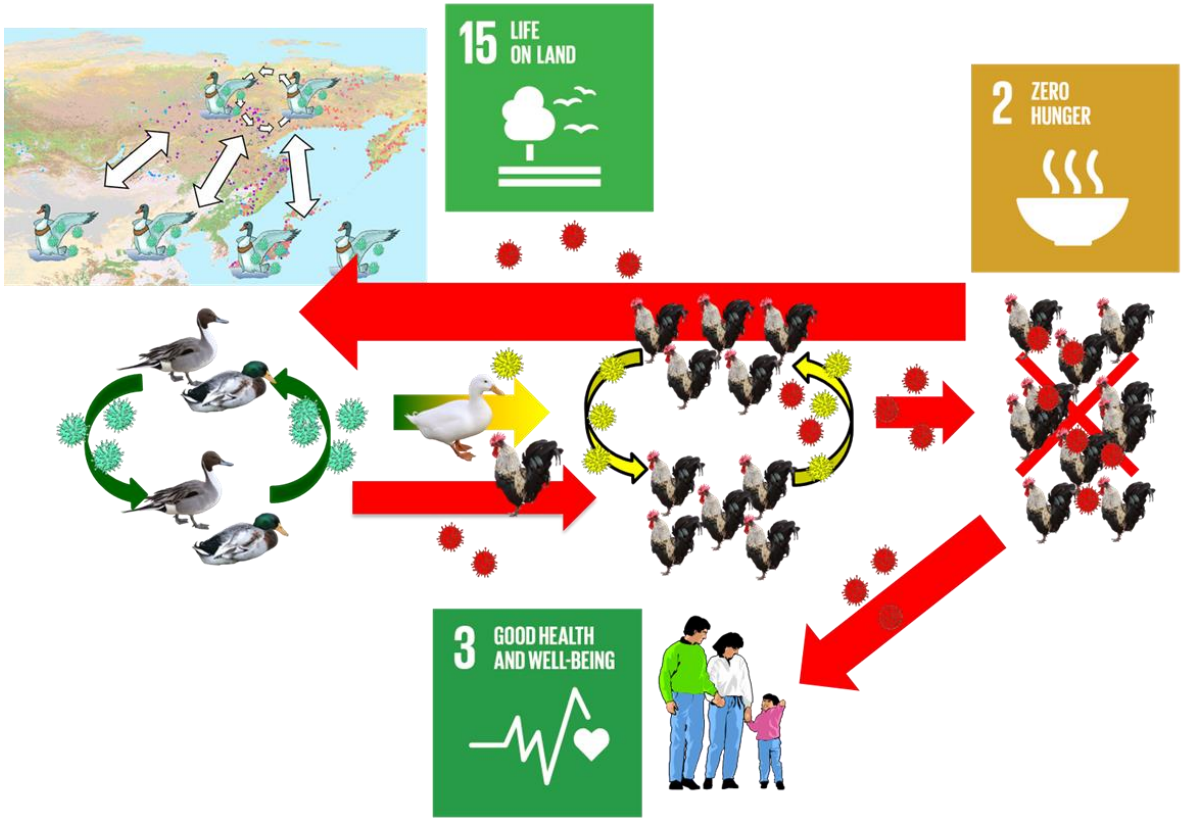
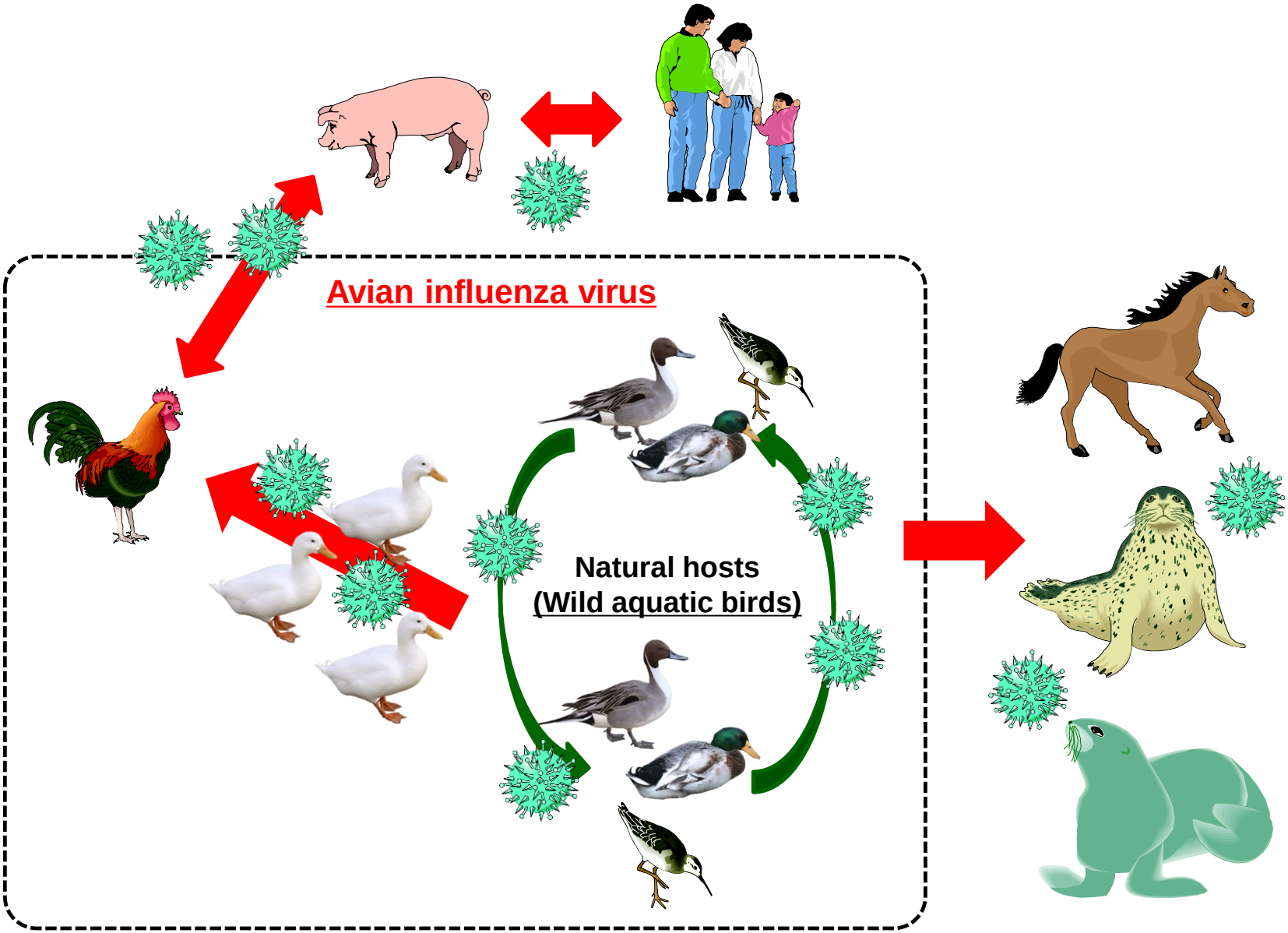
Importance of Promoting the "One-Health" Approach to deal with Highly Pathogenic Avian Influenza Virus Infection and to Achieve Sustainable Development Goals 2, 3, and 15

