

A satellite-style map of the African continent, showing various geographical features like rivers, lakes, and terrain. The colors range from dark green in the south to light tan in the north. The map is set against a dark background.

Awakening Africa's Sleeping Giant: Agriculture and disease

Kate E. Jones

ZSL

LIVING CONSERVATION



WE CAN
END POVERTY
2015 MILLENNIUM
DEVELOPMENT
GOALS



A Gateway to the UN System's Work on the MDGs

**MILLENNIUM
DEVELOPMENT GOALS**



**End Poverty
and Hunger**



**Universal
Education**



**Gender
Equality**



**Child
Health**



**Maternal
Health**



**Combat
HIV/AIDS**



**Environmental
Sustainability**



**Global
Partnership**

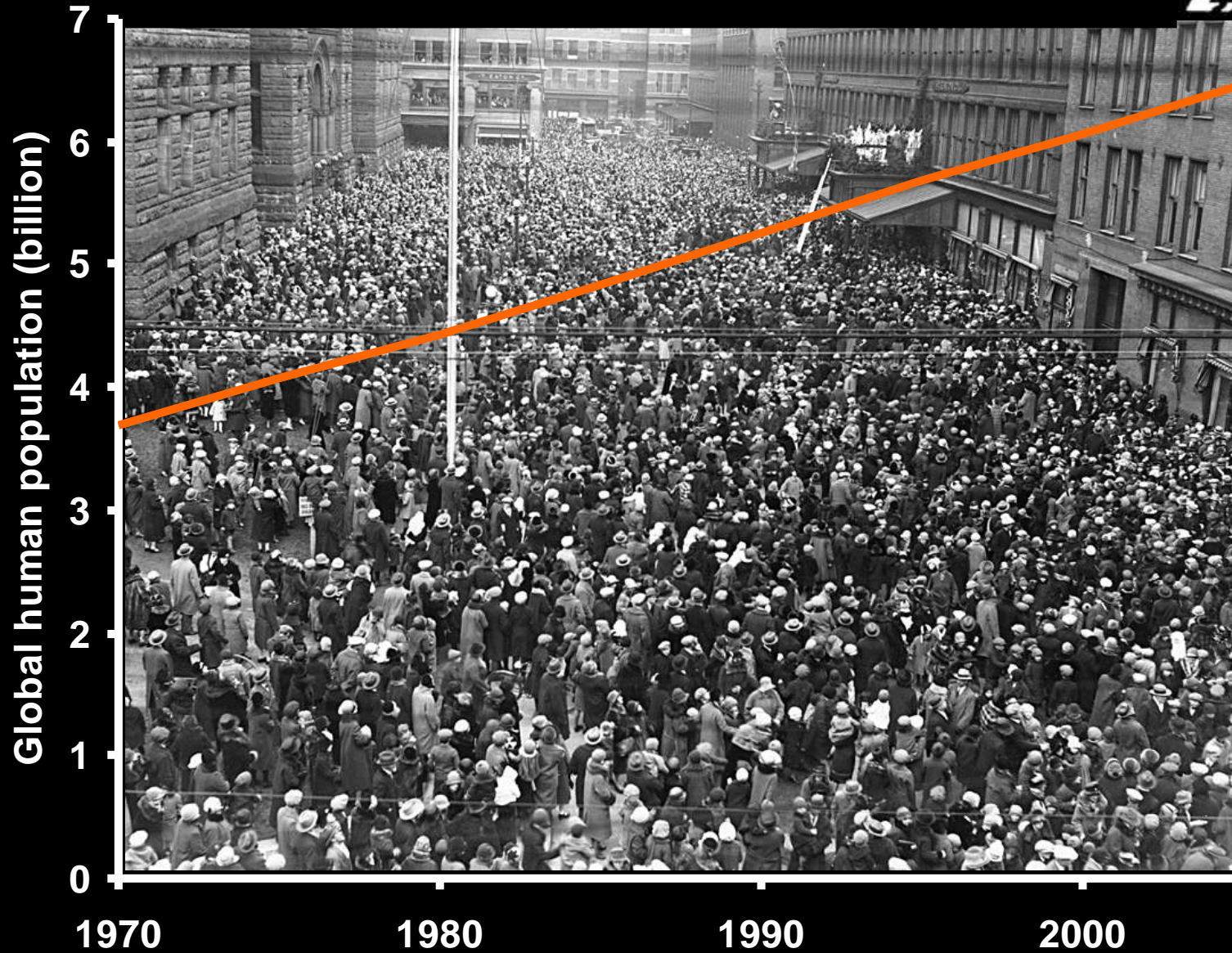


“.. achieve, by 2010, a significant reduction of the current rate of biodiversity loss at the global, regional and national levels as a contribution to poverty alleviation and to the benefit of all life on earth” (Decision VI/26)



April 2002: 6th Conference of the Parties of the
Convention on Biological Diversity (CBD) 188 nations

