

The One Health Opportunity – A Powerful Mechanism to Improve Global Health Outcomes

February 18, 2020

Moderator



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The One Health Opportunity – Greatest Threats

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Anthropocene

- **Significant, irreversible impacts**
- **Humans are the greatest threat to planetary health**
- **All major threats directly or indirectly related to human actions**



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The Anthropocene: Human Impact on the Environment

An epoch is one of the smaller divisions of geologic time. Our current epoch, the Holocene, began about 11,600 years ago. But there is growing evidence that we are entering a new epoch that could be named the Anthropocene because it is marked by extensive human impacts on the environment. This poster explores evidence that future geologists might use to define the Anthropocene.

Atmosphere

Air pollution has many components, like the emission of greenhouse gases that lead to climate change. Carbon dioxide from burning fossil fuels and changes in land use, nitrous oxide from the increased use of fertilizers, and methane from irrigated rice agriculture, cattle, and landfills are changing climate at a rate faster than most changes seen in the geologic record.

Atmospheric Concentrations of Greenhouse Gases



Mining

Humans literally reshape the Earth through mining and construction, causing erosion and polluting waterways. These activities also disrupt natural geochemical cycles of metallic elements, carbon, nitrogen, and phosphorus.



Water Use

Humans have drastically altered rivers and watersheds all over the world. More than half of all available fresh water is being used for agricultural, industrial, and municipal uses, drastically changing seasonal runoff patterns and downstream ecosystems.

Invasive Species

One unintended consequence of extensive global trade and travel is the rapid spread of non-native species across many localities. Invasive species change the species makeup of the environment, which will be detectable as fossils in the future.

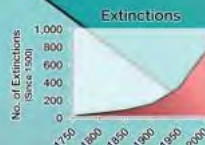
Ocean

Overfishing depletes fish populations. Many traditional fisheries such as the Atlantic Cod have collapsed, causing immediate economic hardship and also reverberating throughout the marine ecosystem, harming numerous other species.



Biodiversity

Almost 900 species have gone extinct in the past 500 years and the pace of extinctions has greatly accelerated in the past few decades, perhaps trending toward a mass extinction.



Coastal Habitats

Coastal waters and nearshore ecosystems are vulnerable to pollution such as agricultural runoff, which carries nitrogen and phosphorus into coastal waters that feed plankton blooms that end up suffocating fish and shellfish. Industrial pollutants such as toxic heavy metals and organic compounds can also be deadly to coastal life.

Agricultural Runoff



Cities
More than 7 billion people inhabit the planet. Their demands for land, water, food, and energy are reshaping the planet.

Farms
Natural ecosystems are converted to managed agricultural land in order to feed the world. This results in release of carbon to the atmosphere and a loss of biodiversity.

Agricultural Land Use



Deforestation



Forests
Clearing native forests for agriculture or other human development reduces biodiversity and fragments habitats, impeding the ability of species to change their geographic ranges to adapt to global warming.

ANTHROPOCENE EPOCH?
HOLOCENE EPOCH
PLEISTOCENE EPOCH

Begins with: Start of Ice Ages, affecting both hemispheres of Earth
Characterized by: Ice Age animals, e.g., saber-toothed tiger, mammoth

Begins with: End of the last Ice Age
Characterized by: Modern animal species, modern landscape

Begins with: Atomic Age, globalization, global warming
Characterized by: Changes in landscape, ocean and atmospheric chemistry, species extinctions and invasions

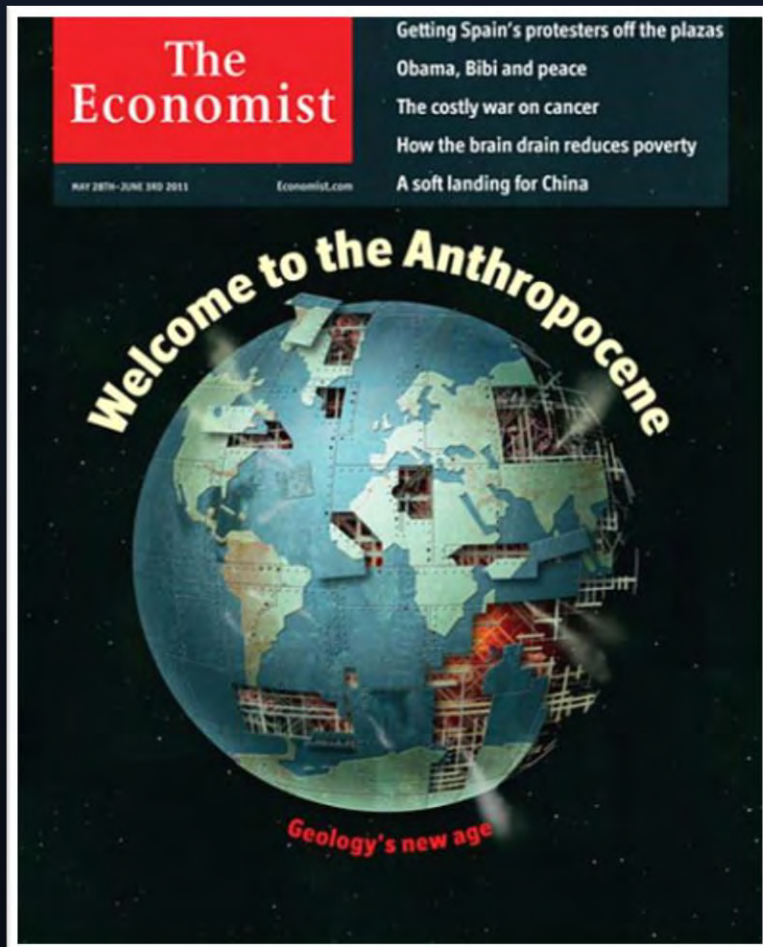
Defining the Anthropocene

Each geologic epoch is defined by a unique marker in the rock strata, the sharper and more global the marker, the better. Markers can be fossils of new forms of life, or a chemical signal—like the high concentration of the element iridium produced when an asteroid hit Earth 66 million years ago, leading to a mass extinction.

Scientists are considering what the most useful markers for the beginning of the Anthropocene will be. Candidates include roads, microplastics, mercury from air pollution, and radionuclides from nuclear weapons testing. Various markers would put the start of the Anthropocene as early as the beginning of the industrial revolution or as recently as the beginning of widespread globalization in the 1950s.

What will characterize the fossil record of the Anthropocene? Our actions could determine whether the epoch is marked by diminishing biodiversity or even a mass extinction.

Anthropocene in the news



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Greatest Threats

- **Climate change**
- **Emerging, re-emerging infectious diseases**
- **Biodiversity and natural resource loss**
 - The sixth mass extinction event
- **Land degradation and human expansion**
- **Food security**
- **Pollutants**
- **Wealth inequality**
- **Science denialism**
- **And many more!**



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Greatest Threats

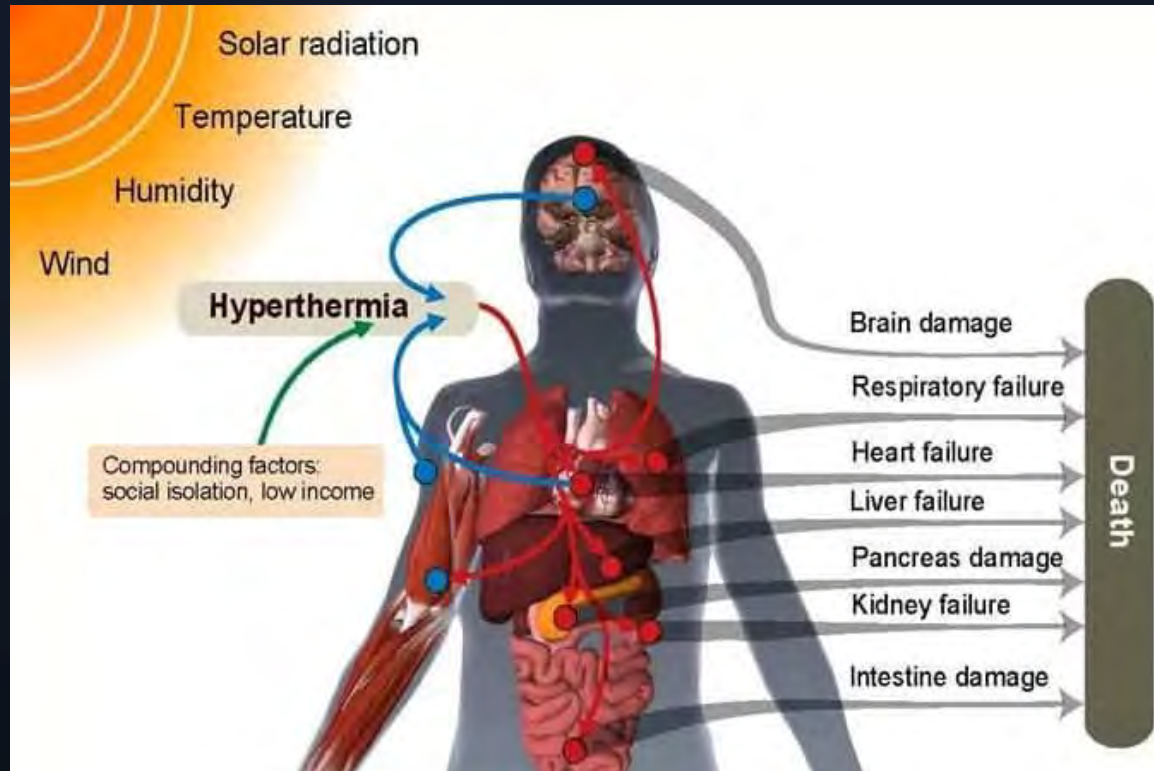


Climate Change



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Climate warming directly impacts health



*** By 2100, 74% of world population will be experiencing deadly heat waves (Mora et al. 2017)**

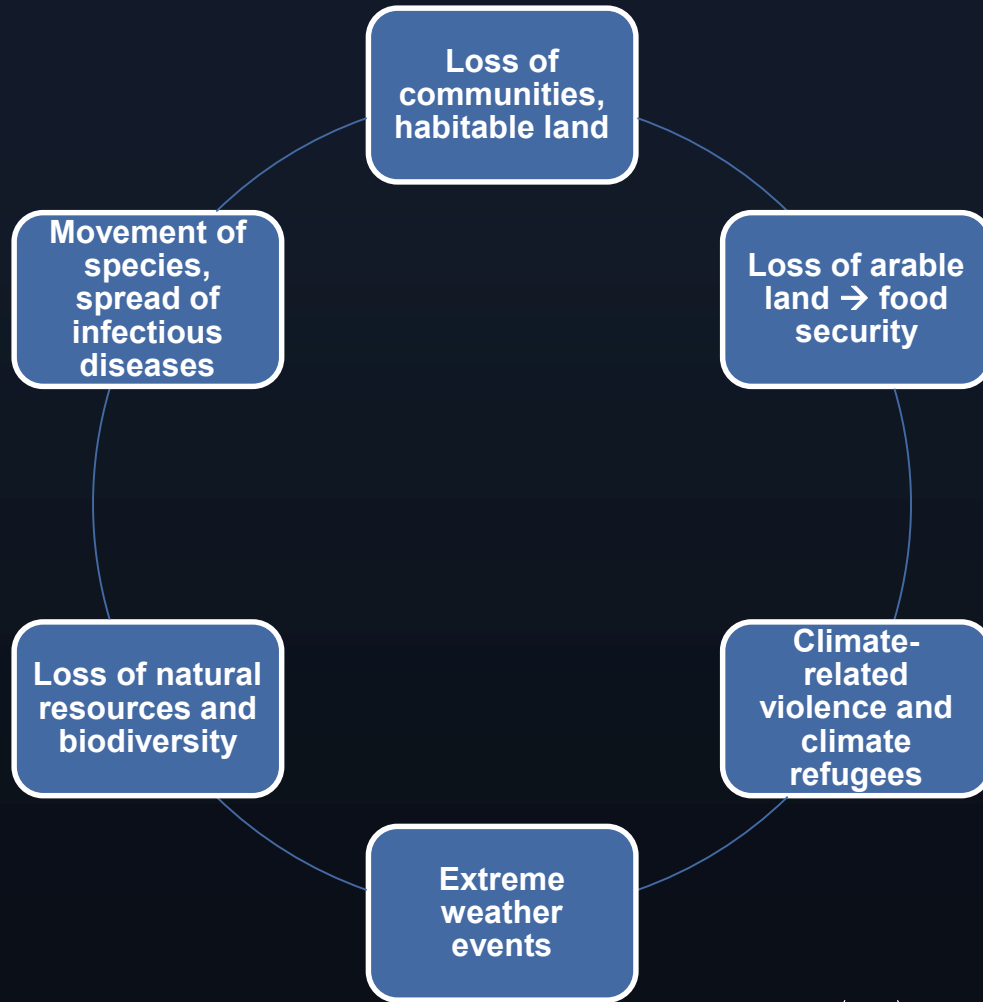


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Global health impacts of climate change



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Australian Wildfires



<https://abcnews.go.com/International/billion-animals-estimated-dead-australia-wildfires/story?id=68143966>



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Emerging Infectious Diseases

75% human EID are from animals

70% human EID from wild animals



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Wildlife Trade

- Wet Markets
- Extinction and Disease
- Crime



Coronavirus link?

