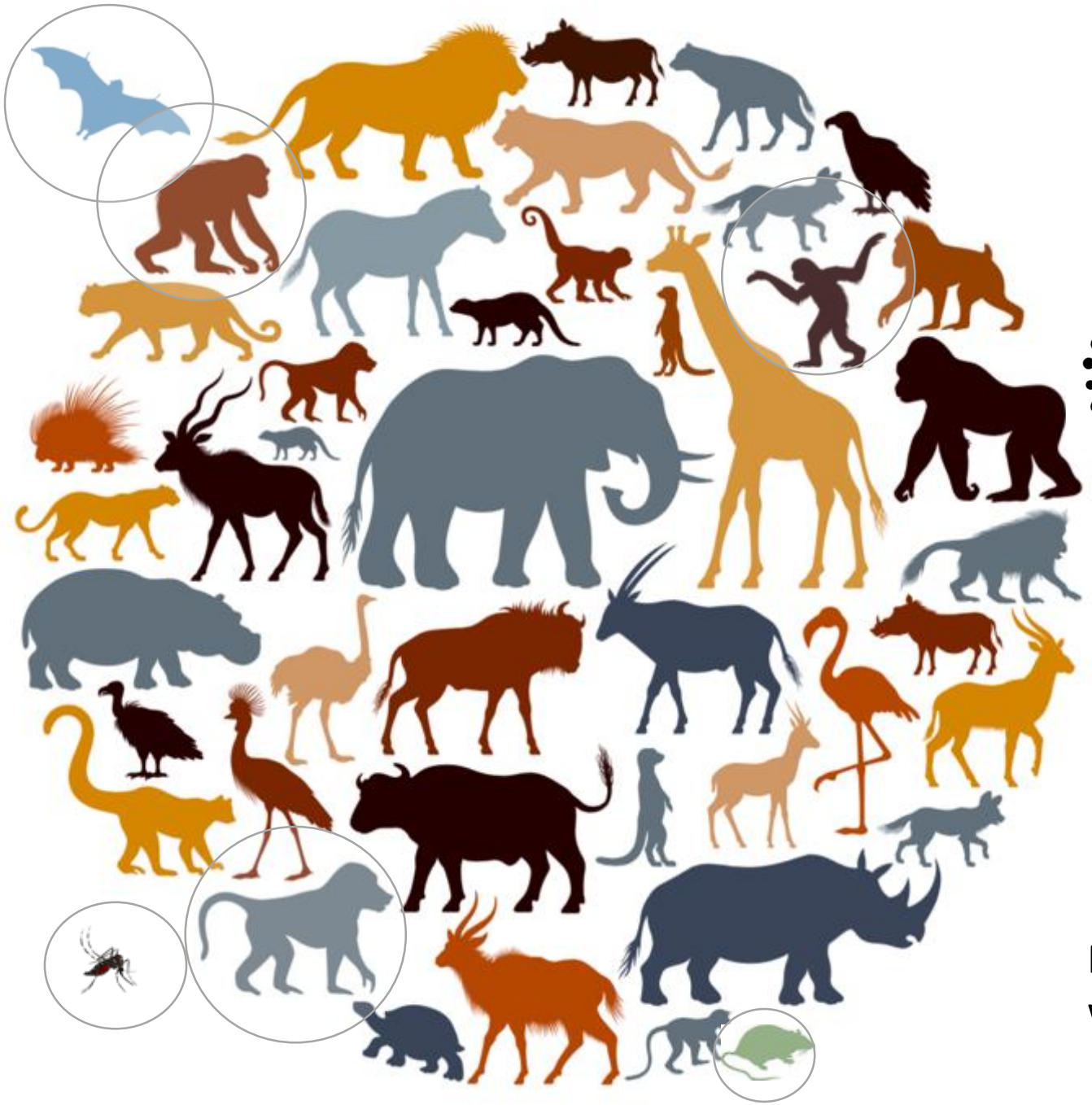
UCDAVIS
VETERINARY MEDICINE
EpiCenter for Disease Dynamics

