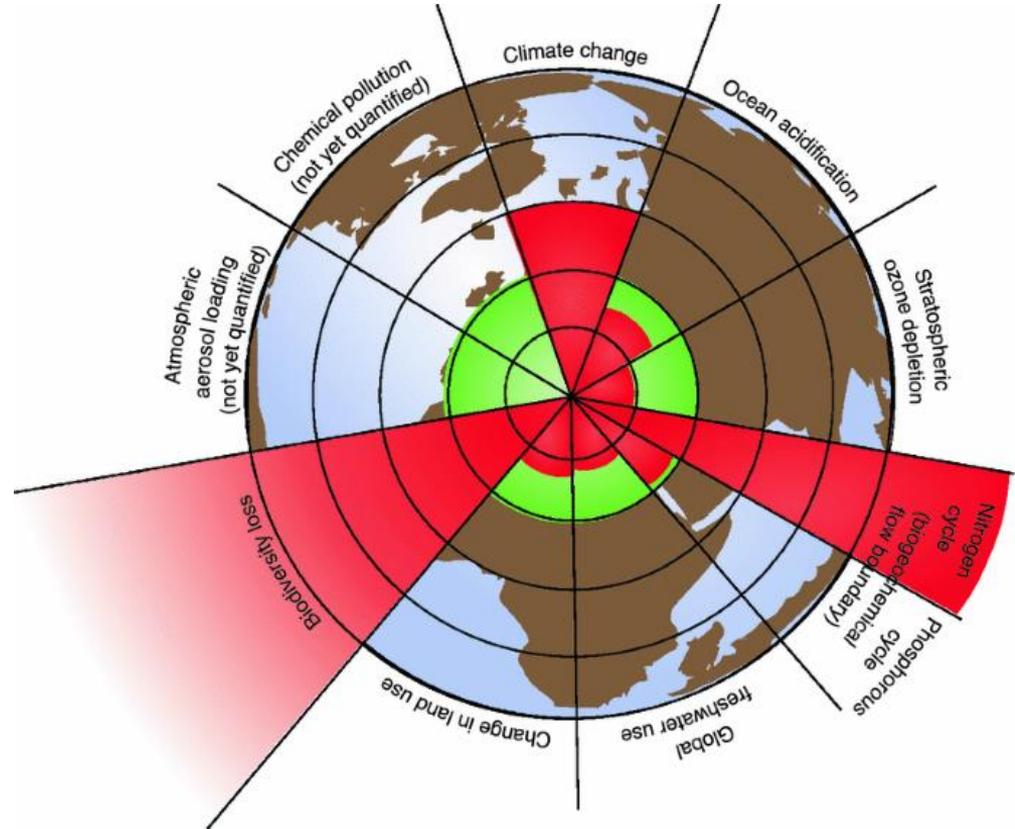
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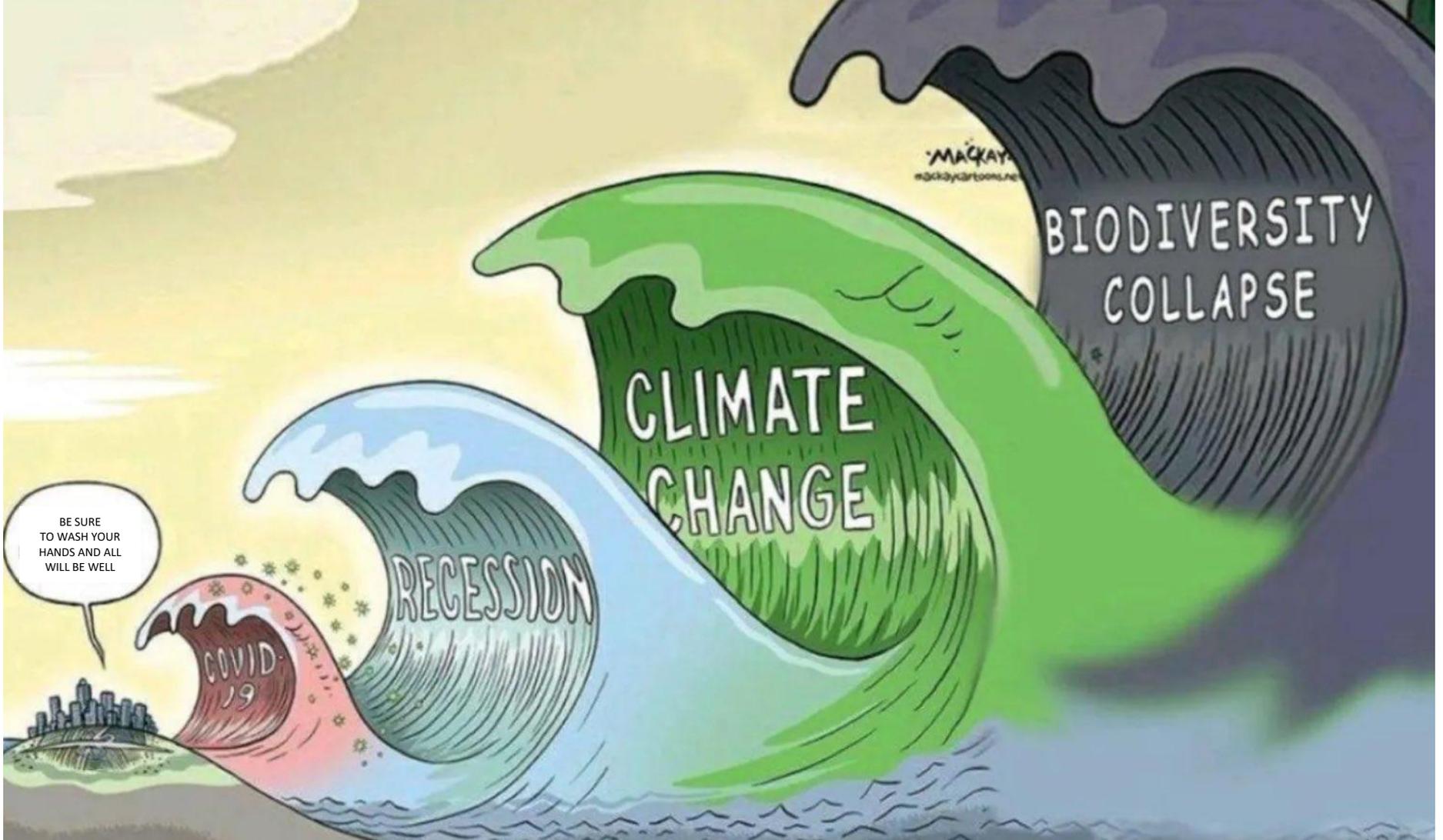
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Bigger picture: Nine planetary systems to ensure stability of global ecosystem *(Steffen et al. Ambio 2011)*

- Green shadings: safe operating space
- Red shading: current position
- Boundaries exceeded for three systems
 - Biodiversity loss (related to disease risk)
 - Climate change
 - Nitrogen cycle





BE SURE
TO WASH YOUR
HANDS AND ALL
WILL BE WELL

COVID
19

RECESSION

CLIMATE
CHANGE

BIODIVERSITY
COLLAPSE

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