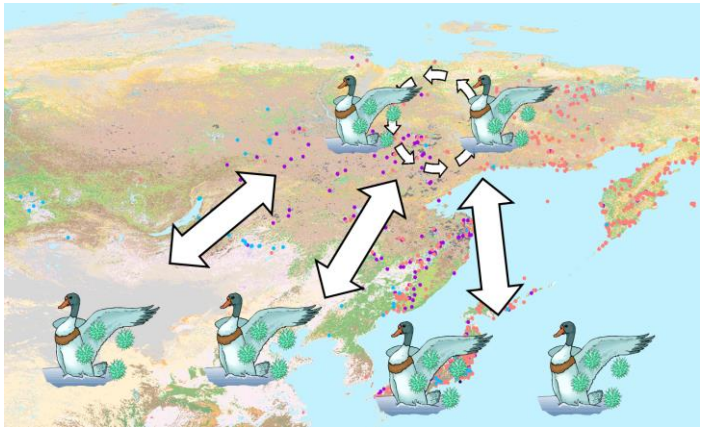


Manabu ONUMA
National Institute for Environmental Studies

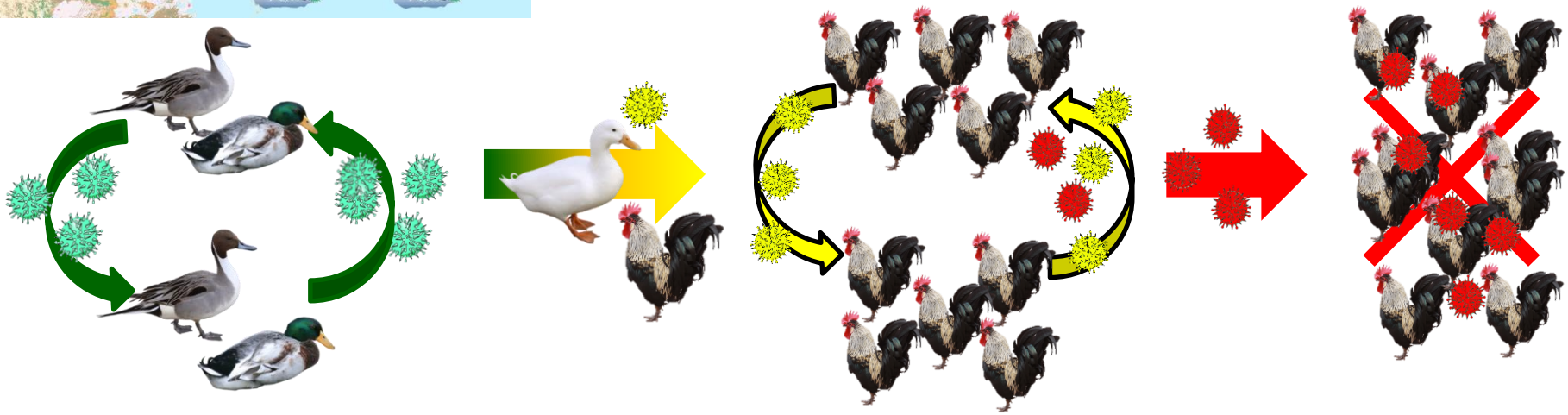
Hosts of influenza A virus

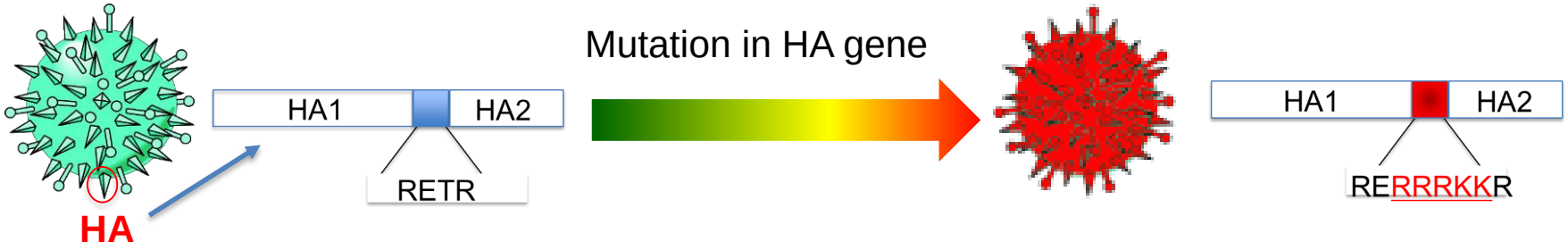


Pathogenicity shifts from LPAIV to HPAIV

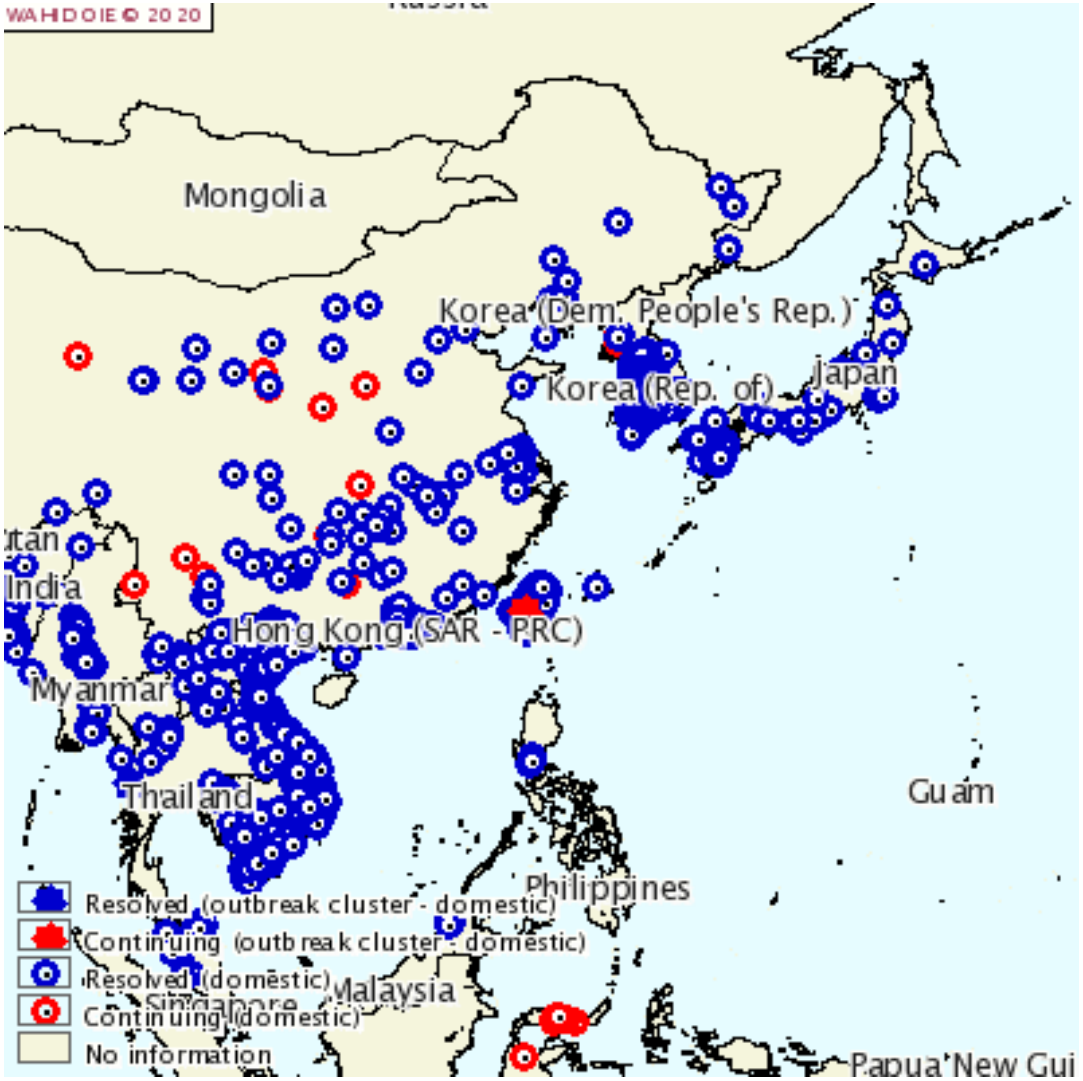


Continues infection in poultry farm

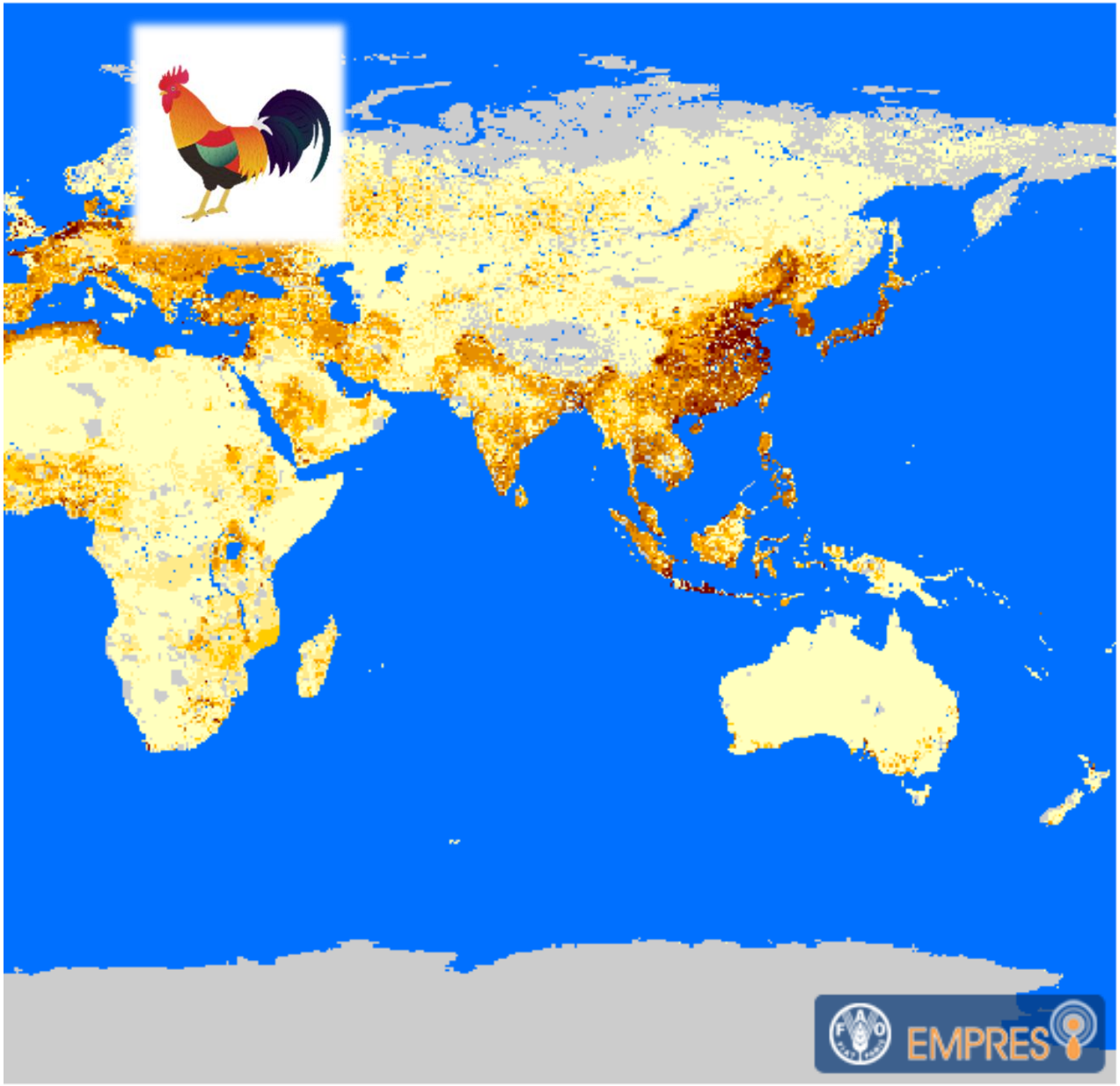




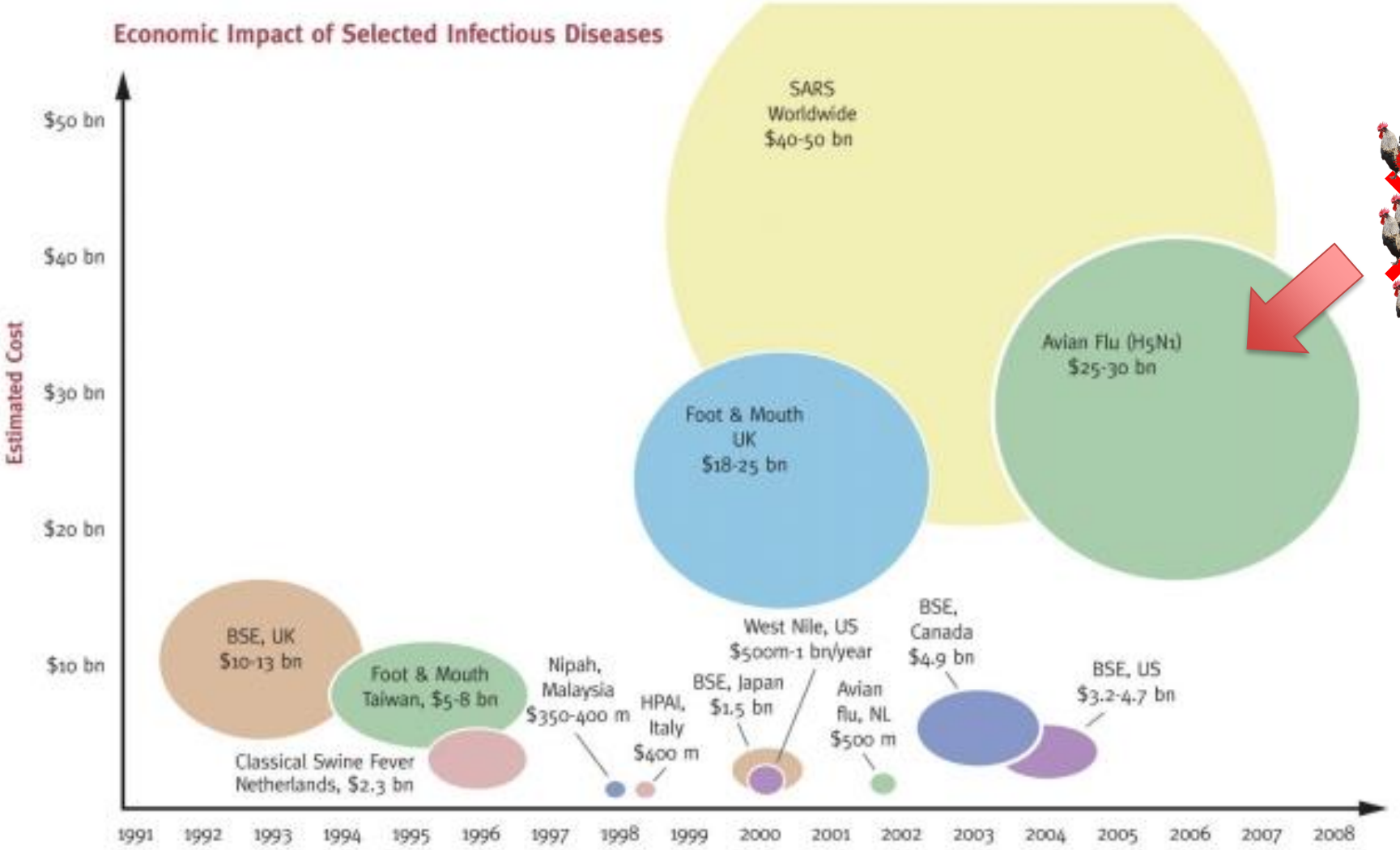
HPAI cases in poultry 2005-2019



Global poultry density



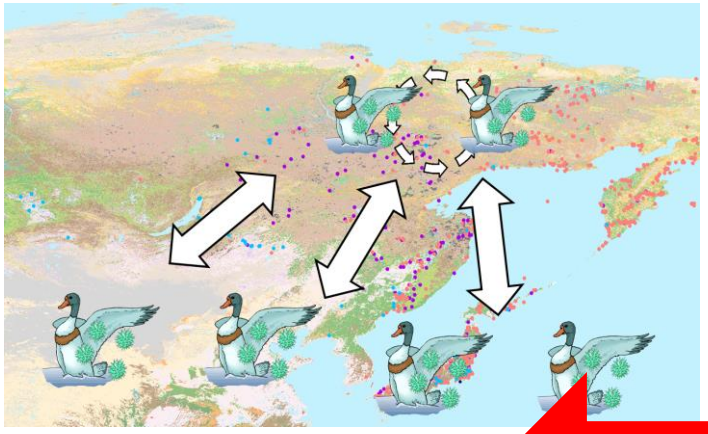
Economic impact of HPAIV



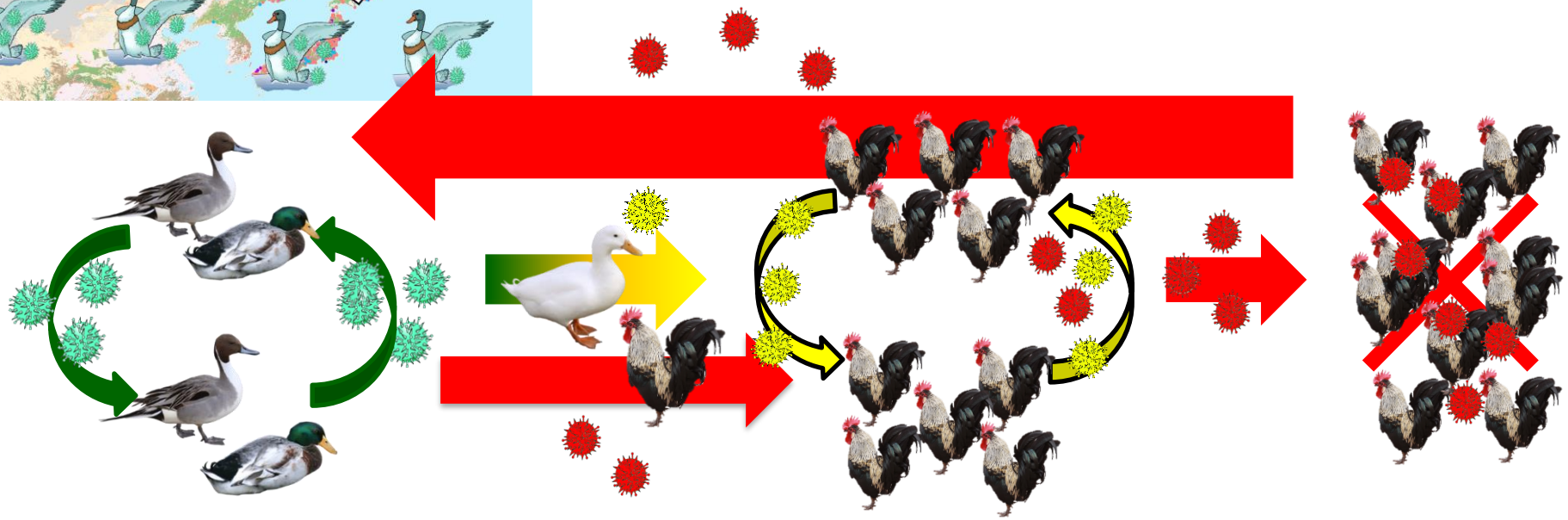
https://www.ncbi.nlm.nih.gov/books/NBK45729/figure/ch3.f2/?report=objectonly

3, Mobile Animals and Disease *in* Infectious Disease Movement in a Borderless World: Workshop Summary.Institute of Medicine (US) Forum on Microbial Threats. Washington (DC): National Academies Press (US); 2010.

HPAIV as the risk factor of biodiversity loss



Virus transmission to wild birds



Mass mortality event in Migratory Waterfowl Highly Pathogenic Avian Influenza (HPAI)

JOURNAL OF VIROLOGY, June 2006, p. 5976–5983 Vol. 80, No. 12
0022-538X/06/$08.00+0 doi:10.1128/JVI.00110-06

Properties and Dissemination of H5N1 Viruses Isolated during an Influenza Outbreak in Migratory Waterfowl in Western China†

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Received 16 January 2006/Accepted 13 March 2006