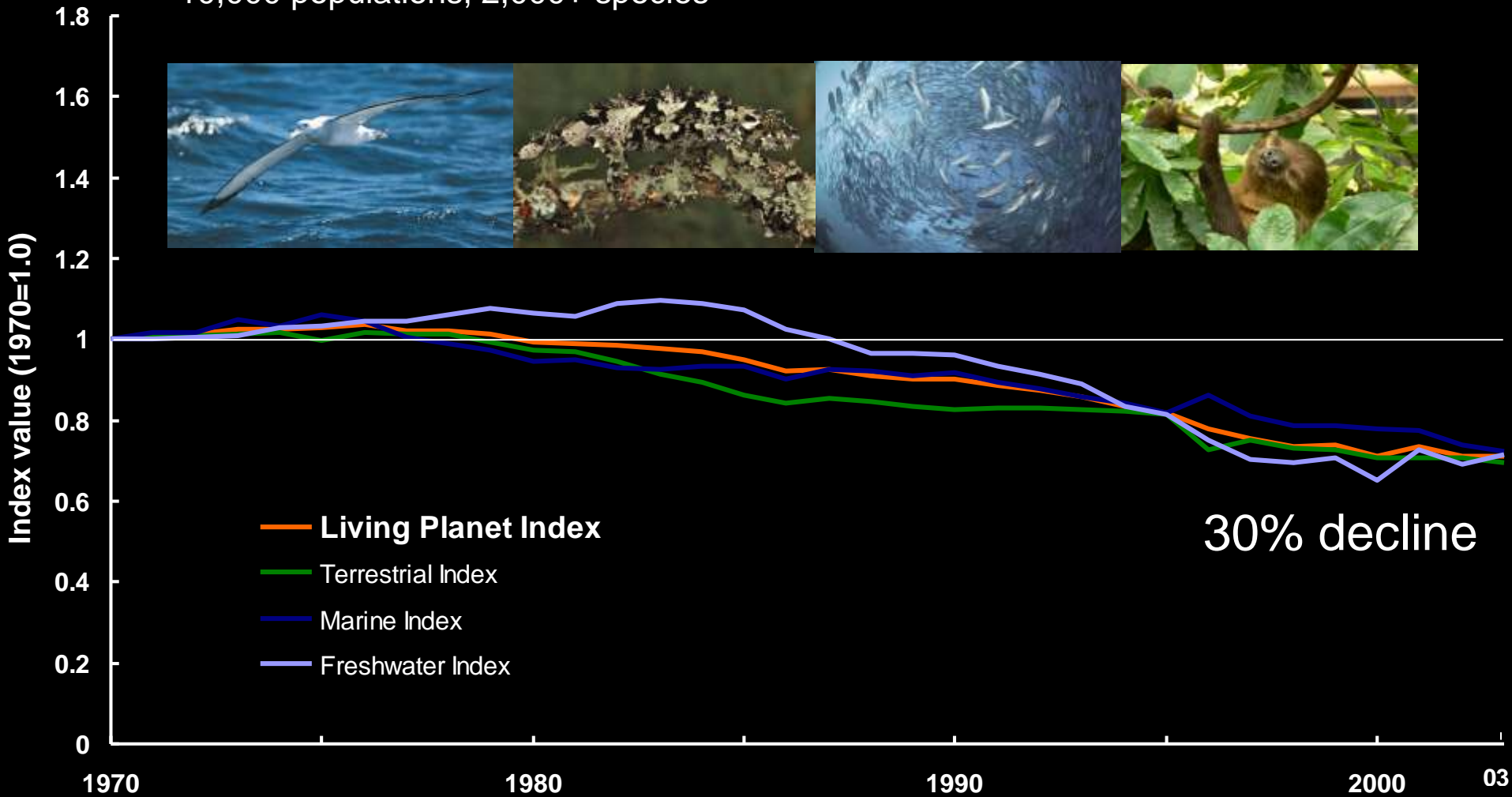
Human population growth



Living Planet Index



10,000 populations, 2,000+ species





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The Economics of Ecosystems and Biodiversity (TEEB)

The Economics of Ecosystems and Biodiversity (TEEB) study is a major international initiative to draw attention to the global economic benefits of biodiversity, to highlight the growing costs of biodiversity loss and ecosystem degradation, and to draw together expertise from the fields of science, economics and policy to enable practical actions moving forward.



Biodiversity is not just
a luxury for the rich :
It is a necessity for the poor.



News

guardian.co.uk

Economic report into biodiversity crisis reveals price of consuming planet.

Species losses around the world could really cost us the earth with food shortages, floods and expensive clean up costs . [More>>>](#)

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New Release



The TEEB for Policy Makers report can be downloaded here by clicking on image above