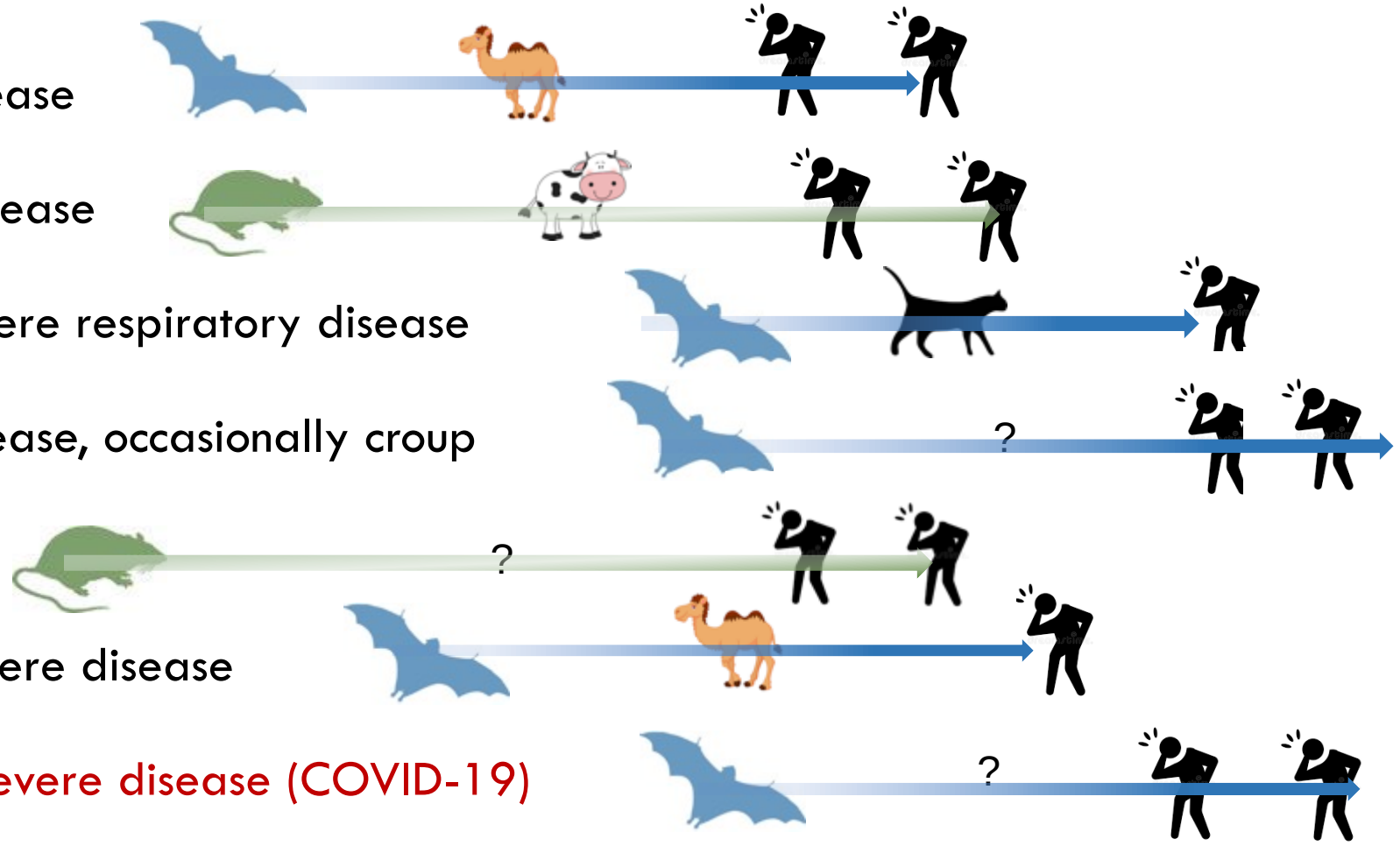


Most recently emerged infectious disease have wildlife origins

Human Coronaviruses

Virus name – date of first discovery, most common disease manifestation, suspected source

1. 229E – 1968, causes mild disease
2. OC43 – 1967, causes mild disease
3. SARS-CoV – 2002, causes severe respiratory disease
4. NL63 – 2004, causes mild disease, occasionally croup
5. HKU1 – 2005, mild disease
6. MERS-CoV – 2012, causes severe disease
7. SARS-CoV-2 – 2019, causes severe disease (COVID-19)