H5N1 influenza A viruses are widely distributed among poultry in Asia, but until recently, only a limited number of wild birds were affected. During late April through June 2005, an outbreak of H5N1 virus infection occurred among wild birds at Qinghai Lake in China. Here, we describe the features of this outbreak. First identified in bar-headed geese, the disease soon spread to other avian species populating the lake. Sequence analysis of 15 viruses representing six avian species and collected at different times during the outbreak revealed four different H5N1 genotypes. Most of the isolates possessed lysine at position 627 in the PB2 protein, a residue known to be associated with virulence in mice and adaptation to humans. However, neither of the two index viruses possessed this residue. All of the viruses tested were pathogenic in mice, with the exception of one index virus. We also tested the replication of two viruses isolated during the Qinghai Lake outbreak and one unrelated duck H5N1 virus in rhesus macaques. The Qinghai Lake viruses did not replicate efficiently in these animals, producing no evidence of disease other than transient fever, while the duck virus replicated in multiple organs and caused symptoms of respiratory illness. Importantly, H5N1 viruses isolated in Mongolia, Russia, Inner Mongolia, and the Liaoning Province of China after August 2005 were genetically closely related to one of the genotypes isolated during the Qinghai outbreak, suggesting the dominant nature of this genotype and underscoring the need for worldwide intensive surveillance to minimize its devastating consequences.

6,184 migratory waterfowls were dead.

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Last Updated: Thursday, 7 July, 2005, 06:27 GMT 07:27 UK