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Poverty & Biodiversity loss

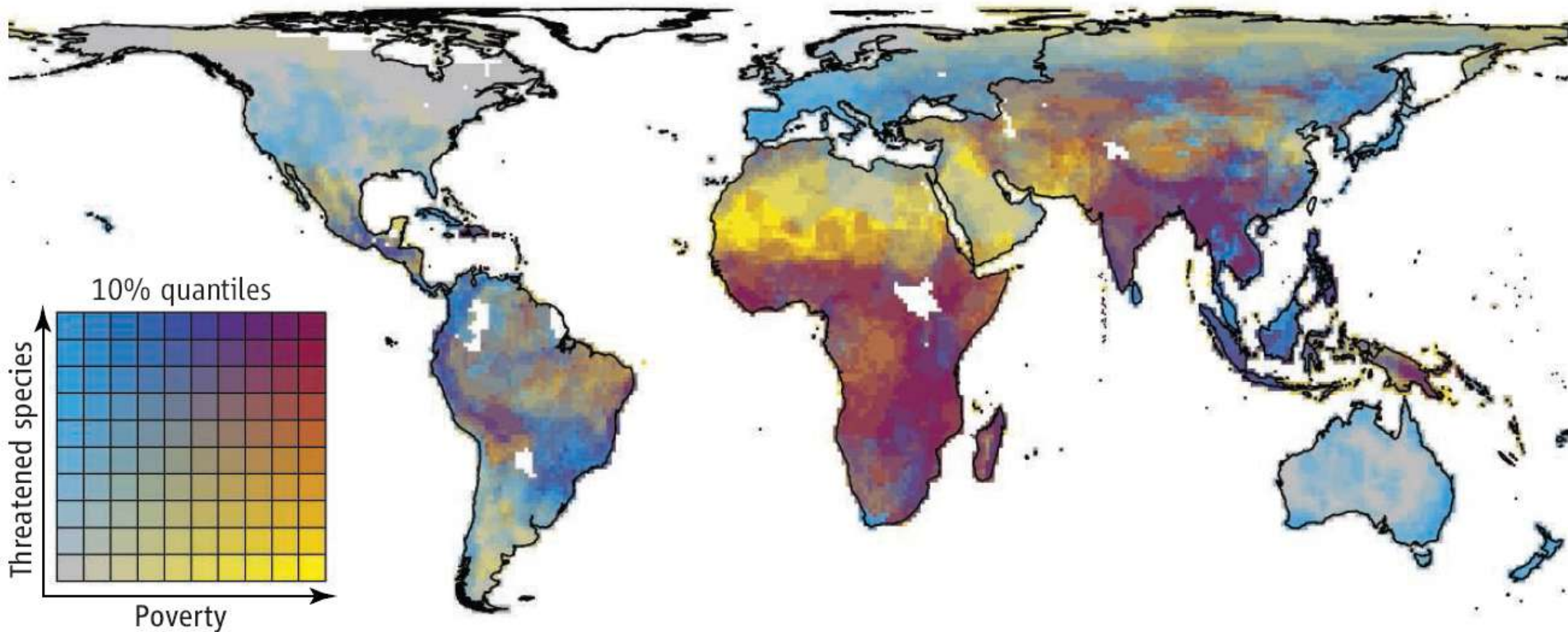
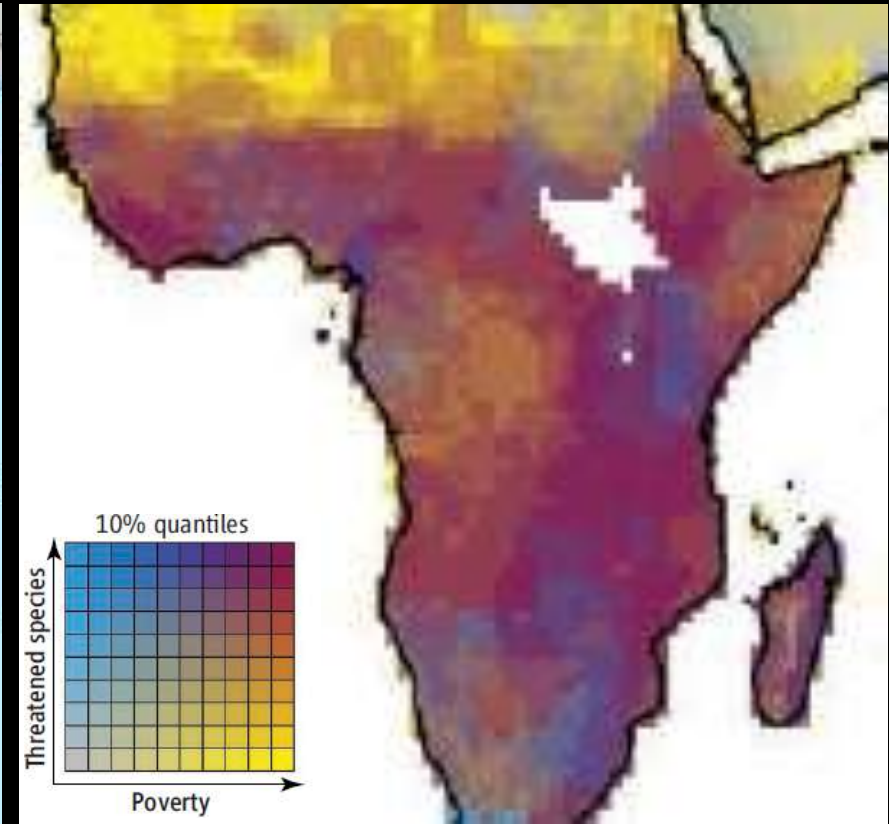


Fig. 1. Map of poverty and potential biodiversity loss, showing the level of poverty (proxied by the log rate of human infant mortality) combined with the log number of threatened species of mammals, birds, and amphibians per one-degree grid square (Behrmann equal-area projection). White areas represent missing data. Data from (14) and (15).

Poverty and loss in proposed areas



Emerging infectious diseases (EIDs)

A screenshot of the BBC News website from January 2005. The page features several news articles related to emerging infectious diseases. The main article is titled "Vietnam bird flu deaths increase" and reports on a 10-year-old girl's death from bird flu in Vietnam. Other articles include "Deadly virus linked to fruit bat" and "Uganda confirms Marburg outbreak". The page also includes a navigation menu, a sidebar with regional news links, and a "SEE ALSO" section with related stories.

bbc.co.uk Home TV Radio Talk Where I Live A-Z Index

Low Graphics version | Change edition

BBC NEWS UK EDITION

News Front Page Election 2005 World

Last Updated: Monday, 31 January, 2005, 09:20 GMT

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Vietnam bird flu deaths increase

A 10-year-old girl has died of bird flu in Vietnam, the country's 12th confirmed victim in a month.



More than 200,000 chickens were culled in Vietnam

Medical official Ngo Van Hoang said the girl developed a high fever and bad cough a week after helping her family bury some dead chickens.