Emergence of a Pandemic Threat

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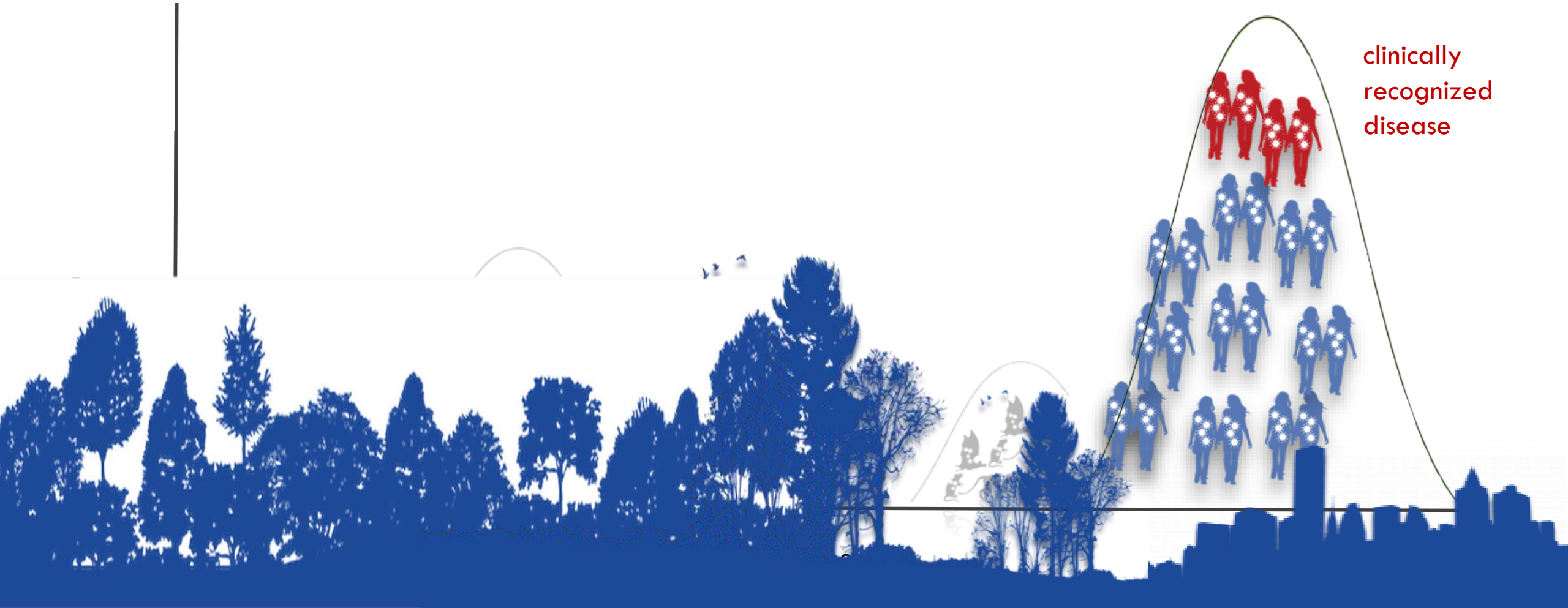
One Health Institute



Accelerated Global Change

- Agricultural development, industrialization, urbanization
- Globalization and movement at the international scale
- Substantial net gains in human well-being and economic development
- Degradation of ecosystem services
  - Increased nonlinear or abrupt changes in ecological processes
  - Diminished regulatory processes
  - Increasingly frequent emerging infectious diseases