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Avian flu moves among wild geese

An outbreak of avian flu in wild geese in western China has raised fears that the virus responsible could soon spread beyond its Asian stronghold.


A dying bar-headed goose displays classic symptoms

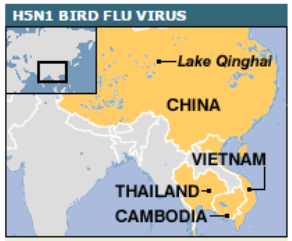
Researchers say evidence of the H5N1 pathogen in the geese is a big concern because of the migratory animals' ability to fly huge distances.

Their reports, in the Science and Nature journals, are the first to show viral transmission between wild birds.

Previously, the flu was only seen to move to wild birds from domestic fowl.

World health officials are worried avian influenza virus (AVI) could cause a pandemic of human disease if it ever acquires the ability to pass easily from human to human.

So far, the impact on people has been limited to 54 deaths out of 154 infections in Vietnam, Thailand and Cambodia - again, after contact with domesticated chickens and other infected food birds.



- Principally an avian disease, first seen in humans in Hong Kong, 1997
- Almost all human cases thought to be contracted from birds
- Isolated cases of human-to-human transmission in Hong Kong and Vietnam, but none confirmed

News that the H5N1 viral strain is now being passed around wild geese makes avian flu even more of a global threat than it already is, the scientists say.

"These birds can fly one thousand miles a day at maximum," explained Yi Guan, of the University of Hong Kong, China.