The spike in deaths has raised worries the virus could mutate into a form that is easily spread to humans.

It has also renewed scientists' fears that the virus could mutate into a form that is easily spread to humans.

Vietnamese officials are investigating whether the 10-year-old girl and her mother from Dong Thap province, who both died of the virus in the last two weeks, infected each other, or caught the disease from infected ducks.

They are also concerned about a 25-year-old Cambodian woman who died in southern Cambodia last Saturday from suspected bird flu.

BBC NEWS **WORLD** **FRONT PAGE**

Last Updated: Wednesday, 22 August 2007, 07:41 GMT 08:41 UK

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Deadly virus linked to fruit bat

US and Gabonese scientists say a common type of fruit bat could be the source of an outbreak of the deadly Marburg disease in Africa.



Uganda has been hit by outbreaks of deadly viruses like Marburg and Ebola

Outbreaks of the Marburg disease have hit sub-Saharan Africa in the past.

SEE ALSO

- Uganda confirms Marburg outbreak 02 Aug 07 | Africa
- Vaccine hope for deadly disease 28 Apr 06 | Health
- Ebola, Marburg vaccine 'success' 05 Jun 05 | Africa
- Angola virus outbreak 'not over' 17 May 05 | Africa
- Killer virus hits Angolan rituals 14 Apr 05 | Africa
- Marburg outbreak worst recorded 31 Mar 05 | Africa

RELATED INTERNET LINKS

- US Centres for Disease Control and Prevention
- Centre International de Recherches Medicales de Franceville

The BBC is not responsible for the content of external internet sites.

TOP AFRICA STORIES

- Ban support for Sudan peace deal
- Food giant sells out of Zimbabwe
- Violent protests over SA housing