<https://globalstory.pangolinreports.com/#malaysia-thai-border>



Photo by Nick Nichols



Photo by Joe Anelli

Animals across the globe



Smith et al. (2012) PLoSOne

2000-2006 in USA

**120,000,000 LIVE
wildlife individuals**

**25 million kilograms
of non-live wildlife
products**



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Biodiversity Loss

- Climate change
- Habitat loss
- Pollution
- Invasive species
- Infectious Diseases

Since 1970, we've lost **52%** of the Earth's bird, mammal, fish, reptile and amphibian populations:

 **39%** for land-based species

 **39%** for marine species

 **76%** for freshwater species

SOURCE: World Wildlife Fund

 USA TODAY

The Sixth Mass Extinction



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Disease threats and biodiversity conservation

- **Ebola**
in great apes
- **Fibropapillomatosis**
in sea turtles
- **Rabies and canine distemper**
in wild carnivores
- **Chytridiomycosis**
in amphibians
- **Devil Facial Tumor Disease**
in Tasmanian devils
- **White nose syndrome**
in bats
- **Colony Collapse Disorder**
in bees



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Not just for “conservationists”

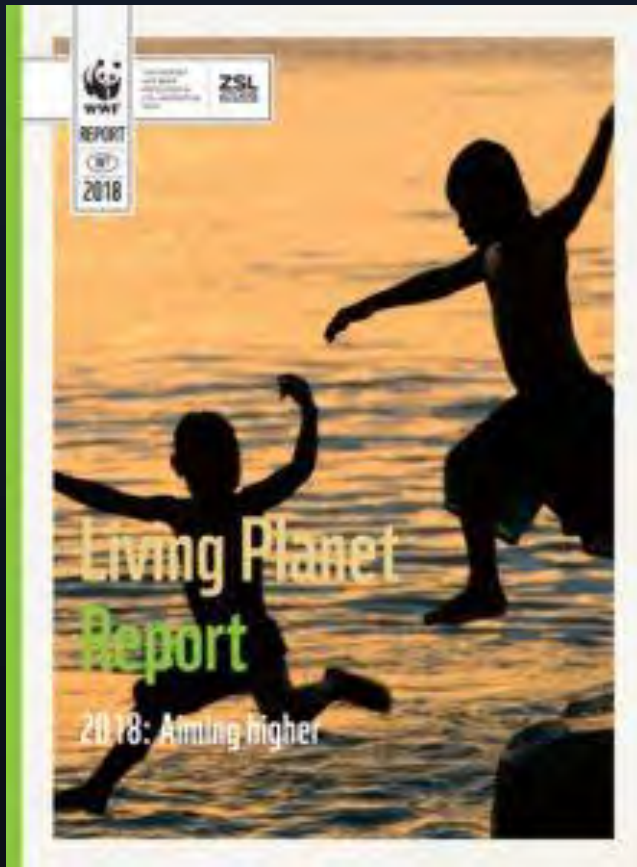


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Ecosystem Services



Feeding 7.6 billion and counting



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Increased Meat Consumption and One Health

■ Animal

- Loss of biodiversity
- Welfare issues
- Disease transmission



■ Environmental

- Water and land resources
- Waste and pollution
- Climate change

■ Human

- Obesity
- Heart disease
- Diabetes
- Colorectal cancer
- EIDs



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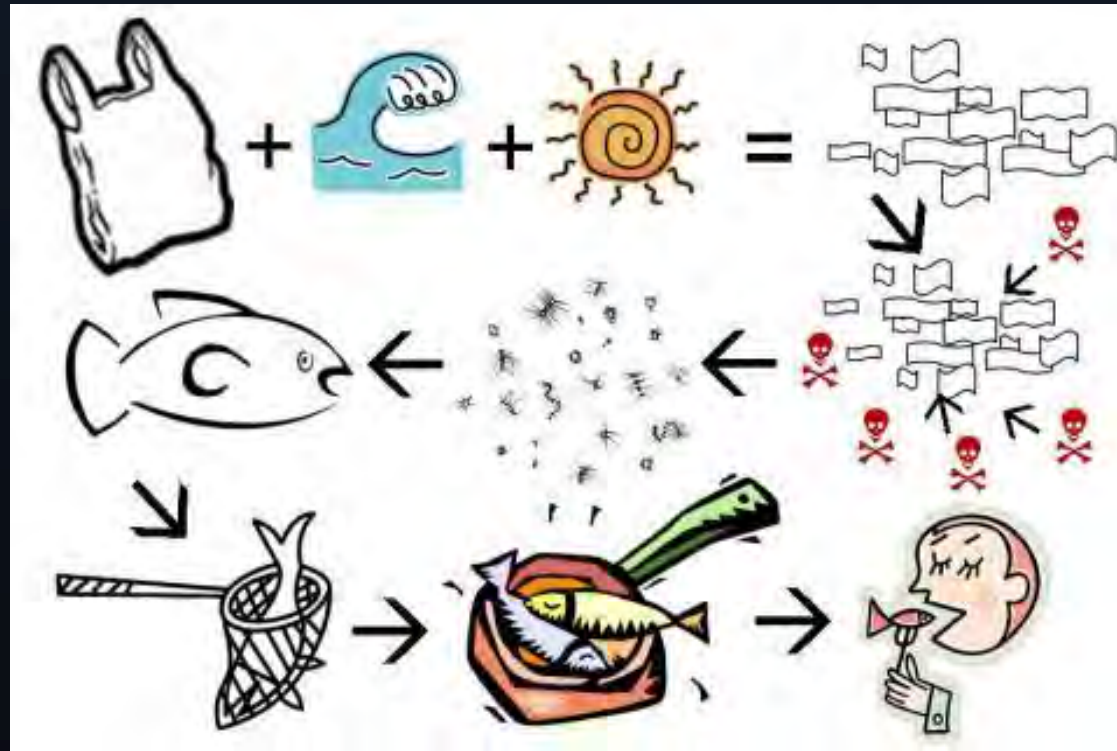
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Pollution – Plastics and More



Impacts on marine food webs

- Fisheries
- Seabirds
- Food webs
- Chemical compounds from plastics



EDCs in wildlife

Modified from: Jandegian, CM, et al. 2015.
General and Comparative Endocrinology.



Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

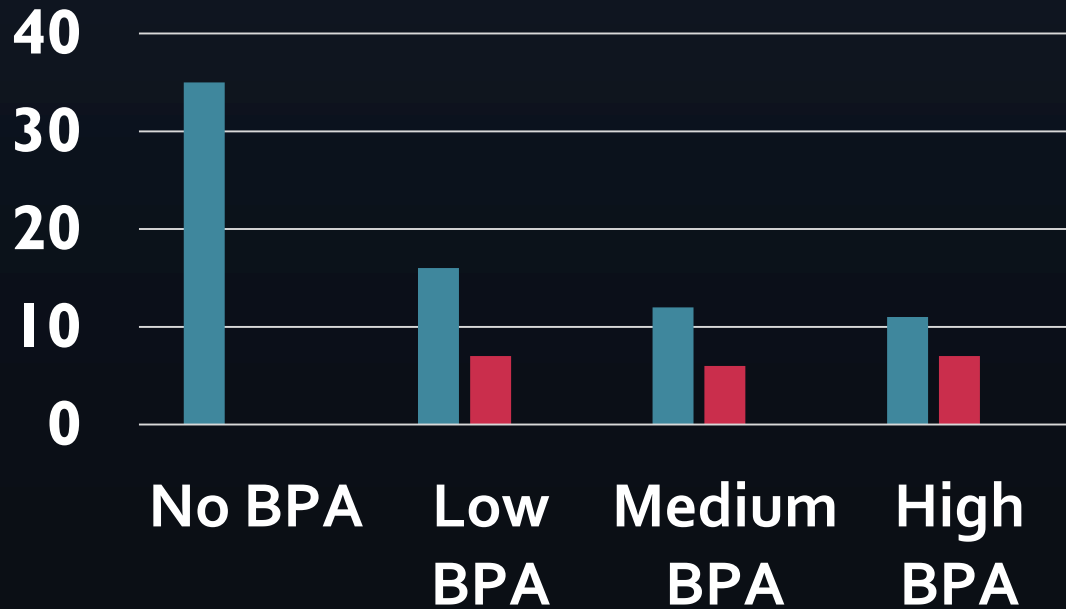
2015
General and Comparative Endocrinology

journal homepage: www.elsevier.com/locate/ygcen

Effects of the environmental estrogenic contaminants bisphenol A and 17 α -ethinyl estradiol on sexual development and adult behaviors in aquatic wildlife species

Ramji K. Bhandari ^{a,b}, Sharon L. Deem ^{c,d}, Dawn K. Holliday ^{e,f}, Caitlin M. Jandegian ^{b,c,g}, Christopher D. Kassotis ^a, Susan C. Nagel ^{a,h}, Donald E. Tillitt ^b, Frederick S. vom Saal ^a, Cheryl S. Rosenfeld ^{i,j,k,*}

BPA Turtle Study



Male

Male-Female



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Human impacts from EDCs

What Endocrine-Disrupting
CHEMICALS
ARE DOING TO YOUR BODY

Phytoestrogens

Polyaromatic Hydrocarbons

Pesticides

Dr. Axe
FOOD • MEDICINE

Polychlorinated Biphenyls (PCB)

Developing Earlier Puberty

FRESH AIR

Infants and Early Children

George A. Macones⁴,
Amber R. Cooper^{2*}

Department of Obstetrics and Gynecology, United States of America, **2** Division of Reproductive and Gynecology, Washington University in St. Louis, United States of America, **3** Department of Biomedical and Health Informatics, University of Missouri—Kansas City School of Medicine, Kansas City, Missouri, United States of America, **4** Division of Maternal Fetal Medicine, Department of Obstetrics and Gynecology, Washington University in St. Louis, Barnes-Jewish Hospital, St. Louis, Missouri, United States of America, **5** Wadsworth Center, New York State Department of Health and Department of Environmental Health Sciences, State University of New York at Albany, Albany, New York, United States of America

* coopera@wudosis.wustl.edu

Global Health



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Introduction to One Health

An Interdisciplinary Approach to Planetary Health

Sharon L. Deem • Kelly E. Lane-deGraaf • Elizabeth A. Rayhel



TEDx Sharon Deem



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drsharondeem.com

Thank You



The Value of One Health for Strengthening Health Security

February 18, 2020



Consortium of
Universities
for Global Health



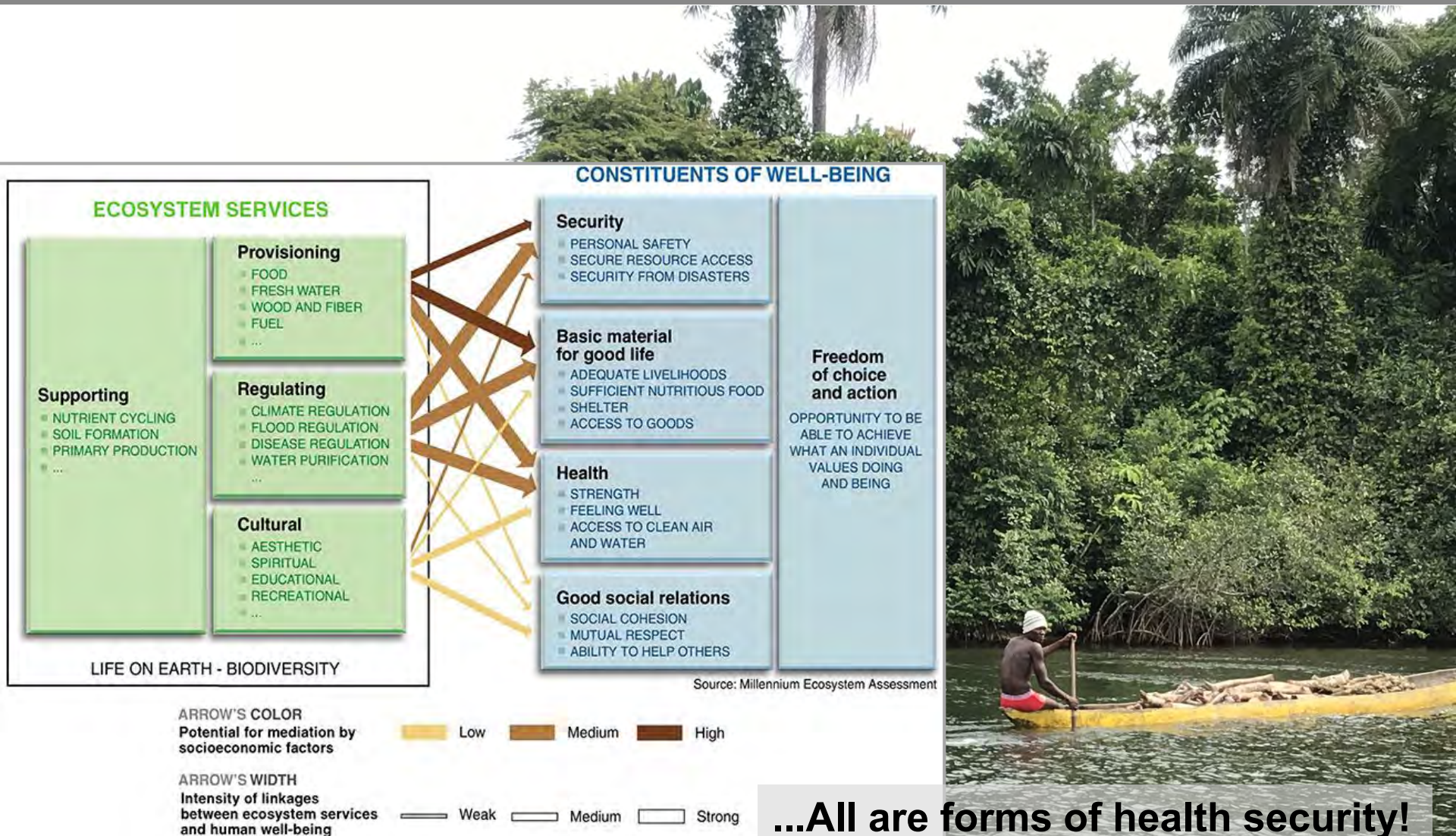
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@CUGHnews

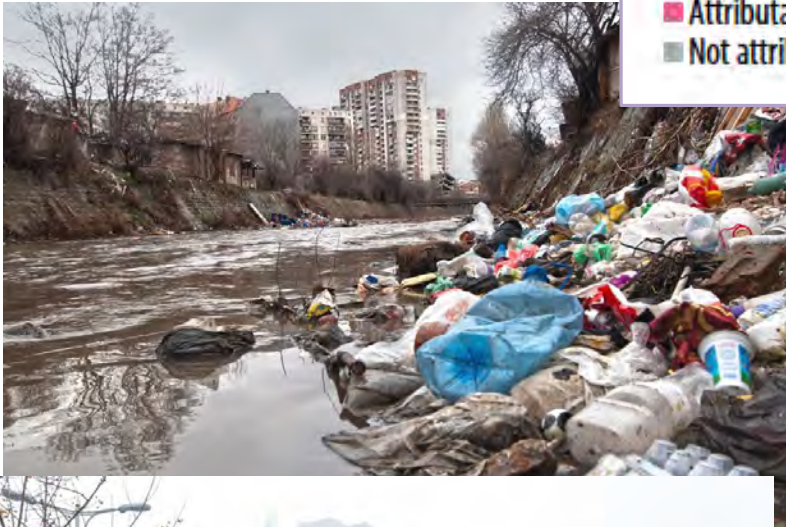
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Health-Benefitting Ecosystem Services

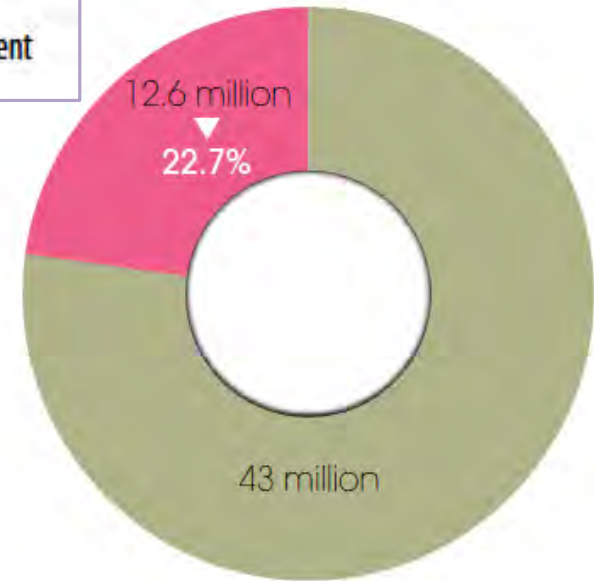


Health of Environment, Animals, and People



■ Attributable to the environment
■ Not attributable to the environment

Deaths (millions), 2012



Most known human infectious diseases are shared with animals



Rabies, Influenza A, Ebola, SARS, Q Fever, Toxoplasmosis, Salmonella, Brucellosis, Hendra, Echinococcosis, Anthrax, Marburg, Nipah, Psittacosis, Crimean-Congo Hemorrhagic Fever, Plague, Bas Congo, Monkeypox, Rift Valley, Leptospirosis, Schistosomiasis, Leishmaniasis, Chagas disease, Hantavirus, Japanese B encephalitis.....