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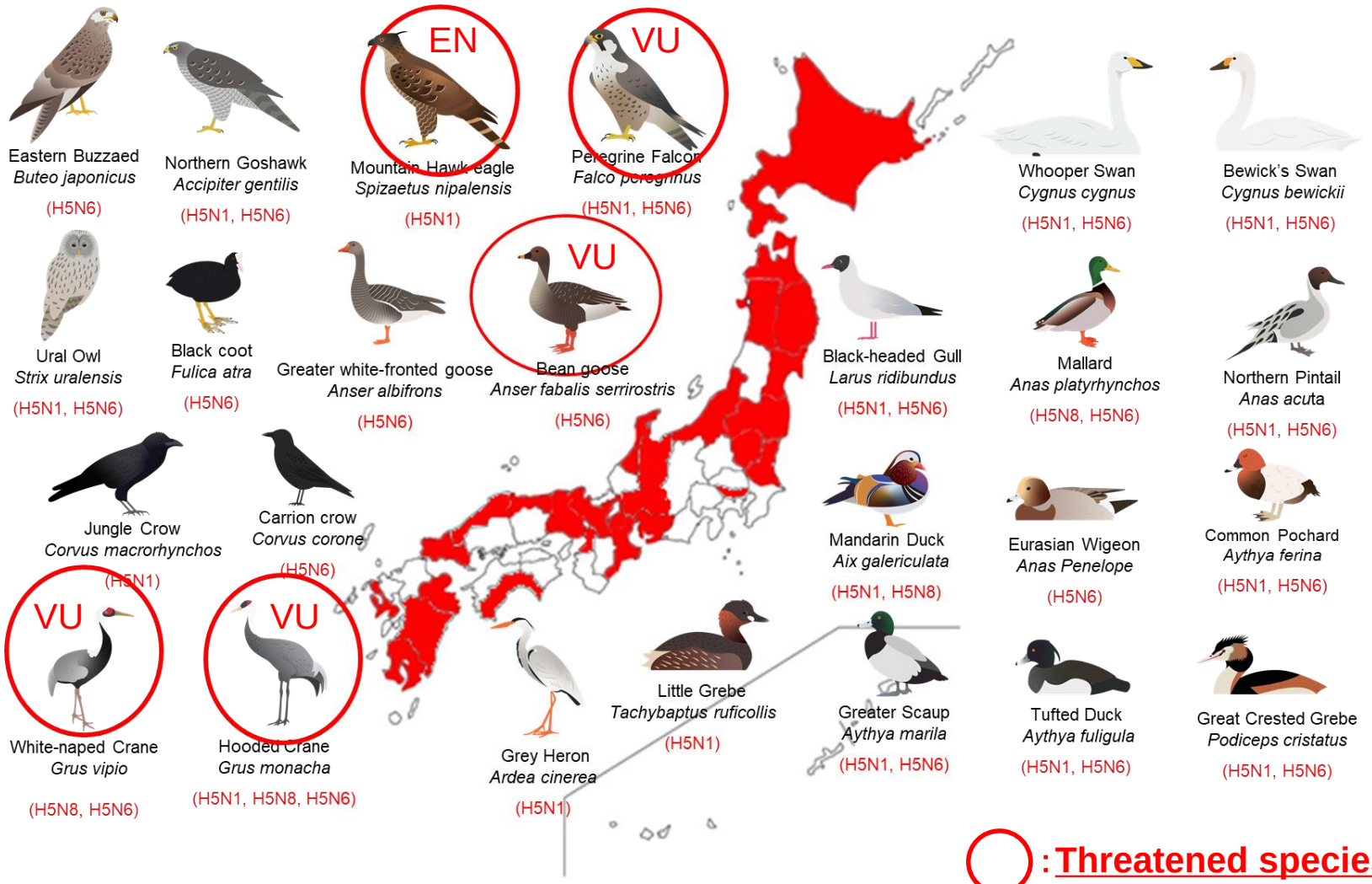
http://news.bbc.co.uk/2/hi/science/nature/4657145.stm

HPAI cases in wild birds 2005-2019

HPAI cases of wild birds in Japan (2004-2018)

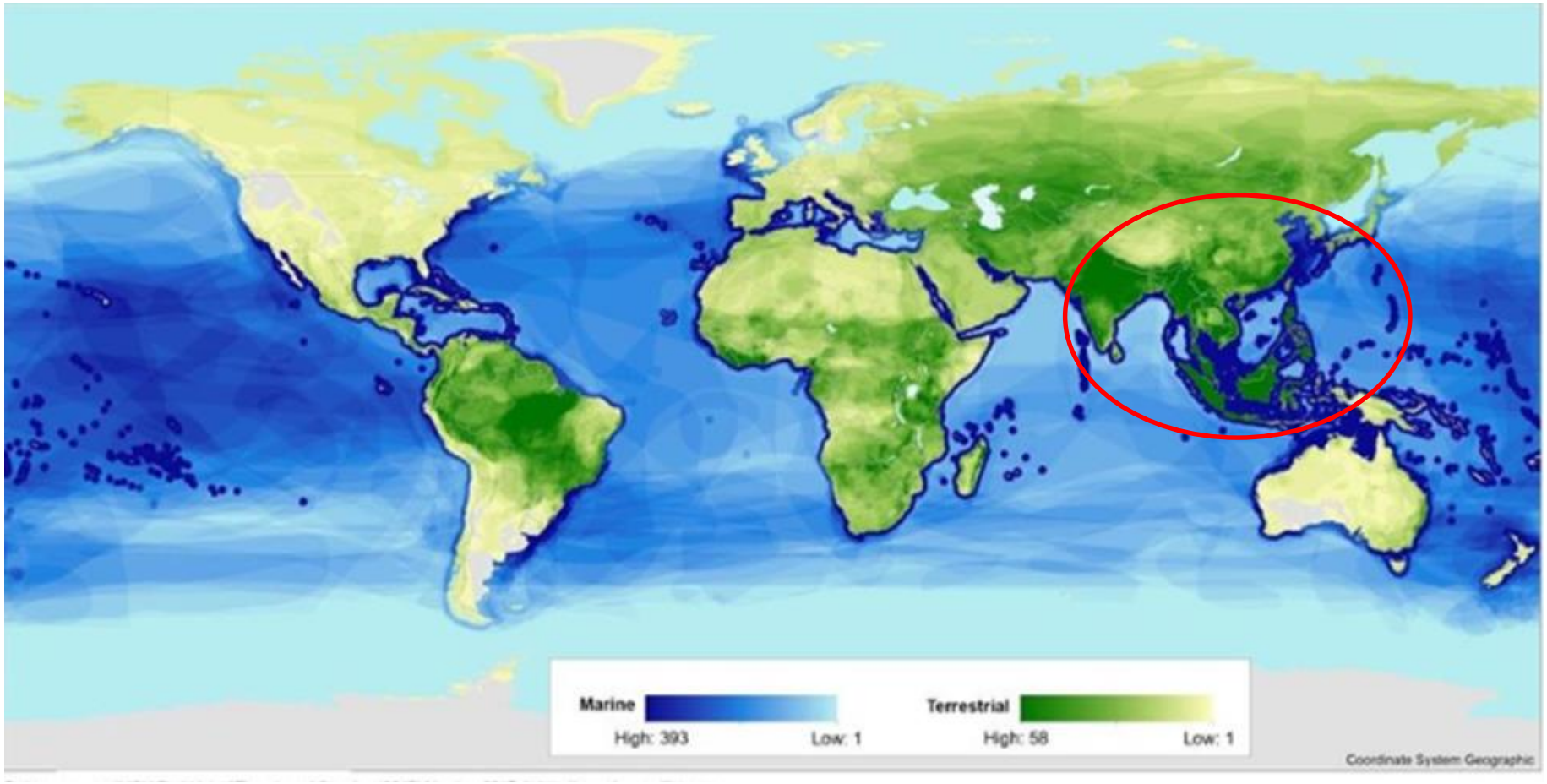
More than 300 individuals Subtype：H5N1、H5N8、H5N6