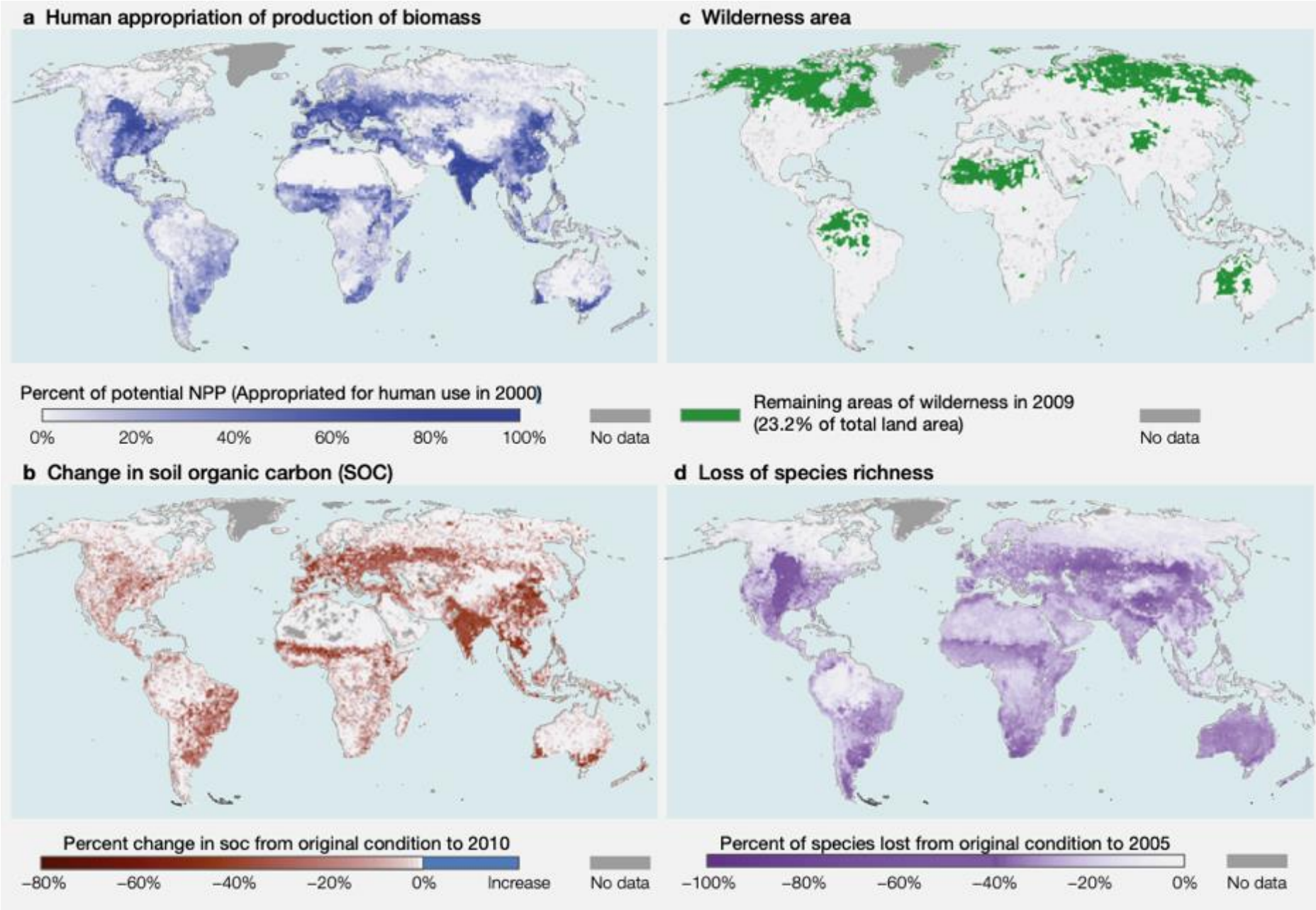
Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: Synthesis.* Island Press, Washington, DC.

Assessment Report on Land Degradation and Restoration (2018)

Human activity has drastically changed the planet

Cultivated systems cover over 1/3rd of earth's surface

Less than ¼ of land surface considered "wilderness" (ecological and evolutionary processes operating with minimal human disturbance)



ipbes
Science and Policy for People and Nature

IPBES (2018): Summary for policymakers of the assessment report on land degradation and restoration of the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services. R. Scholes, L. Montanarella, A. Brainich, N. Barger, B. ten Brink, M. Cantele, B. Erasmus, J. Fisher, T. Gardner, T. G. Holland, F. Kohler, J. S. Kotiaho, G. Von Maltitz, G. Nangendo, R. Pandit, J. Parrotta, M. D. Potts, S. Prince, M. Sankaran and L. Willemen (eds.). IPBES secretariat, Bonn, Germany. 44 pages