■ Shared with animals (61%)

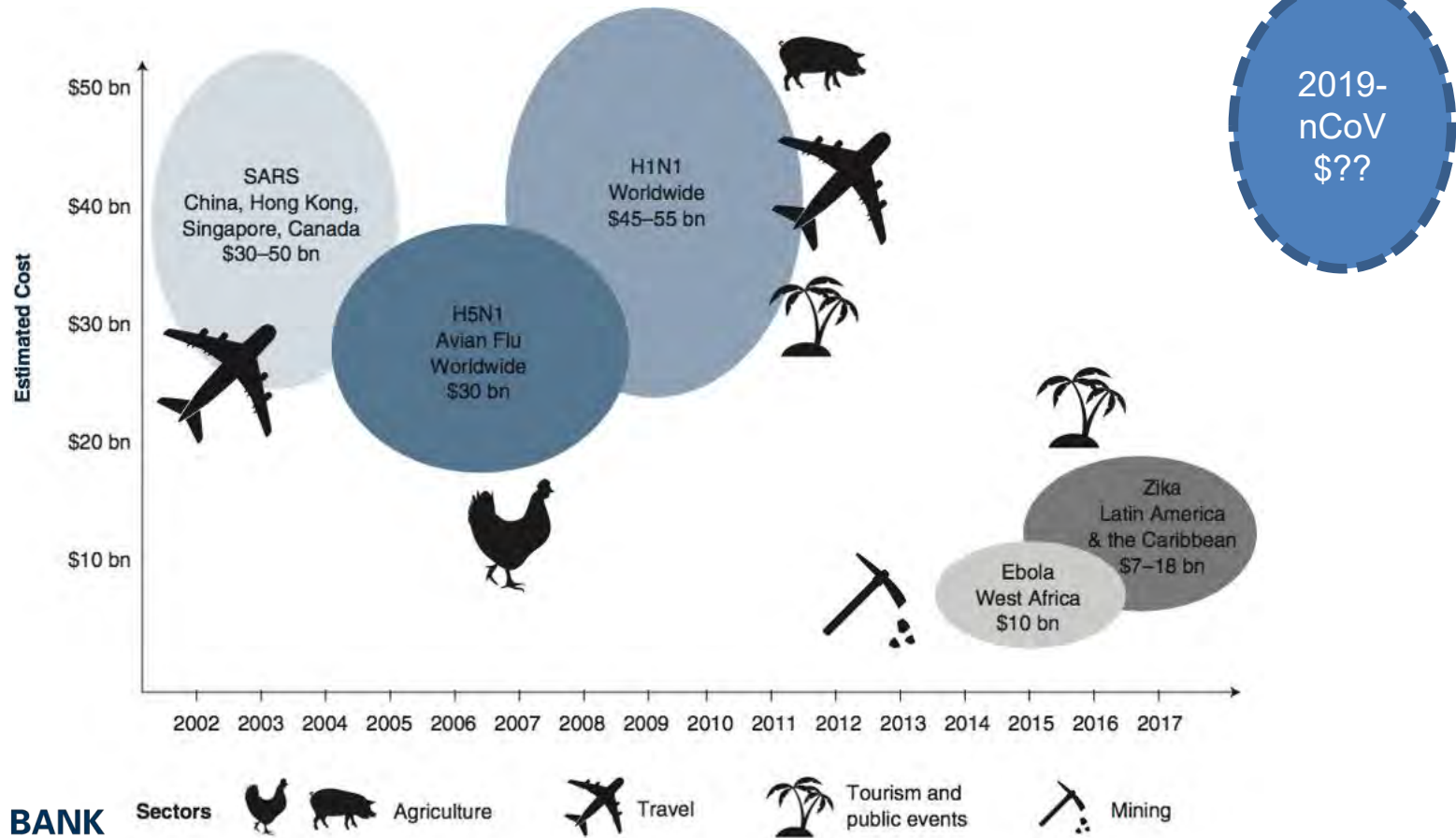
■ Not known to be shared (39%)

Resulting in over 1,000,000,000 human cases every year

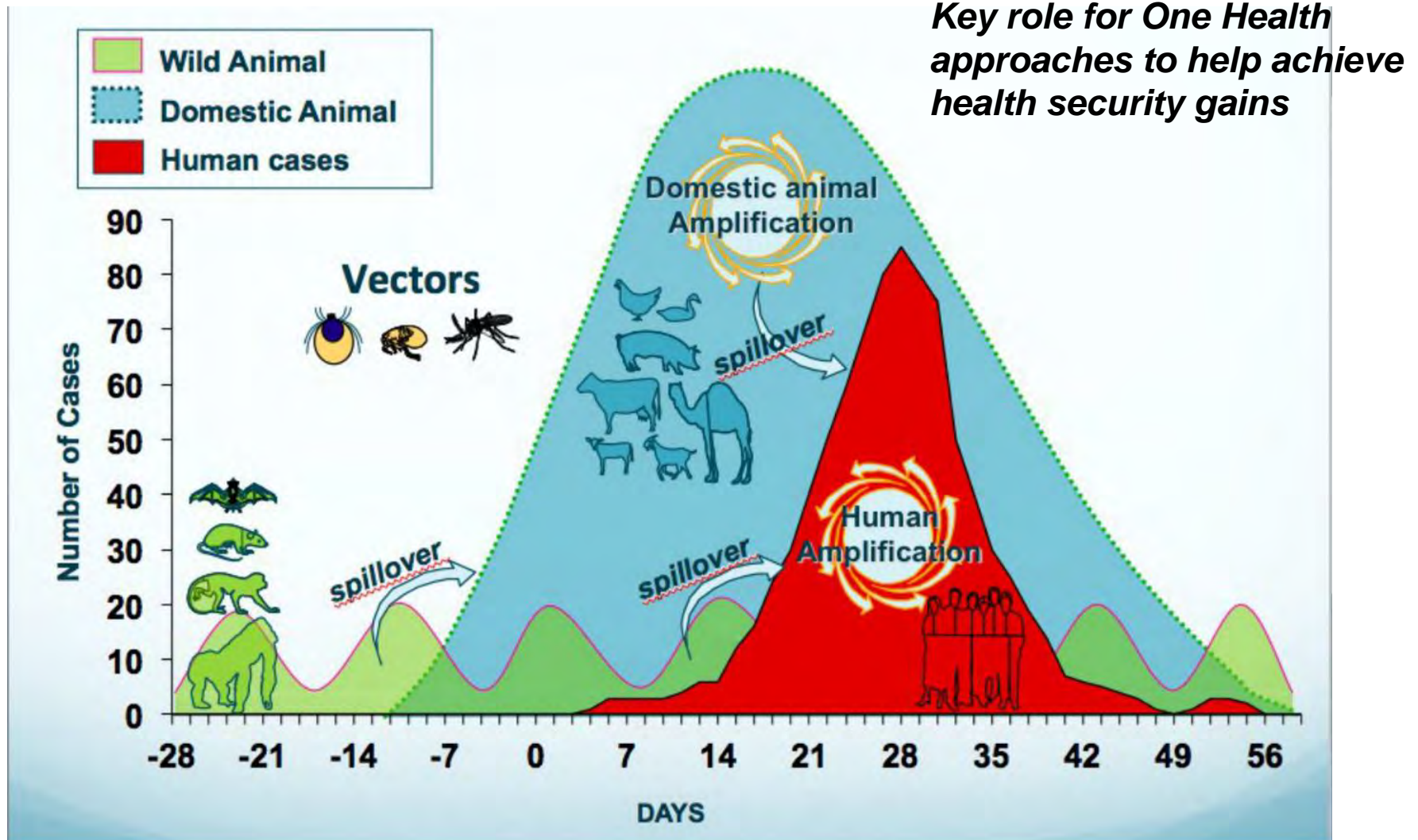


Economic Cost of Disease Outbreaks

High cost of epidemics: *Impacts often extend far beyond the health sector*

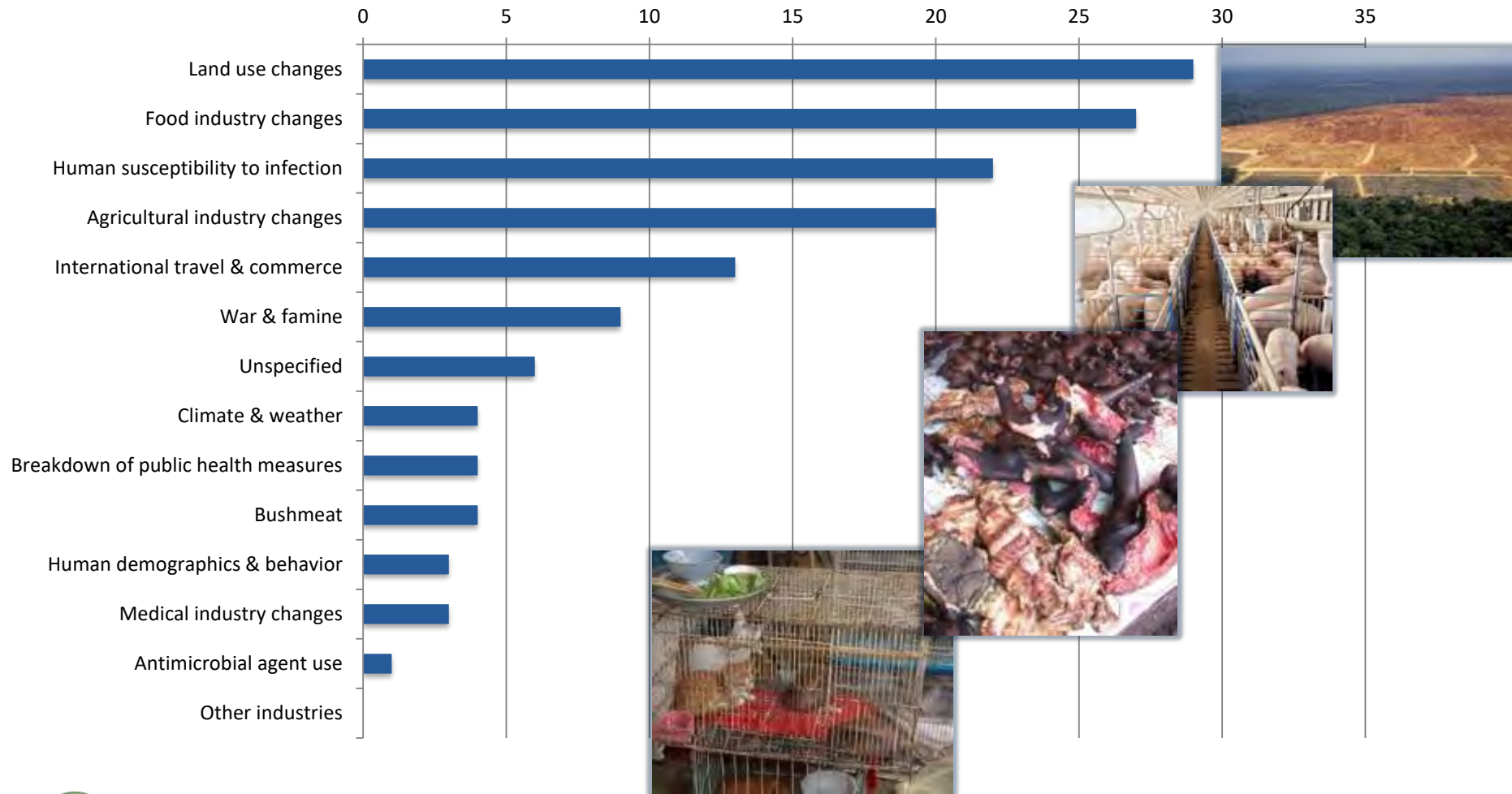


Moving from Disease Response to Prevention

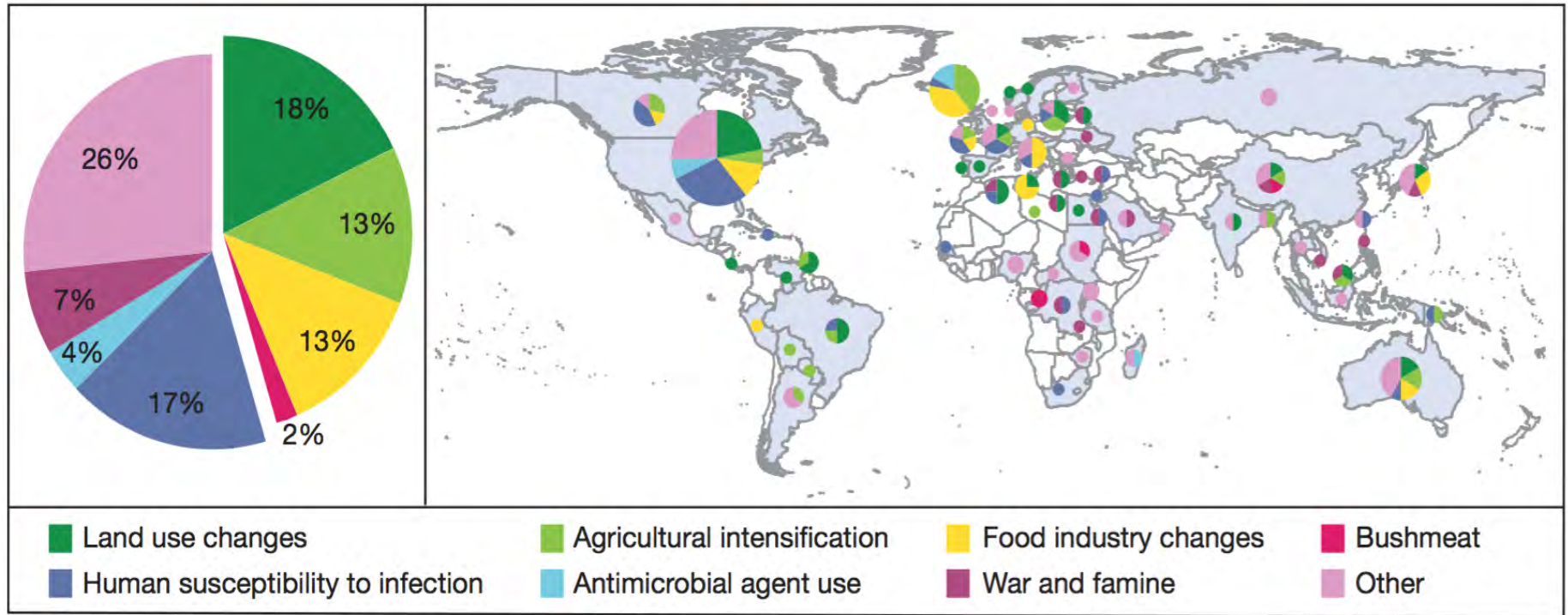


Source: Karesh et al. 2012. The Lancet & WHO

Shared Drivers: Biodiversity Loss and Recent EIDs from wildlife



Country-Level Drivers of Disease Emergence



Global Health Security Agenda



A partnership against global health threats



DETECT



PREVENT



RESPOND

Action Packages

ANTIMICROBIAL
RESISTANCE

BIOSAFETY &
BIOSECURITY

IMMUNIZATION

SUSTAINABLE
FINANCING

SURVEILLANCE

WORKFORCE
DEVELOPMENT

ZOOONOTIC
DISEASE

(multi-sectoral) National Action Plans for Health Security (NAPHS)