○：Threatened species

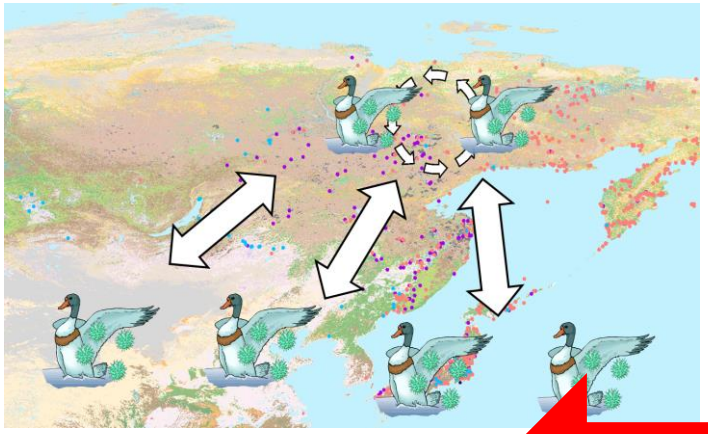
Threatened species richness

Numbers of threatened (i.e., vulnerable, endangered or critically endangered) species per 10km grid cell,

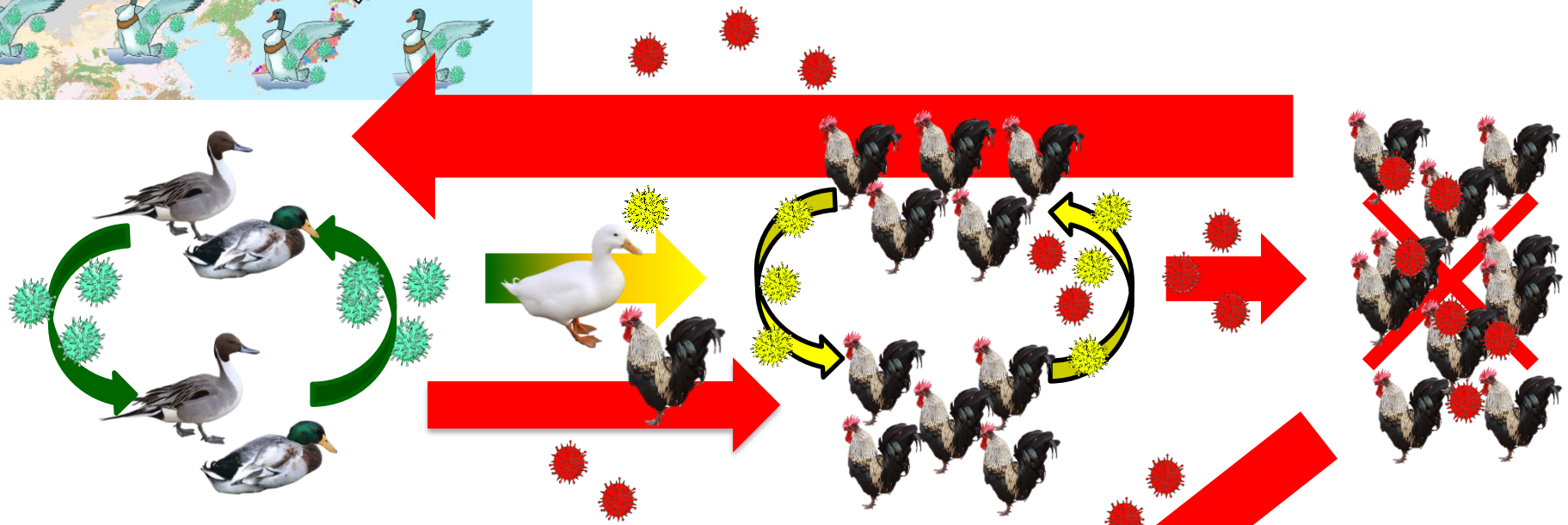


https://ipbes.net/sites/default/files/ipbes_global_assessment_chapter_2_2_nature_unedited_31may.pdf

HPAIV as Zoonosis



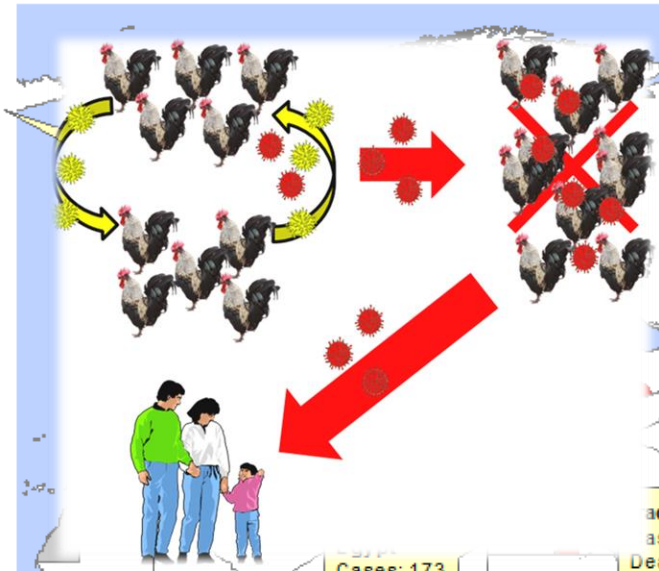
Virus transmission to wild birds



Virus transmission to human

Areas with confirmed human cases for avian influenza A(H5N1) reported to WHO, 2003-2013*

http://gamapserver.who.int/mapLibrary/Files/Maps/2003_2013_AvianInfluenza_GlobalMap_24Jan14.png