Movements of wildlife species to accommodate fragmentation and loss of habitat

Spillover Risk from Wildlife

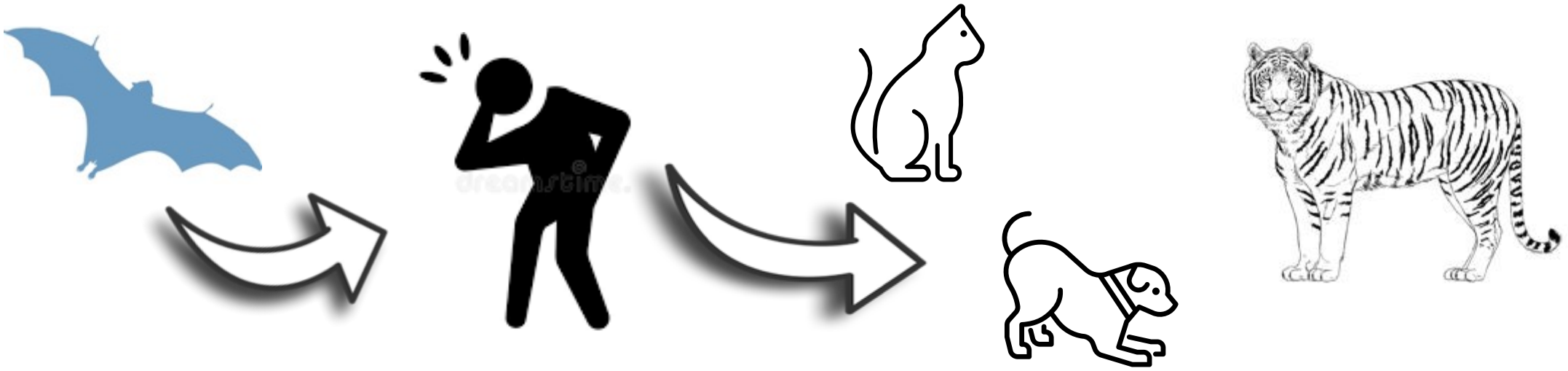
Global shifts in mammalian population trends reveal key predictors of virus spillover risk

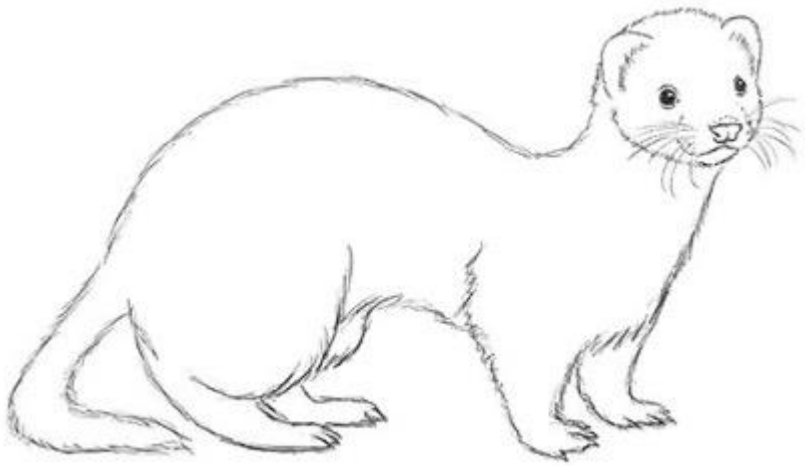
Christine K. Johnson[1], Peta L. Hitchens[2], Pranav S. Pandit[1], Julie Rushmore[1], Tierra Smiley Evans[1], Cristin C. W. Young[1] and Megan M. Doyle[1]

[1]EpiCenter for Disease Dynamics, One Health Institute, School of Veterinary Medicine, University of California, Davis, CA 95616, USA

- Species in global decline because of exploitation and habitat loss shared more viruses with people
- **Declines in habitat for wild mammals**, due to deforestation, development, and conversion to cropland - increase disease distribution and animal-human interactions
- **Exploitation of wildlife** through hunting and the live wild animal trade - the perfect epidemiologic setting for spillover of emerging threats

SARS-CoV-2 – a zoonotic virus





Science

REPORTS

Cite as: B. B. Oude Munnink *et al.*, *Science* 10.1126/science.abe5901 (2020).

Transmission of SARS-CoV-2 on mink farms between humans and mink and back to humans

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