*COUNTRIES WORKING TOGETHER
ON COMMITMENTS TO THE
GLOBAL HEALTH SECURITY AGENDA*

— PREVENT

— DETECT

— RESPOND

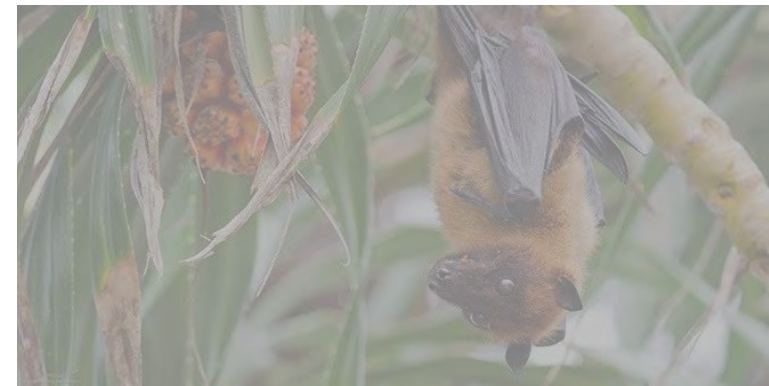
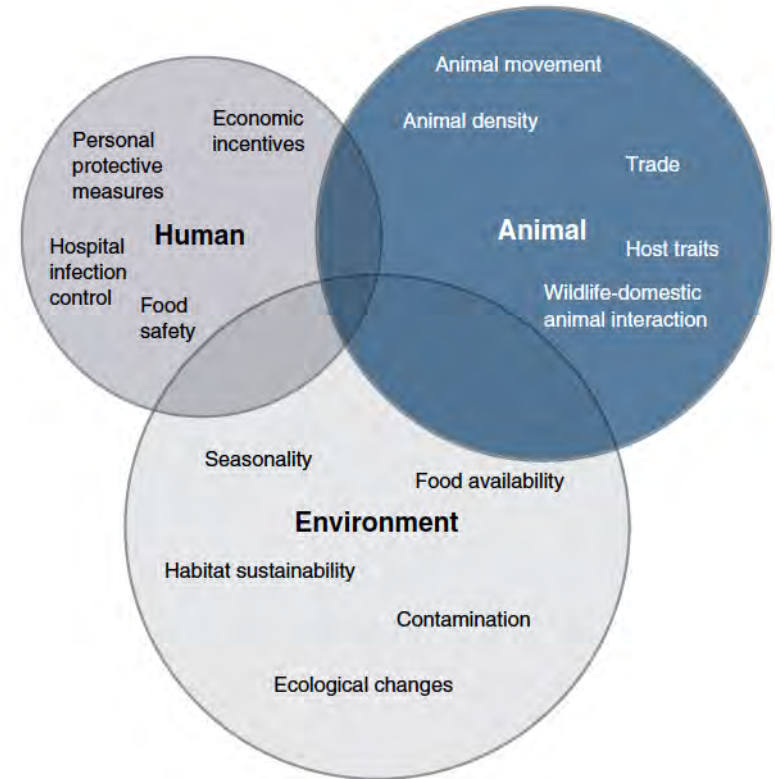


Supporting Functions for Health Security

PILLAR	
MAJOR ELEMENTS	
DEFINITION	
FUNCTIONS	
CROSS-CUTTING FUNCTIONS	<ul style="list-style-type: none">• Governance: leadership, policy, statute, regulation, enforcement• Resource allocation and coordination• Community engagement and resilience• Risk communication and education• Workforce development and sustainment• Research and development• Data and information management

Context Matters for One Health!

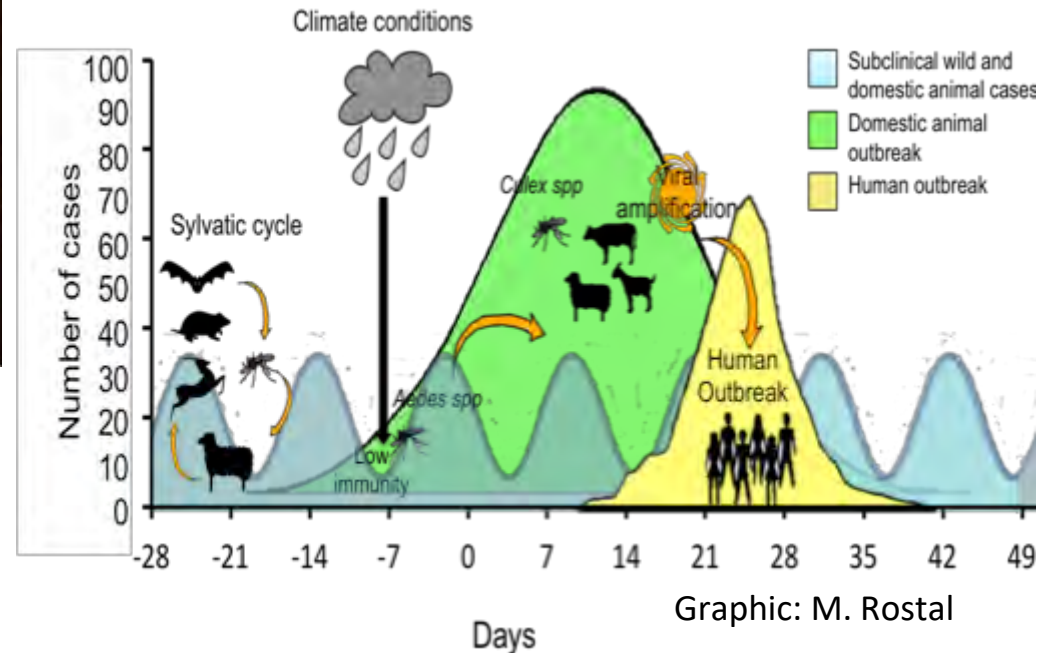
- Not everyone working together all the time....
- But strong human, animal and environmental health systems are needed to determine relevant sectors for a given objective, disease, or situation



Context Matters! *Rift Valley Fever*



defence
Department:
Defence
REPUBLIC OF SOUTH AFRICA

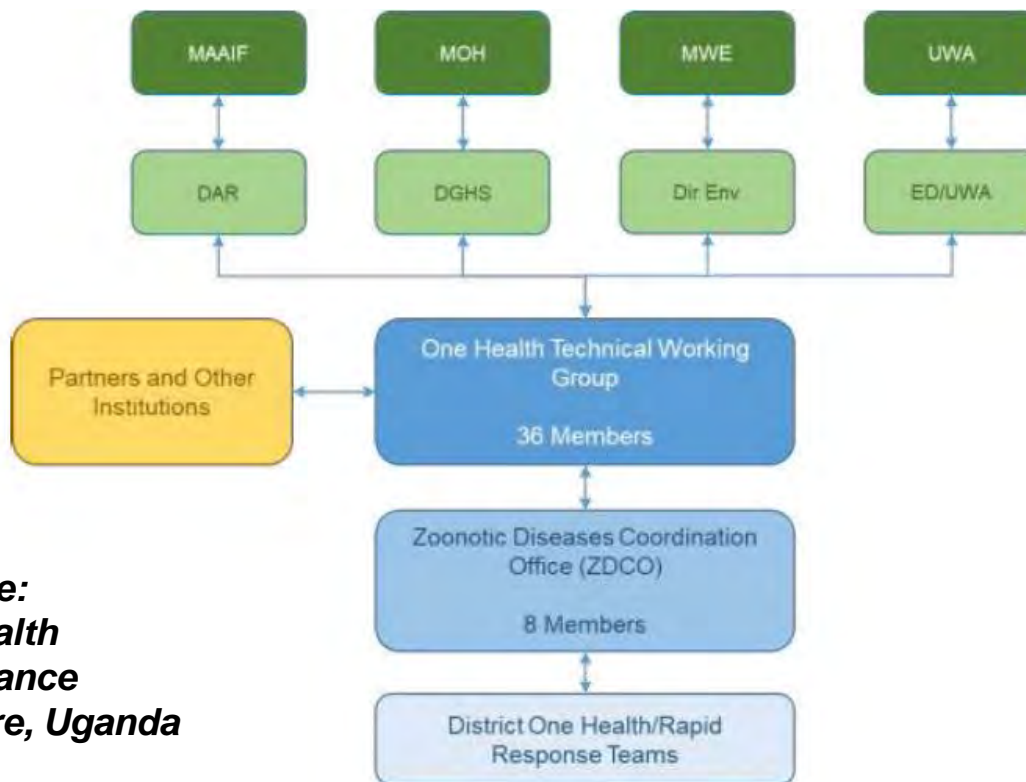


Value-added information sharing between sectors to understand the ecology, epidemiological, and economics of Rift Valley Fever

National One Health Coordination

Priority issues for multi-sectoral coordination: individual sectors may have different roles, but generate synergies from a shared vision

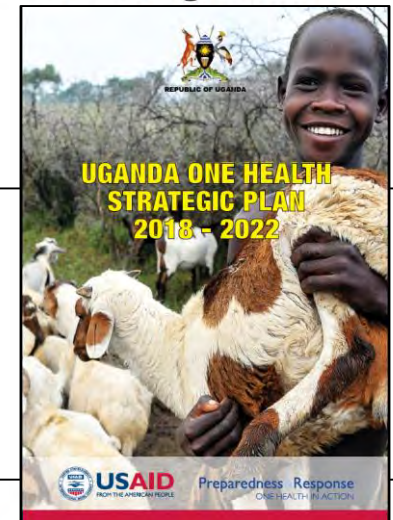
‘All hands on deck’ sentiment for more routine coordination in emergencies and in peacetime



Example:
One Health
Governance
structure, Uganda



Strategic framework for One Health approach to infectious diseases in Bangladesh



ONE HEALTH COORDINATION PLATFORM

Ministry of Health, Ministry of Agriculture, National Public Health Institute of Liberia, Environmental Protection Agency and the Forest Development Authority
- Republic of Liberia -





USAID | **PREDICT**
FROM THE AMERICAN PEOPLE

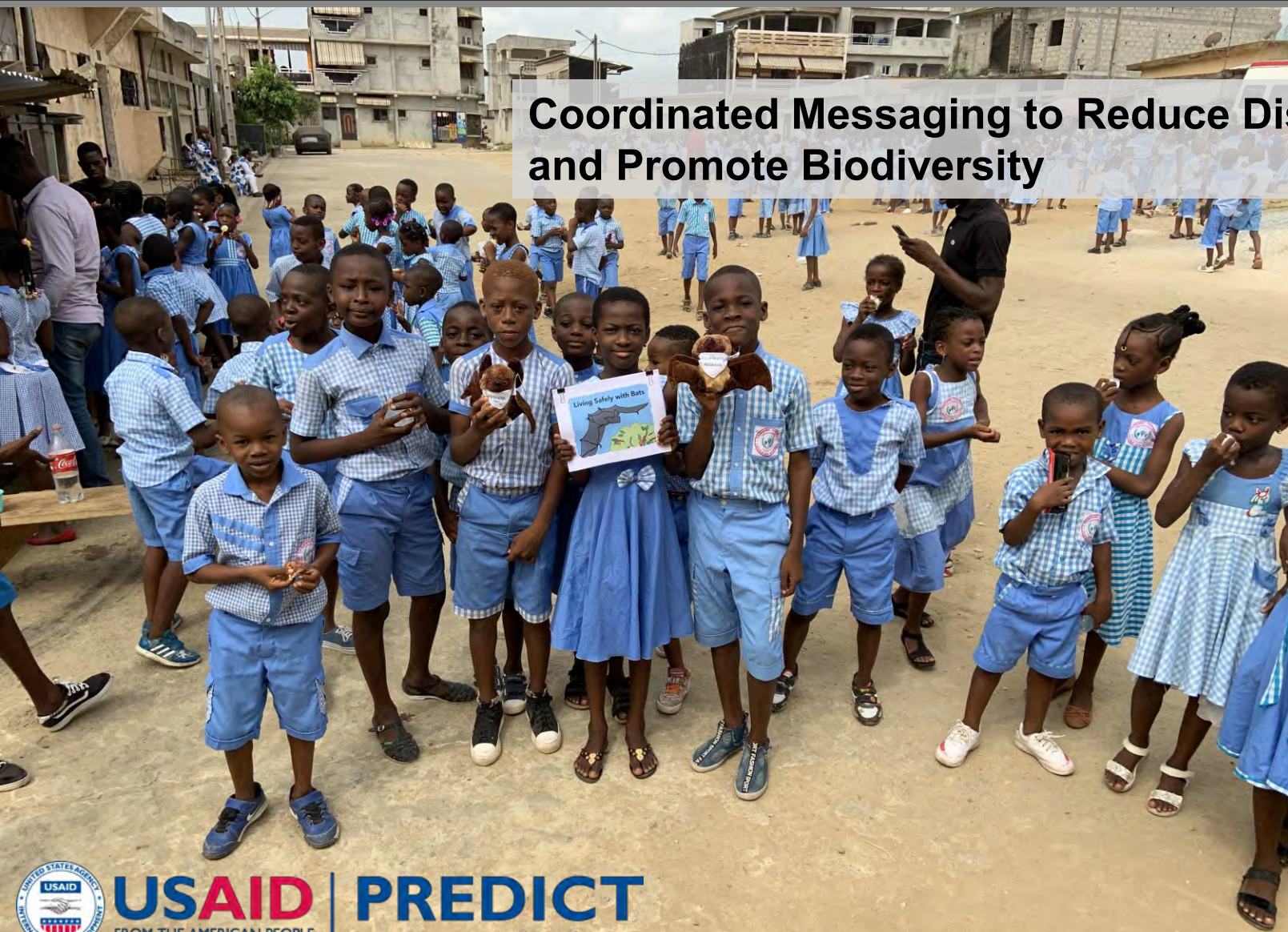
Early Warnings from Wildlife and Effective Collaboration to Prevent Human Outbreaks

Yellow Fever is a mosquito-borne virus that infects humans as well as non-human primates, potentially resulting in hemorrhagic fever leading to death. Yellow Fever transmission can occur if infected monkeys and any of the mosquito vector species are present. In 2012, after One Health training by partners from the PREDICT program, staff at a wildlife sanctuary in Santa Cruz, Bolivia, reported six dead Howler Monkeys near the park. Early investigation during specimen collection and analysis at University of San Andres' Institute of Molecular Biology suggested that the infection was associated with a Flavivirus (a family of viruses transmitted from mosquitos or ticks). PREDICT partners alerted the Bolivian Ministry of Health while conducting further analysis for the specific pathogen — ultimately identified as Yellow Fever virus. A transdisciplinary, collaborative and coordinated response was undertaken in the region, including preventive human vaccination campaigns, mosquito control, and public outreach. Although infected monkeys had never been previously reported in Bolivia, the response to this outbreak was rapidly mobilized — within eight days from the detection to resolution of the outbreak. No human cases were reported, suggesting the benefit of awareness of risks, early warning systems in animals (including local laboratory capacity to screen for pathogens), and effective collaboration channels with a wide range of partners.