Azerbaijan
Cases: 8
Deaths: 5

China
Cases: 45
Deaths: 30

Iraq
Cases: 3
Deaths: 2

Pakistan
Cases: 3
Death: 1

Bangladesh
Cases: 7
Death: 1

Lao People's Democratic Republic
Cases: 2
Deaths: 2

Cases: 173
Deaths: 63

Myanmar
Case: 1
Death: 0

Viet Nam
Cases: 125
Deaths: 62

Djibouti
Cases: 1
Death: 0

Thailand
Cases: 25
Deaths: 17

Cambodia
Cases: 47
Deaths: 33

Nigeria
Case: 1
Death: 1

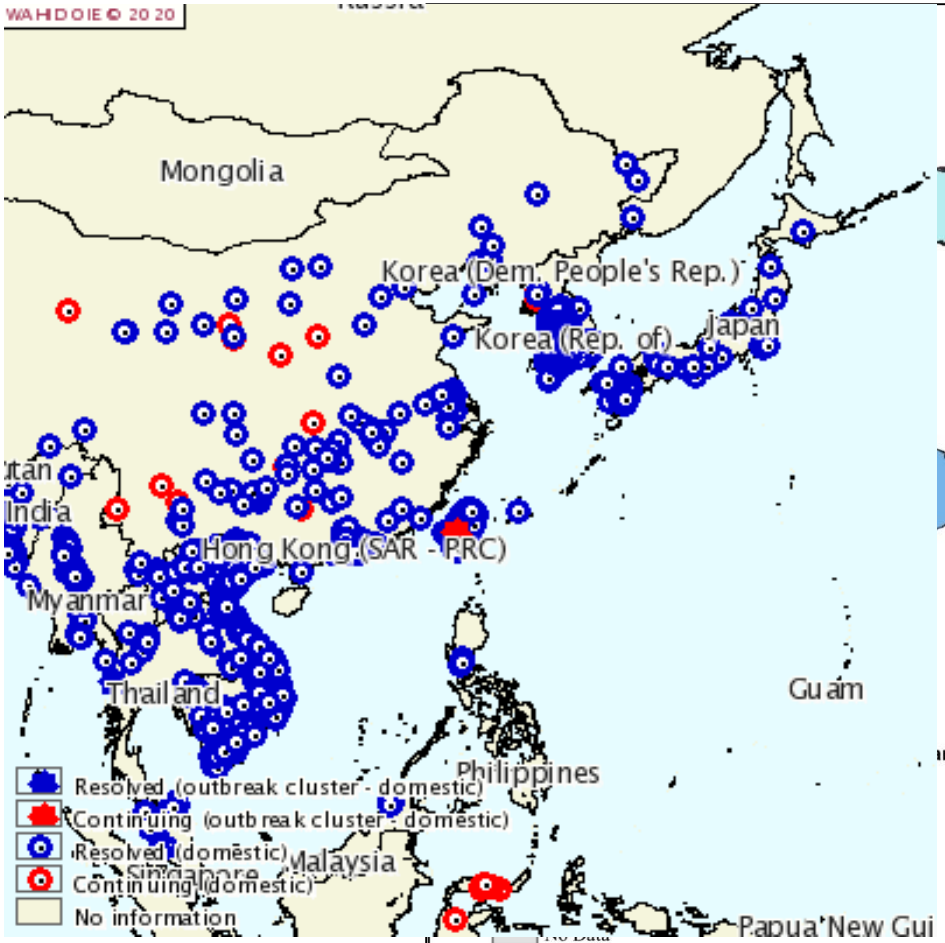
Indonesia
Cases: 195
Deaths: 163

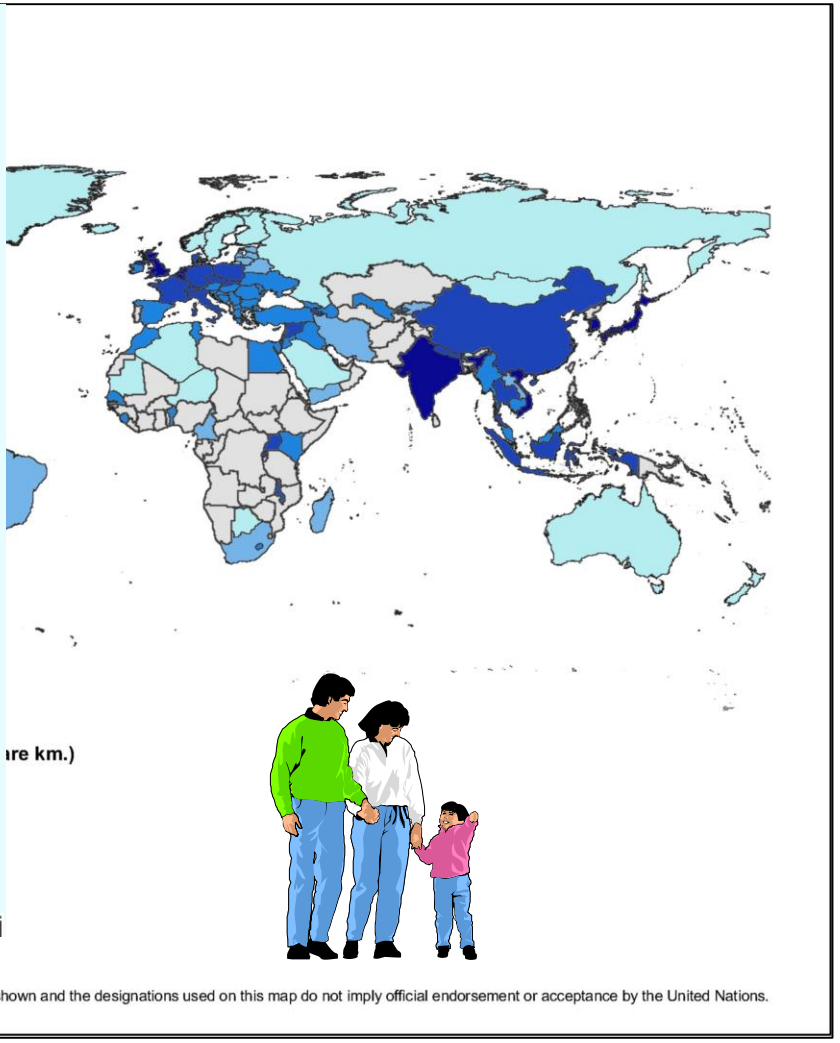
Member State
Cases: cumulative number
Deaths: cumulative number

Areas with confirmed human cases for avian influenza

*All dates refer to onset of illness
Data as of 24 January 2014
Source: WHO/GIP

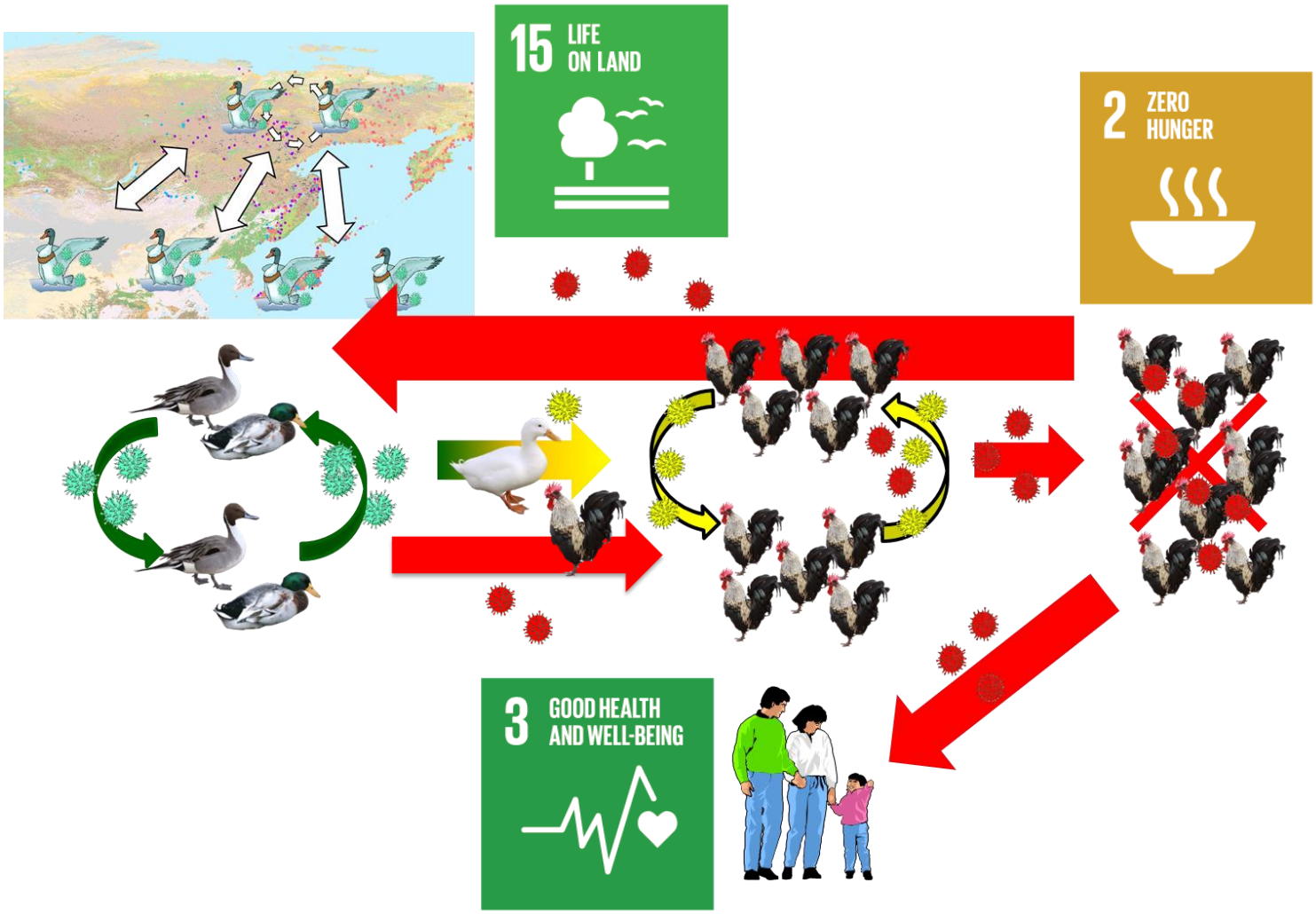
Global population and HPAIV positive cases