News feeds

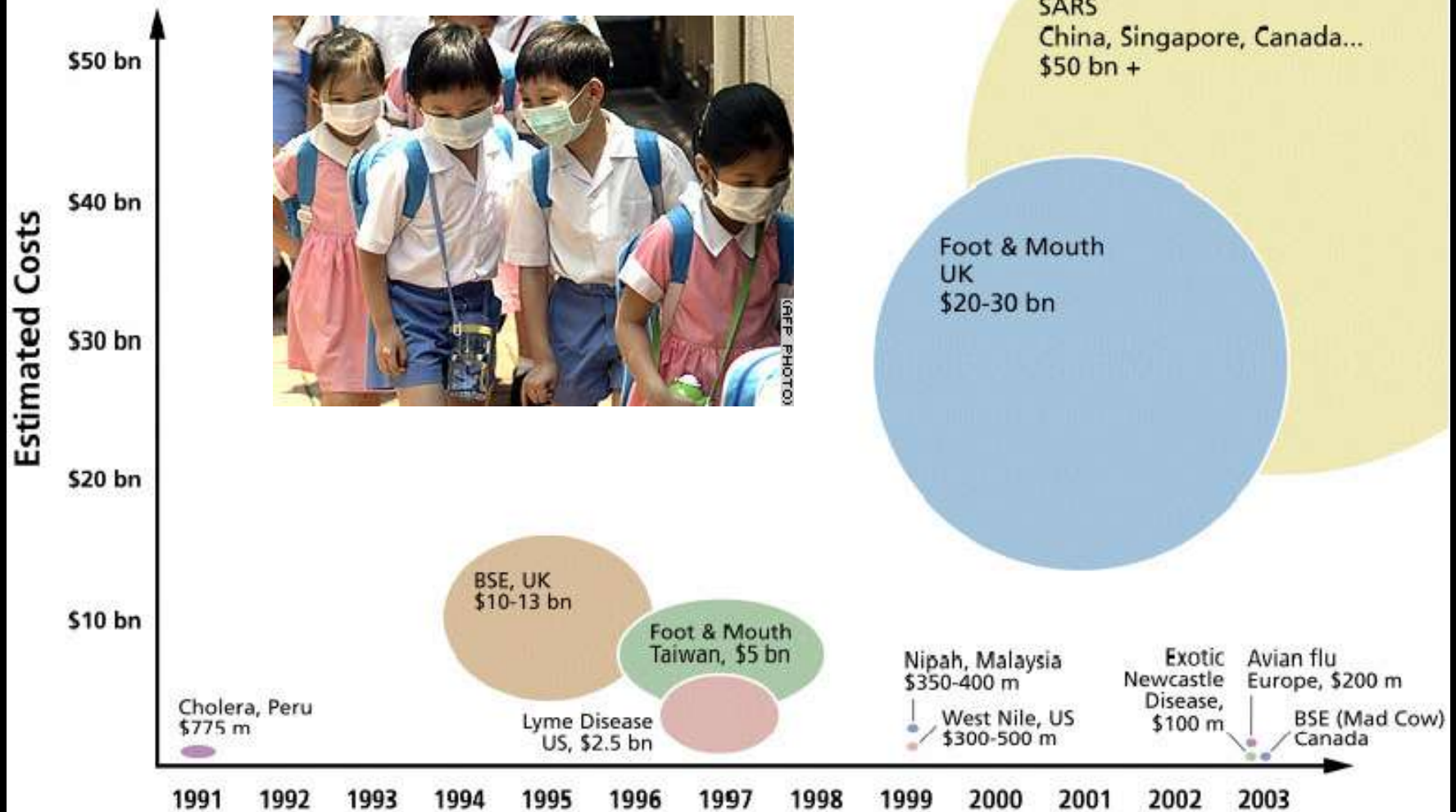
MOST POPULAR STORIES NOW

MOST E-MAILED MOST READ

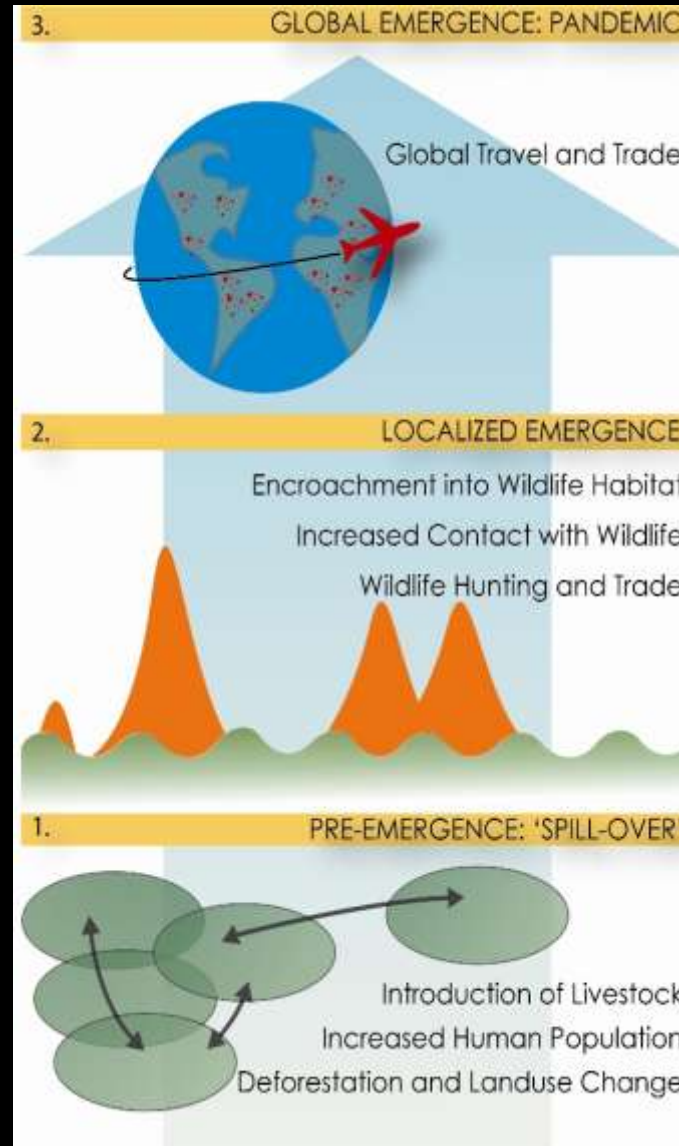
- Jane Tomlinson loses cancer fight
- Tube strike causes travel chaos
- Army helps tourists hit by wasps
- Three hurt as car strikes buffalo
- St Pancras - the new link to the Channel Tunnel