One Health Partners: Ministry of Public Health; Ministry of Environment; Wildlife Conservation Society; EcoHealth Alliance; Pan-American Health Organization; Ambue Ari wildlife sanctuary; University of San Andres' Institute of Molecular Biology; the Vesty Pakos Zoo; USAID Emerging Pandemic Threats PREDICT.

Risk Communication

Coordinated Messaging to Reduce Disease Risk and Promote Biodiversity



USAID
FROM THE AMERICAN PEOPLE

PREDICT

Projected Impacts of Climate Change

- 5% increase in people at risk of malaria exposure
- 10% increase in diarrheal disease burden
- 7.5 million more stunted children
- Direct health damages of US\$2-4 billion
- Up to equivalent of 20% in labor productivity losses in some regions from excess heat
- 100 million into extreme poverty

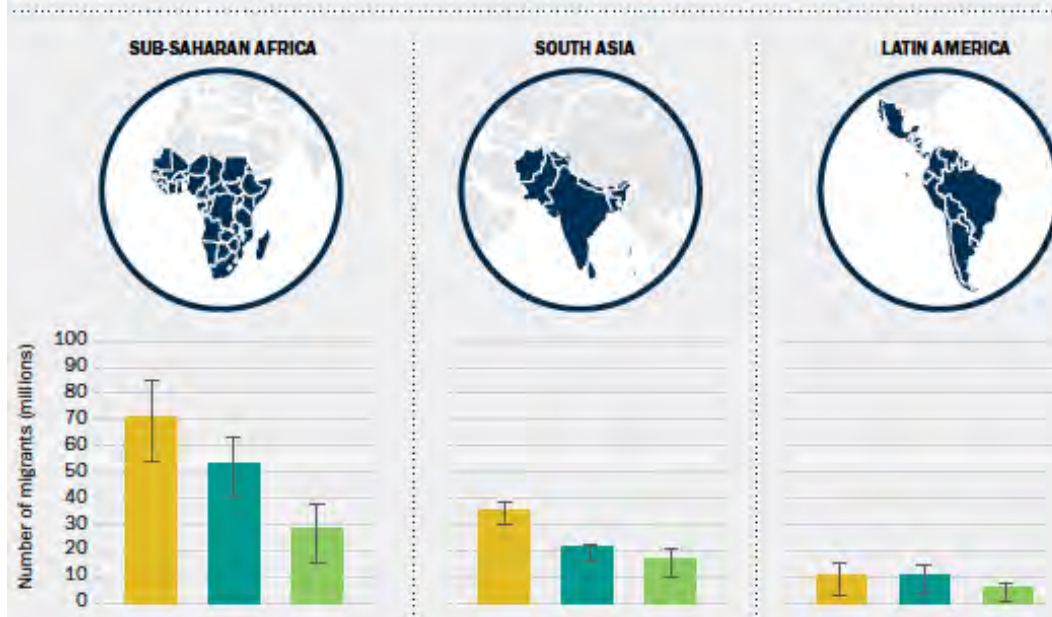
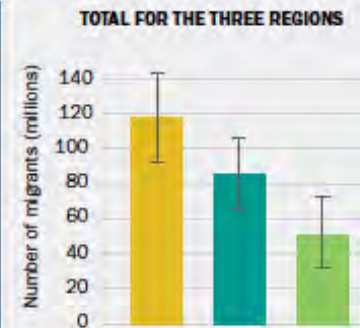
Undermines Sustainable Development

Figure 1: Projected number of climate migrants in Sub-Saharan Africa, South Asia, and Latin America under three scenarios, by 2050

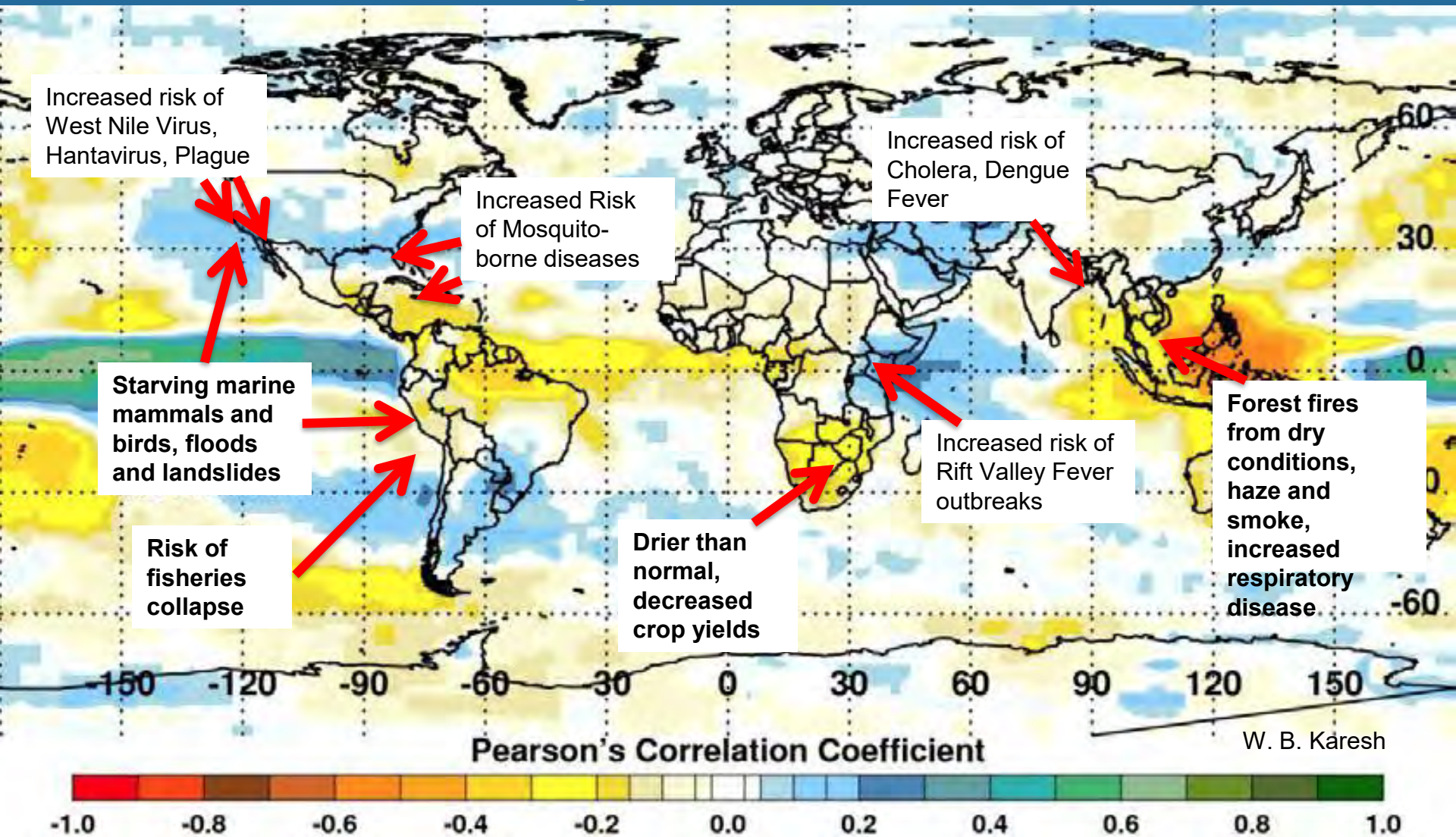
World Bank 2018

PLAUSIBLE SCENARIOS

Pessimistic (Reference) More Inclusive Development More Climate-Friendly



Prediction and Mitigation of Disaster Events



Examples of likely health effects from El Niño, 2015-2016. Karesh, Huffington Post, 2016.

Background map of average rainfall anomalies

from Dr. Assaf Anyamba, et al., PLOS Neglected Pathogens, 2012.

Shades of yellow to red indicate below normal rainfall and blue to green indicate above normal.



Local Health Security: Call to Action

POLLUTION The World's Largest Environmental Threat to Health

POLLUTION KILLS THE POOR AND THE VULNERABLE.

92% of deaths occur in low- and middle-income countries. Children are most affected.

9 MILLION = **16%** of all deaths worldwide premature deaths

Pollution costs the global economy **\$4.6 trillion** per year, equivalent to **6.2%** of global economic output.

Pollution is neglected by funding agencies worldwide.

We can all help to make a difference.

Governments
Implement programs to reduce pollution.
End special treatment for polluting industries.

International donors, foundations, & individuals
Prioritize funding for pollution planning, interventions and research.

VISIT WWW.POLLUTION.ORG for metrics and to connect.

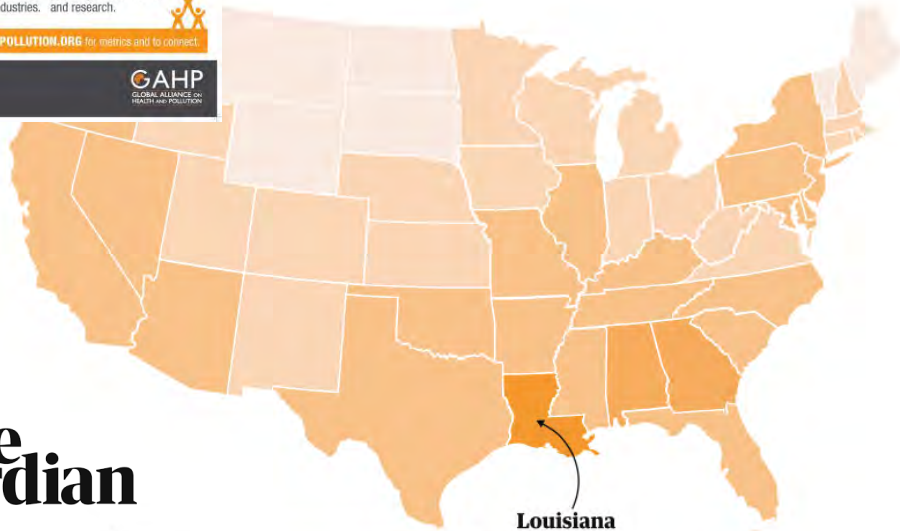
PURE EARTH

GAHP
GLOBAL ALLIANCE ON HEALTH AND POLLUTION

Cancer Town

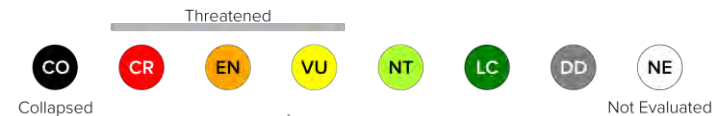
'Almost every household has someone that has died from cancer'

A small town, a chemical plant and the residents' desperate fight for clear air

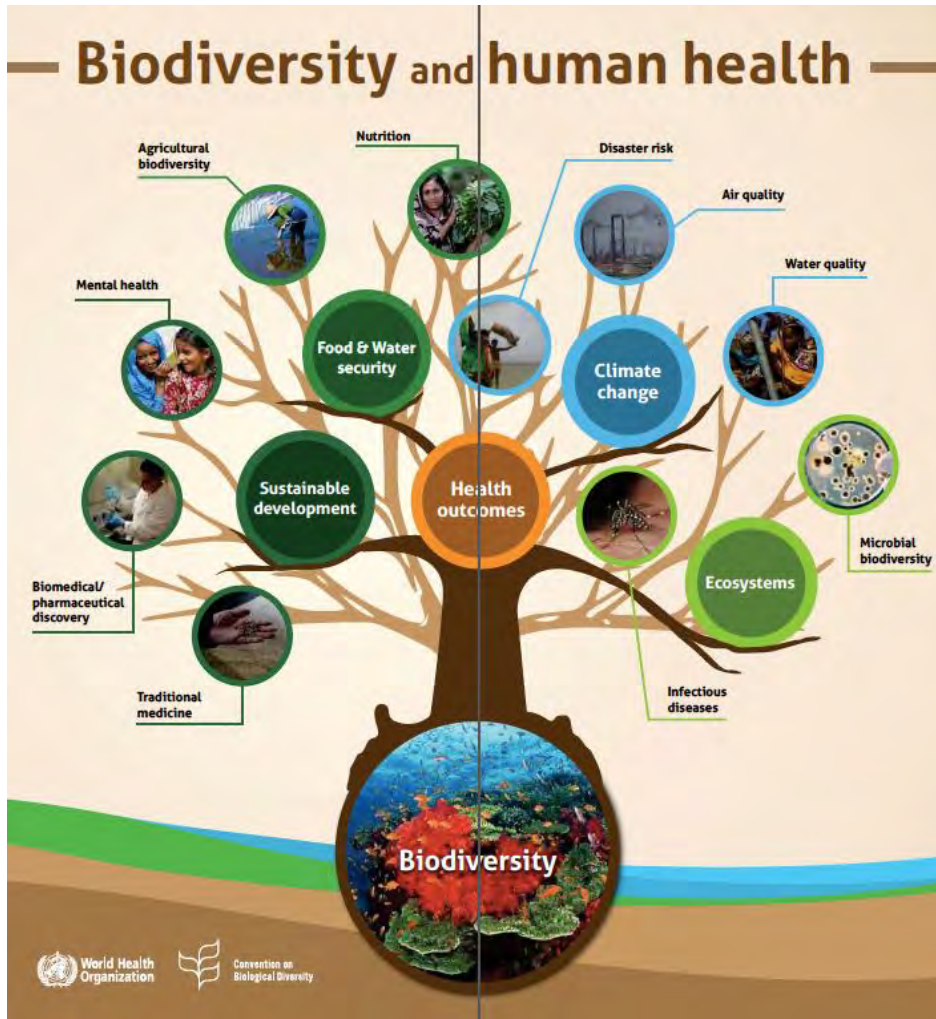


The Guardian

Louisiana has the most toxic air in America



Mainstreaming One Health Across Sectors



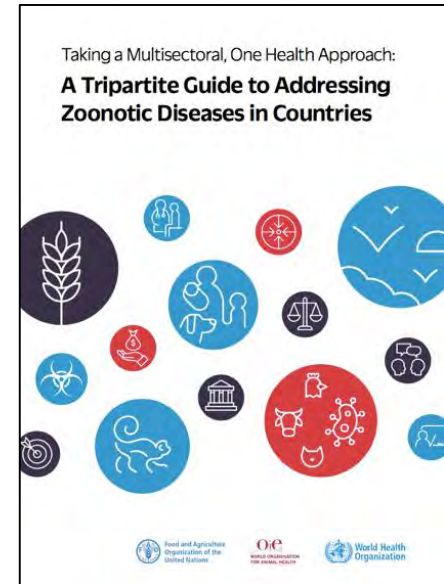
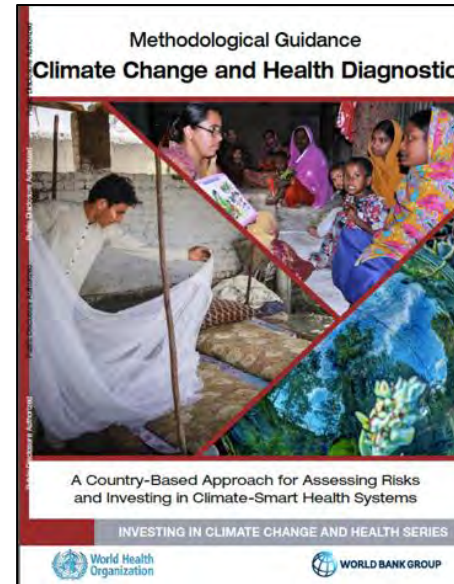
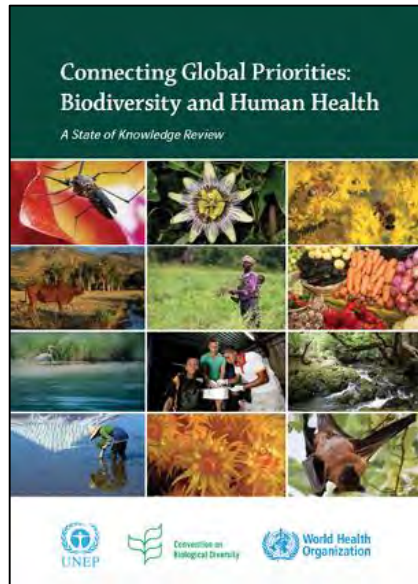
A multisectoral, One Health approach can help optimize sustainable development for a healthy, safe, and equitable future