https://unstats.un.org/unsd/Demographic/products/dyb/dyb2011/maps/table03a.pdf

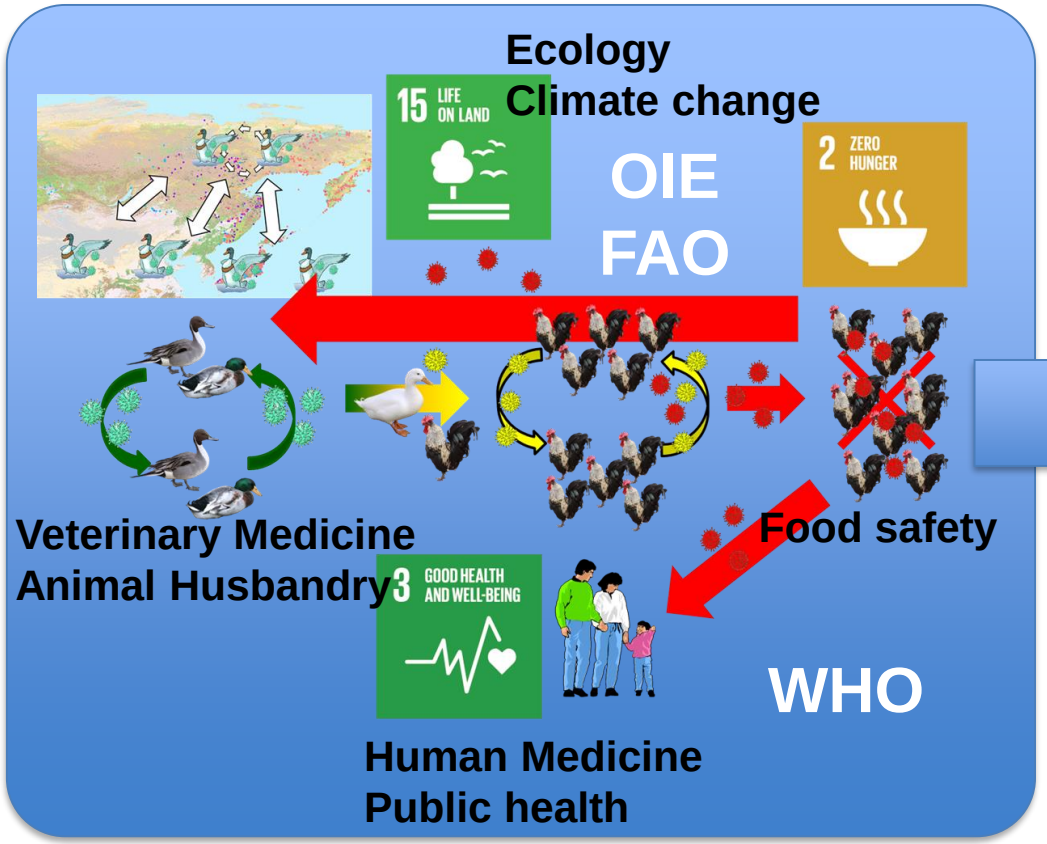
HPAIV outbreak and SDGs



One Health Concept

The One Health concept is a worldwide strategy for expanding interdisciplinary collaborations and communications in all aspects of health care for humans, animals and the environment.

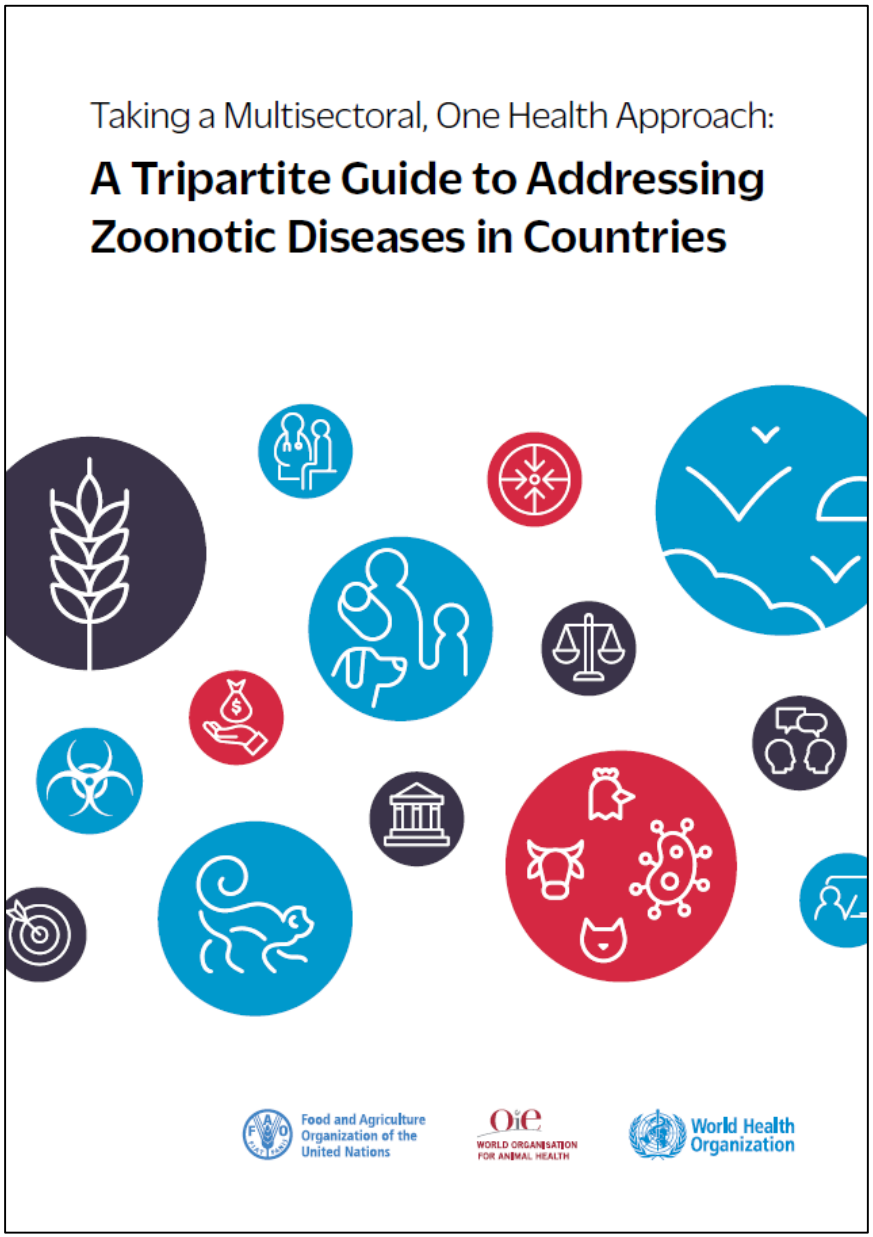
"One Health Initiative. www.onehealthinitiative.com/about.php"



Collaborations and Communications

1,Contribute for food safety
2,Prevent biodiversity loss
3,Better output for public health

Achieve SDG goals



https://extranet.who.int/sph/one-health-operations

Future corroborations

1, Technical support of detecting and typing of avian influenza virus in wild birds.

2, Construct potential risk map of HPAIV in wild birds.

3, Estimation of wild bird migration pattern change due to climate change.