Getting Involved in the GHSA

- Alliance for Health Security Cooperation
- GHSA Consortium
- GHS Next Generation Network



Additional Tools and Information



*Thank
you*

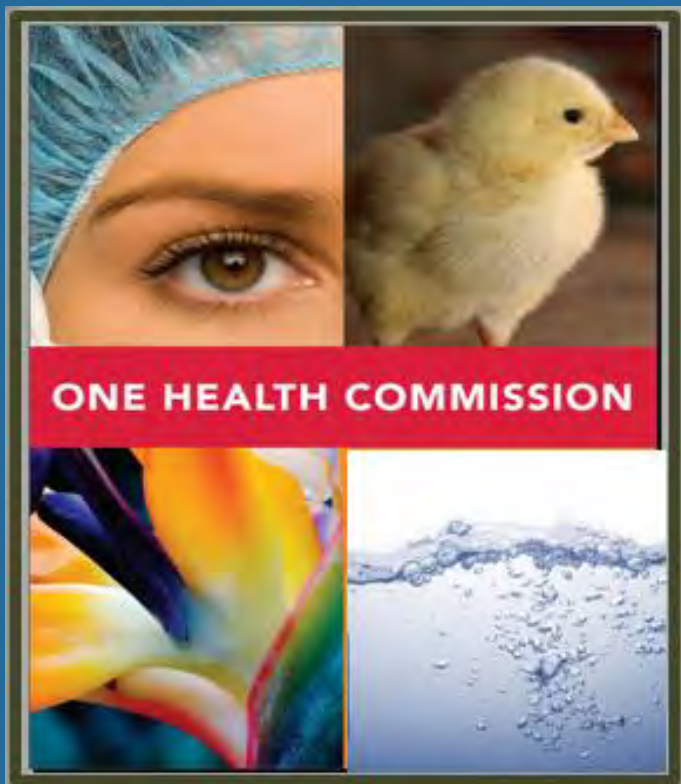


Consortium of
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One Health, Here, There and Everywhere: Why it is 'so' urgent!

February 18, 2020



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@OneHealthCom



One Health Truths

Collaborations

start with

Relationships!!

*Which start when we
come together in direct conversations*



One Health Truths

Need for Reframing of human attitudes



Many faces (arenas in need) of One Health

- 
- Animals as Sentinels
 - Antimicrobial Resistance
 - Bio-Diversity /Conservation Medicine
 - Bio-Surveillance
 - Climate Change
 - Civil Society
 - Comparative Biology
 - Disaster Preparedness / Relief
 - Economics/Complex Systems
 - Food & Water Safety / Security
 - Human – Animal Bond
 - Non-Communicable Diseases
 - Plant & Soil Health
 - Vector-borne Diseases / Climate Change
 - Welfare / Well-being of animals, humans, planet
 - Zoonotic Diseases



Many faces (arenas in need) of One Health

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Zoonotic Diseases



Ebola



Economic Benefits of One Health

Table 1. Economic costs of outbreaks are often more significant than public-health impacts

Examples of outbreaks	Type of impact	Magnitude of impact (US\$ billion)	Number of cases	Cost/ case, US\$ 000
Small public-health impact (because response contained outbreak)				
SARS in 37 countries (2003)	Economic cost	40-54 a/	8,096	4,941
Ebola in West Africa (2013-16)	Economic cost	6.4 b/	28,652	223
Ebola in West Africa (2013-16)	Comprehensive cost	53 c/		1,850
MERS in Rep. of Korea (2015)	Economic cost	8.2 d/	186	44,300
Large public-health and economic impact (because response much-delayed)				
AIDS	Response cost only	563 e/	76 m	7,395
Catastrophic public-health and economic impacts (pandemics)				
Flu pandemic (or similar disease)	Economic cost (ongoing, annual expected value)	80 f/	~30% of population	~37
Flu pandemic (or similar disease)	Comprehensive cost (annual)	570 f/		~265

Notes and sources


- a/ Lee, J.W. & McKibbin, W. (2004). Estimating the Global Economic Costs of SARS. National Academies Press.
- b/ World Bank (2016). –West Africa Ebola Crisis Impact Update: economic cost of \$2.8b. CDC (2017). Cost of the Ebola Epidemic. Factsheet: response cost of \$3.6 b.
- c/ Huber, C., Finelli, L. & Stevens, W. (2018). The Economic and Social Burden of the 2014 Ebola Outbreak in West Africa. The Journal of Infectious Diseases.
- d/ Cho K. & Yoo J. (2015). Estimation of economic loss from the Korean outbreak of MERS-CoV. Korean Economic Research Institute (KERI) Insight, Seoul.
- e/ Institute for Health Metrics and Evaluation (2018). Financing Global Health 2017; UNAIDS (2018). Factsheet.
- f/ Severe and moderately severe flu pandemic, with annual probabilities of 1.6% & 2.0%, respectively. Fan, V., Jamison, D. & Summers, L. (2016). The Inclusive Cost of Pandemic Influenza Risk. NBER Working Paper No. 22157. Based on severe-case scenario of the World Bank, with economic impact of 4.8% of GDP. A novel flu strain is considered most likely, but other pathogens cannot be excluded. They will most likely originate in animals (like novel flu strains). Thus, "similar disease" refers e.g. to a coronavirus with similar transmissibility and severity as a severe flu. See also (28) and (37).

[Funding for One Health Capacities in Low- and Middle -Income Countries](https://tinyurl.com/wzwc7jm)_ Jonas, O, Published online Jan 15, 2020, Narratives of One Health in Action, One Health Commission website
<https://tinyurl.com/wzwc7jm>

Economic Benefits of One Health

RESEARCH ARTICLE

Economics of One Health: Costs and benefits of integrated West Nile virus surveillance in Emilia-Romagna

Giulia Paternoster , Sara Babo Martins, Andrea Mattivi, Roberto Cagarelli, Paola Angelini, Romeo Bellini, Annalisa Santi, Giorgio Galletti, Simonetta Pupella, Giuseppe Marano, Francesco Copello, Jonathan Rushton, Katharina D. C. Stärk,

Mar

Publ

Trans R Soc Trop Med Hyg 2017; **111**: 235–237
doi:10.1093/trstmh/trx039



One Health Economics to confront disease threats

Catherine Machalaba^a, Kristine M. Smith^a, Lina Awada^b, Kevin Berry^c, Franck Berthe^d, Timothy A. Bouley^d,
Mieghan Bruce^e, Jose Cortiñas Abrahantes^f, Anas El Turabi^g, Yasha Feferholtz^a, Louise Flynn^h, Guillaume Fourniéⁱ,

One Health 7 (2019) 100080



ELSEVIER

Contents lists available at ScienceDirect

One Health

journal homepage: www.elsevier.com/locate/onehit



Infectious disease and economics: The case for considering multi-sectoral impacts

Kristine M. Smith^a, Catherine C. Machalaba^{a,b}, Richard Seifman^c, Yasha Feferholtz^a,
William B. Karesh^{a,d,*}



PREDICT



THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP



Prevent, Prepare and Respond:
Economics of One Health to Confront Disease Threats
30 January – 2 February 2017

Workshop Report



EcoHealth
Alliance



Network
for Evaluation
of One Health

<http://bit.ly/2CHYQml>

Economic Benefits of One Health



Updated March, 2019

One Health Core Competencies

This compilation of publications focuses on Core Competencies needed for implementing a One Health approach.

If you are aware of additional publications on One Health Core Competencies that need to be included here please notify cstroud@onehealthcommission.org

2018

Core Competencies in One Health Education: What Are We Missing?

Togami E, Gady JL, Hansen GR, Poste GH, Rizzo DN, Wilson ME, and Mazet JAK. 2018. *NAM Perspectives*. Discussion Paper, National Academy of Medicine, Washington, DC. <https://doi.org/10.31478/201806a>.

One health in our backyard: Design and evaluation of an experiential learning experience for veterinary medical students, Mor SM, Norris JM, Bosward KL, Toribio JLML, Ward MP, Gongora J, Vost M, Higgins PC, McGreevy PD, White PJ, Zaki S, *One Health*. 2018 Jun; 5: 57–64. Published online 2018 May 2. <https://www.ncbi.nlm.nih.gov/pubmed/29911166>

2017

One Health education for future physicians in the pan-epidemic "Age of Humans", Lucey DR, Sholts S, Donaldson H, White J, Mitchell SR. 2017. *International Journal of Infectious Diseases* 64:1-3. <https://www.sciencedirect.com/science/article/pii/S1201971217302126>

Incorporating One Health into Medical Education, Rabinowitz PM, Natterson-Horowitz BJ, Kahn LH, Kock R, Pappaioanou M, *BMC Medical Education*. 2017 Feb 23; 17: 45 <https://bmcmmededuc.biomedcentral.com/articles/10.1186/s12909-017-0883-6>

2016

One Health Core Competency Domains,

Frankson R, Hueston W, Christian K, Olson D, Lee M, Valeri L, Hyatt R, Anelli J, and Rubin C, *Front Public Health*, 2016; 4: 192, Published Sep 13, 2016 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5020065/>

Core competencies and One Health: From theory to action,

Fenwick S, 2016, PPT Presentation at the USAID-One Health Workforce Meeting, Hanoi, Vietnam. <http://bit.ly/2WwHKz7>

Updated February, 2019

Economic Benefits of One Health

This compilation of publications focuses on the Economic Benefits of using a One Health approach.

If you are aware of additional publications on the Economics of One Health that need to be included here please notify cstroud@onehealthcommission.org

2019

Infectious disease and economics: The case for considering multi-sectoral impacts,

Smith KM, Machalaba CC, Seifman R, Feferholtz Y, Kares WB, *One Health*, Vol 7, June 2019

<https://doi.org/10.1016/j.onehlt.2018.100080>

Societal cost of zoonoses: One Health economics

Article from free online course 'One Health: Connecting Humans, Animals and the Environment'

Accessed 2-4-19, <https://www.futurelearn.com/courses/one-health/0/steps/25480>

2018

Economics of bovine tuberculosis: a one health issue.

Azami HY, Zinsstag J, Chapter 3 (Page no: 31) in *Bovine Tuberculosis*

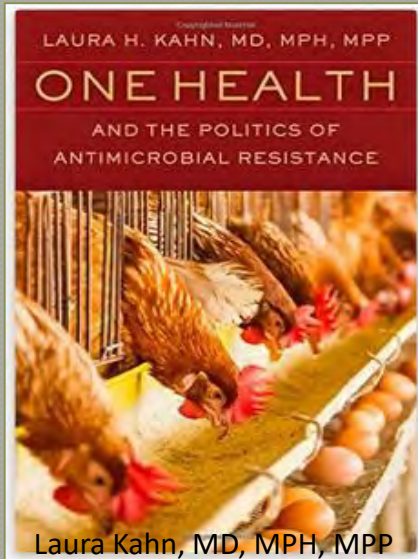
Editors: Chambers M, Gordon S, Olea-Popelka F, Barrow P, 2018, ISBN9781786391520, DOI

[10.1079/9781786391520.0000](https://doi.org/10.1079/9781786391520.0000)

<https://www.cabi.org/vetmedresource/ebook/20183117957>

Publications starting in 2011 – 20 years

Antimicrobial Resistance



Laura Kahn, MD, MPH, MPP



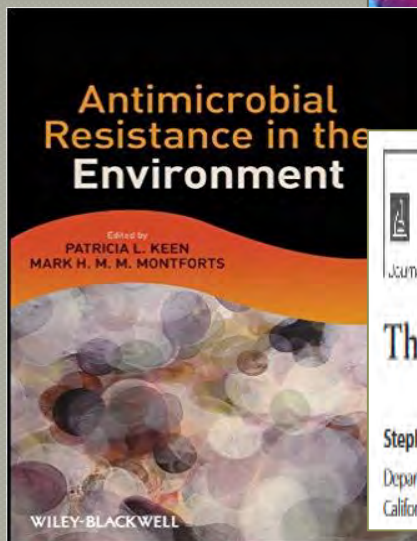
Antibiotic resistance is the quintessential One Health issue

Key words Antibiotics • Antimicrobial resistance (AMR) • Environment • Health
• Livestock • One Health

The scale of antimicrobial resistance

In May this year, the long-awaited final report from the *Review on Antimicrobial Resistance* was published.¹ The report estimates that the 700 000 annual deaths currently attributable to infections by drug-resistant pathogens will increase, if unchecked, to 10 million by 2050, running up a bill of US\$100 trillion in terms of lost global production between now and then. The reported numbers are somewhat

Oxford Journals, Transactions of the Royal Society Tropical Medicine and Hygiene, July 29, 2016



Appl Environ Microbiol 81:7593-7599

The Ocean as a Global Reservoir of Antibiotic Resistance Genes

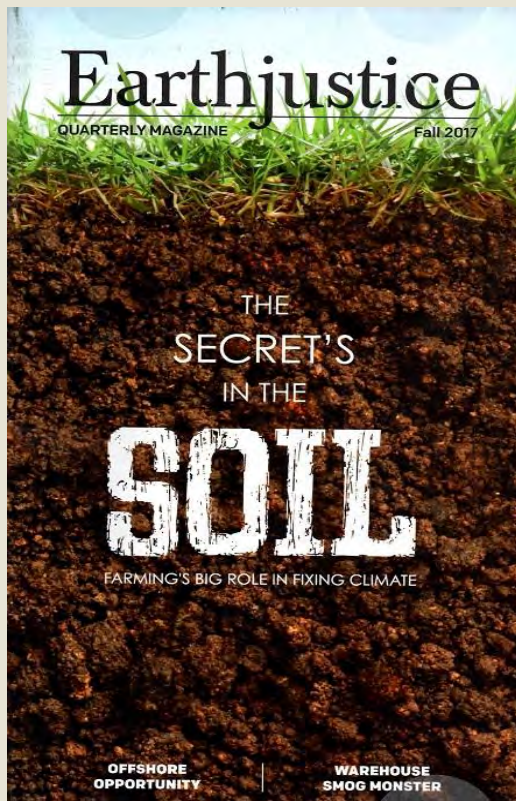
Stephen M. Hatosy,^a Adam C. Martiny^{a,b}

Department of Ecology and Evolutionary Biology, University of California, Irvine, California, USA^a; Department of Earth System Science, University of California, Irvine, California, USA^b

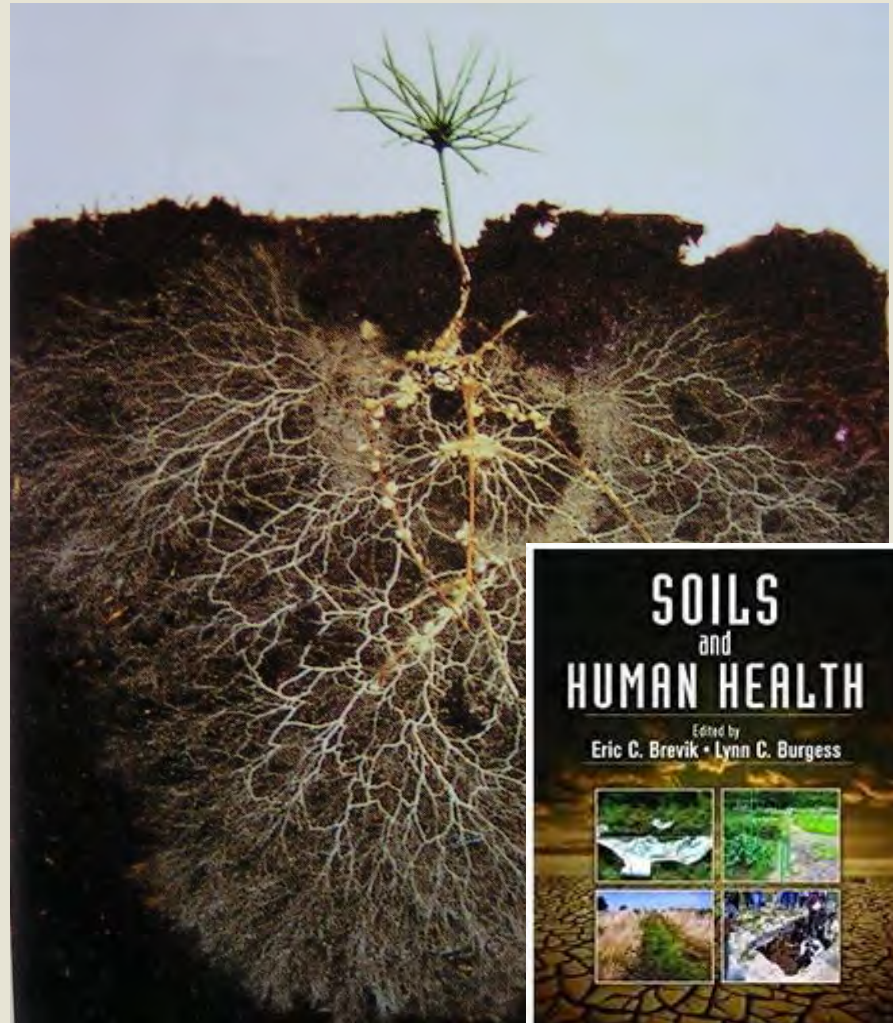


Antimicrobial Resistance

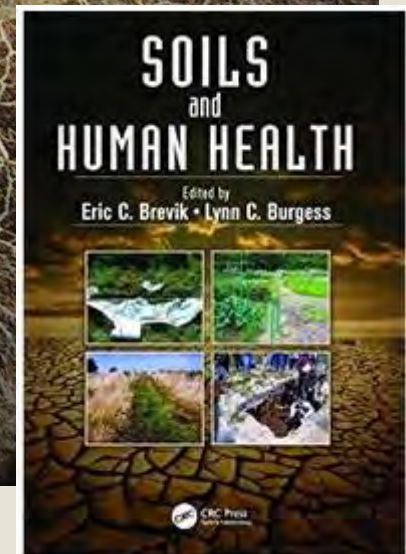
**Healthy Soil Microbes,
Healthy Plants,
Healthy People**



The microbial community in the ground is as important as the one in our guts.



The Atlantic, Jun 11, 2013
<https://theatltn.tc/2rWtDX8>



Food and Water Safety and Security



CSIS

CENTER FOR STRATEGIC &
INTERNATIONAL STUDIES

INVITATION

The Smart Women, Smart Power Initiative cordially invites you to

Food Insecurity as a Security Challenge

Disaster Preparedness / Relief

Lessons from Katrina, a game changer in disaster preparedness and response –
Don't Show Up without pet carriers!!!!



Disaster Preparedness / Relief



2009 Hurricane Floyd

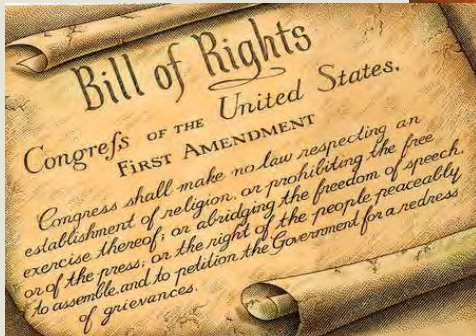


Disaster Preparedness / Relief

Governors and Mayors!

CDC will never be in charge!

U.S. Constitution would have to be rewritten or amended to make public health a federal responsibility!

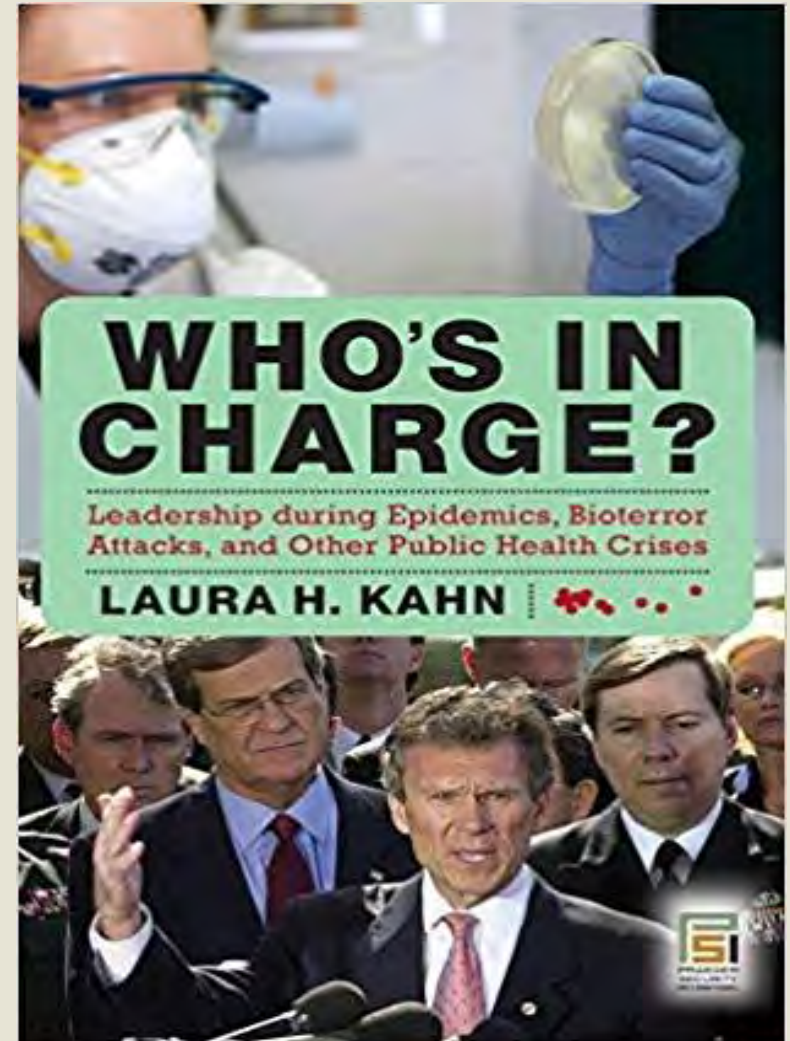


10th Amendment in Bill of Rights

By default, public health is a state and local responsibility.

Each state has developed its own public health laws.

Slide content courtesy of Laura Kahn



Animals as Sentinels



Elevated PBDE Levels in Pet Cats: Sentinels for Humans?

Environ. Sci. Technol. 2007, 41, 6350–6356

JANICE A. DYE,^{*,†} MARTA VENIER,[‡]
LINGYAN ZHU,^{‡,||} CYNTHIA R. WARD,[§]
RONALD A. HITES,[‡] AND
LINDA S. BIRNBAUM[†]

U.S. Environmental Protection Agency, Office of Research and Development, National Health and Environmental Effects Research Laboratory, Experimental Toxicology Division,

Research | Children's Health

[*Environ Health Perspect.* 2012; 120\(7\):1049-54.](#)

Serum PBDEs in a North Carolina Toddler Cohort: Associations with Handwipes, House Dust, and Socioeconomic Variables

Heather M. Stapleton,¹ Sarah Eagle,¹ Andreas Sjödin,² and Thomas F. Webster³

¹Nicholas School of the Environment, Duke University, Durham, North Carolina, USA; ²Centers for Disease Control

Environ Res. 2016 Nov;151:145-153. doi: 10.1016/j.envres.2016.07.027. Epub 2016 Jul 29.

U.S. domestic cats as sentinels for perfluoroalkyl substances: Possible linkages with housing, obesity, and disease.

Bost PC¹, Strynar MJ², Reiner JL³, Zweigenbaum JA⁴, Secoura PL⁵, Lindstrom AB², Dye JA⁶.



Hyperthyroid cats



Humans ??? as Sentinels

The 1999 West Nile Story in the US

Tracy McNamara: (Human) Canaries in the Coal Mine



Our current funding structures are the opposite of One Health. They virtually guarantee that we will not find an emerging zoonotic threat.. until we have people in emergency rooms or bodies in the morgue



The Reality of Biosurveillance in the USA

Human Health
\$\$\$\$\$\$\$\$\$\$\$\$

Agriculture
\$\$\$\$\$\$\$\$

WL

Everything
Else



Humans ??? as Sentinels

Does it matter that in cities around the US, all the animals (shelters, wildlife, pets) do not fall under Jurisdiction of 'Any' federal agencies and therefore are not under any form of surveillance?

Yes!!!!!!.....Why?



Humans ??? as Sentinels

“The threats we face today have changed and evolved... but our systems have not. We are left with a species gap. CDC focuses on human diseases; it does not do animal diseases.”

“What if?”

What if that flu in cats in a shelter in New York in 2017 had turned out to be like the 1918 flu pandemic?

What if the zoonotic coronavirus we are facing today turns into a similar pandemic?

We are missing what is right in front of our noses....

.....All the animals in our environment.

In the US right now we are looking for aerosolized bacteria and *dead people*.

We are using taxpayers as ‘sentinels’.



Stark Reminders - why we urgently Need to implement One Health

We are NOT Ready!!



April 3, 2015 Bill Gates: The next outbreak? We're not ready

https://www.youtube.com/watch?v=6Af6b_wyiwl

January 2017 Bill Gates: A deadly epidemic is a real possibility and we are not prepared

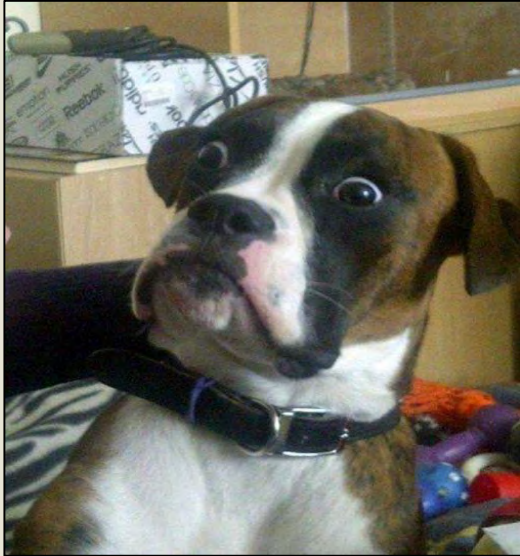
<https://goo.gl/uZxp86>



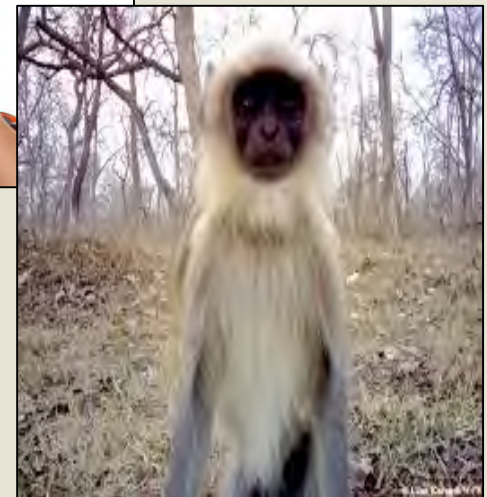
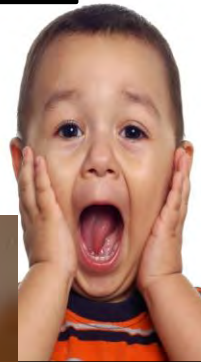
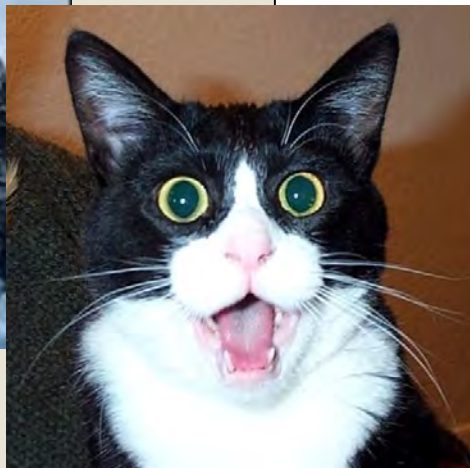
April 27, 2018 Bill Gates: A coming disease could kill 30 million people within 6 months — and we should prepare for it as we do for war

<https://read.bi/2CSpV7x>

What can we DO!!!!



**What can we
DO!!!!**



Education - Global One Health Day



ANNUAL
one health
DAY
november 3

Promoting efforts around the world to bring together all human, animal, and environmental health disciplines

created and hosted by

✓ check **www.onehealthday.org** for more information



HARI
Satu
Kesehatan

DÜNYA
Tek
Sağlık
GÜNÜ

DÍA MUNDIAL DA
Saúde
Unica

GIORNATA MONDIALE
salute
unica

DÍA DE
Una
Salud

JOURNÉE
Une
seule
santé

DÜNYA
Tek
Sağamlıq
GÜNÜ

one health
DAY

created and hosted by

Education – Cradle to Grave

The World We Need

PREPARING SOCIETY TO CREATE THE WORLD WE NEED
THROUGH ONE HEALTH EDUCATION

<https://goo.gl/3YwqD1>



One Health Commission

INTERNATIONAL *ONE HEALTH for ONE PLANET EDUCATION* INITIATIVE (1 HOPE)



- VISION** A world where people of all ages embrace a *One Health & Well-Being (OHWB) approach* recognising the interdependencies among humans, animals, plants and their shared environment.
- AIM** Build global capacity for promoting and valuing the OHWB concept and approach as the foundation for achieving the *UN-2030 Sustainable Development Goals (SDGs)*.
- CONTRIBUTORS** Individuals/organisations from education and community groups invited from all global regions –
– Africa, Americas, Asia, Europe, Middle East, Oceania.

1HOPE - Community
/Civil Society

1HOPE-
Corporate

1HOPE - Government/
Advocacy/Policy

1HOPE-
Primary/Secondary

1HOPE-
Tertiary

One Health Educational Resources



One Health Education Concept Paper

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Basic Guide for
developing K-12
One Health lessons



Education–(Public)-This Exhibit can Travel



Smithsonian



"Human or livestock or wild
can't be discussed in isolation.
There is just one health."

—William B. Karesh, Infectious Disease Expert



Education — Cradle to Grave

One Health Federal Inter-Agency Network



Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

CDC's One Health Office – Key Focus Areas

Achieving Optimal Health Outcomes for People and Animals



Zoonotic and Emerging Infectious Diseases



Global Health Security



Influenza and Pandemic Preparedness



One Health

Advancing One Health in the United States and Globally



One Health Issues and Emergencies at the Human-Animal-Environment Interface



Preventing Zoonoses Shared Between People and Pets

Highlights: One Health Activities in the United States

- Provide** technical assistance, expertise, and policy input on One Health projects, emergencies, and issues
- Coordinating** federal One Health Zoonotic Disease Prioritization activities in collaboration with DOI and USDA
- Address** IHR core capacities from US Joint External Evaluation and US National Action Plan for Health Security
- Lead** One Health Federal Interagency Network (OH-FIN)
- Partner** with US government partners, industry, professional organizations, and others on zoonoses prevention



<https://www.cdc.gov/onehealth/index.html>

One Health

One Health recognizes that the health of people is connected to the health of animals and the environment. It is a collaborative, multisectoral, and transdisciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment.

A One Health approach is important because 6 out of every 10 infectious diseases in humans are spread from animals.

[Learn more about One Health.](#)

One Health Basics



One Health in Action



Domestic Activities



Global Activities



Outbreaks

One Health Zoonotic Disease Prioritization



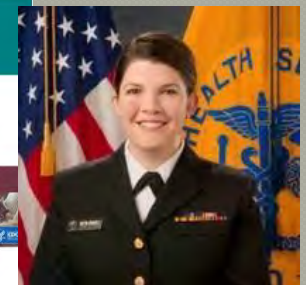
Most commonly prioritized zoonoses:

1. Rabies
2. Zoonotic Influenza viruses
3. Viral Hemorrhagic Fevers
4. Brucellosis
5. Anthrax

For more information, visit:
www.cdc.gov/onehealth/global-activities/prioritization.html

Healthy Pets, Healthy People

www.cdc.gov/healthypets



Overview:

<http://bit.ly/2L77AcO>



Education — of the Public and Lawmakers

116TH CONGRESS
1ST SESSION

S. 1903

To establish an interagency One Health Program, and for other purposes.

IN THE SENATE OF THE UNITED STATES

JUNE 19, 2019

Ms.

116TH CONGRESS
1ST SESSION

H. R. 3771

To establish an interagency One Health Program, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

JULY 16, 2019

Mr. SCHRADER (for himself and Mr. YOHIO) introduced the following which was referred to the Committee on Energy and Commerce, in addition to the Committees on Agriculture, Natural Resources, and Foreign Affairs, for a period to be subsequently determined by the Speaker in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

A BILL

To establish an interagency One Health Program, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the “Advancing Emergency Preparedness Through One Health Act of 2019”.

SEC. 2. FINDINGS.



Senator Tina Smith



Senator Todd Young



Representative
Kurt Schrader



Representative
Ted Yoho



To establish in the US an
Inter-Agency One Health Program

Education — of the Public and Lawmakers

One Health Awareness Month January 2020 (in the US and Beyond)



December 19, 2019

CONGRESSIONAL RECORD—SENATE

S7215

SENATE RESOLUTION 462—DESIGNATING JANUARY 2020 AS “NATIONAL ONE HEALTH AWARENESS MONTH” TO PROMOTE AWARENESS OF ORGANIZATIONS FOCUSED ON PUBLIC HEALTH, ANIMAL HEALTH, AND ENVIRONMENTAL HEALTH COLLABORATION THROUGHOUT THE UNITED STATES AND TO RECOGNIZE THE CRITICAL CONTRIBUTIONS OF THOSE ORGANIZATIONS TO THE FUTURE OF THE UNITED STATES

Mrs. FEINSTEIN (for herself, Ms. MCSALLY, Ms. SMITH, Mr. BROWN, Mr. KING, Mr. CASEY, and I) submitted the following report, which was considered and agreed to:

S. RES. 462

Whereas One Health is a multisectoral, transdisciplinary approach, working at the local, national, and global levels, achieving optimal health by recognizing the interconnections between humans, animals, plants, and the environment;

By using the One Health approach, global health problems including antibiotic resistance, infectious disease spread, and sequestered medical knowledge can be addressed.

Antibiotic resistance is of grave concern for both people and animals. Public health specialists are working with physicians and veterinarians to minimize inappropriate antibiotic usage in their patients.

By 2050, according to the United Kingdom's 2014 Review on Antimicrobial Resistance, experts expect that more people will die from antibiotic-resistant microbes than die from

problems with a One Health approach must be encouraged.

Thank you Mr. President. I yield the floor.

AMENDMENTS SUBMITTED AND PROPOSED

SA 1268. Mr. WICKER proposed an amendment to the bill S. 1822, to require the Federal Communications Commission to issue rules relating to the collection of data with respect to the availability of broadband services, and for other purposes.

SA 1269. Mr. McCONNELL (for Mr. PORTMAN) proposed an amendment to the bill S. 1822, to require the use of emergency

ONE HEALTH AWARENESS MONTH JANUARY 2020

STEP 1 **Connect**

1. Connect with Media Outlets. Tell them about One Health Awareness Month.
2. If you live in the US, share the S. Res. 462 Press Release and a personal story about One Health or a One Health issue that has affected you.

STEP 2 **Create**

1. Using your favorite social media platform, consider following the suggested topics to create a post each day using #OneHealth.
2. Engage with people by tweeting #OneHealth and commenting and sharing their posts.

STEP 3 **Educate**

1. Do a talk about One Health and One Health issues at a library, school, park, church, business, etc. near you.
2. Call your lawmakers. Share the urgent need to implement One Health.

116TH CONGRESS
2D SESSION

H. RES. 794

Supporting the designation of January 2020 as “National One Health Awareness Month” to promote awareness of organizations focused on public health, animal health, and environmental health collaboration throughout the United States and to recognize the critical contributions of those organizations to the future of the United States.

IN THE HOUSE OF REPRESENTATIVES

JANUARY 14, 2020

SOCIAL MEDIA CHALLENGE TOPIC CALENDAR

1 What is OH and Why is OH Important?	2 OH Topic: What are Zoonotic Diseases?	3 OH Topic: What are Vector Borne Diseases?	4 OH Topic: Mosquito Borne Diseases	5 OH Topic: Tick Borne Diseases	6 OH Topic: Antimicrobial Resistance
7 Climate Change and the Health of Animals, Humans, & Ecosystems	8 Climate Change and Food Security	9 Comparative Medicine: Research Discoveries made using a One Health Approach	10 Organizations around the world working for One Health	11 OH Topic: Animals as Sentinels (environmental indicators)	12 One Health and Chronic/Non-Communicable Diseases
13 One Health and Food Security	14 One Health and Food Safety	15 Humans Encroaching on Wildlife/Loss of Biodiversity	16 One Health: One Welfare One Planet	17 Benefits of the Human/Animal Bond	18 The Link Between Animal Abuse and Human Abuse
19 Clean Water & Air: Healthy Soil, Plants, and People	20 Occupational Health Risks for Agricultural & Animal Workers	21 OH Topic: Plastics in the Environment	22 One Health and Wildlife	23 Economic Benefits of One Health	24 One Health Successes
25 One Health K12 Education: Will our students be prepared for the future?	26 One Health: Personal Stories	27 One Health in Disaster Preparedness/ Emergency Responses	28 OH Topic: Land Use / Ecosystem Degradation	29 One Health: The Ties that Bind	30 One Health & the United Nations Sustainable Development Goals
31 Advocate for the Advancing Emergency Preparedness Through One Health Act of 2019! Check out its progress! Plan a One Health Day 2020 event! One Health Day is Nov 3; but events can be held any time of the year. Be sure to register your event to get on the map!					

Education — of the Public and Lawmakers

Nov One Health Month 2017

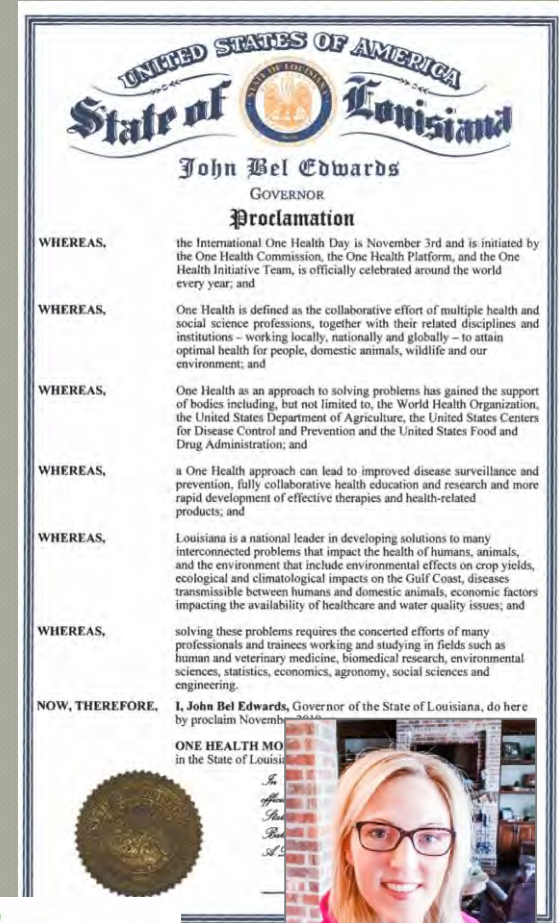


One Health Day Nov 3, 2019

ISOHA has created an instructional document on how to pursue legislative or executive branch advocacy for One Health initiatives. While focused on government advocacy in the United States, this document may also be helpful for those planning One Health advocacy in any country. <http://bit.ly/2B3aLek>



Nov One Health Month 2019



Education – Government and Policy

[US CDC - One Health Zoonotic Disease Prioritization](#)

One Health reports for:

Burkina Faso
Cameroon
Côte d'Ivoire
Ethiopia
Mozambique
Pakistan
Tanzania
Uganda

Also working to
Implement One Health
at Government Level:

Northern Ireland
Nigeria
Rwanda
Thailand
Viet Nam

Others???

One Health Truths



One Health
is a pathway to both
Planetary Health
and Global *Security*



One Health Truths

Collaborations

start with

Relationships!!

*Which start when we
come together in direct conversations*



One Health Truths

Reframing 'G.R.O.W.T.H'



Dream the Future



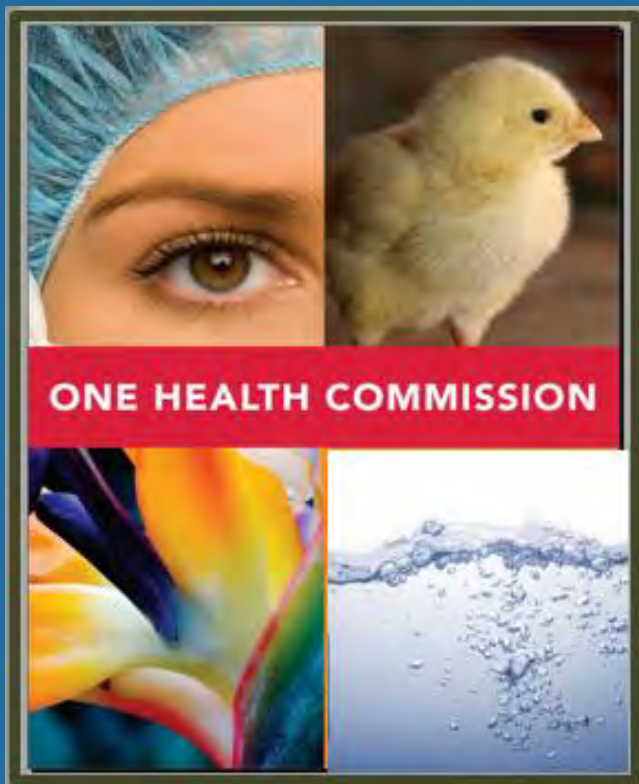
**One Health, Here, There
and Everywhere:
It's Urgent!**

and

It's Up to US!!

to make One Health the default way of
doing business around the world!!





One Health, Here, There
and Everywhere:
It is urgent on 'so'
many fronts

*Thank
you*

For listening



Cheryl Stroud, DVM, PhD
Executive Director
One Health Commission

cstroud@onehealthcommision.org

www.onehealthcommission.org

@OHCommision

@OneHealthCom



The One Health Opportunity – A Powerful Mechanism to Improve Global Health Outcomes

Q&A



**Catherine Machalaba,
MPH**

*Research Scientist
EcoHealth Alliance, MD*



**Dr. Sharon Deem, DVM,
PhD, DACZM**

*Director
Institute of Conservation Medicine at
the St. Louis Zoo*



**Dr. Cheryl Stroud,
DVM, PhD**

*Executive Director
One Health Commission*



Moderator

Keith Martin, MD, PC

*Executive Director
Consortium of Universities for
Global Health*

Consortium of
Universities
for Global Health



Consortium of Universities for Global Health

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