Most popular now, in detail

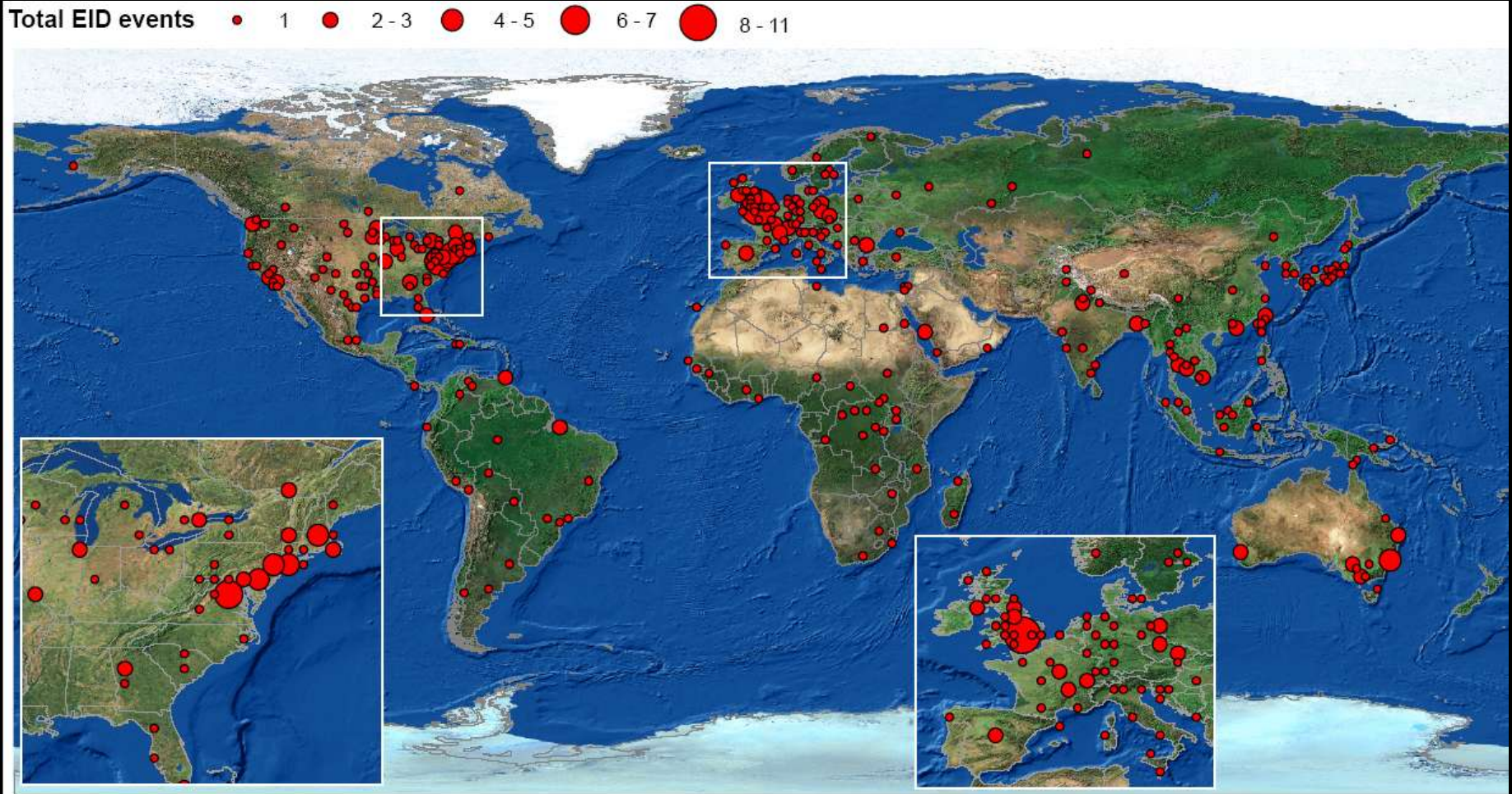
Economic impacts of EIDs



Disease invasion process

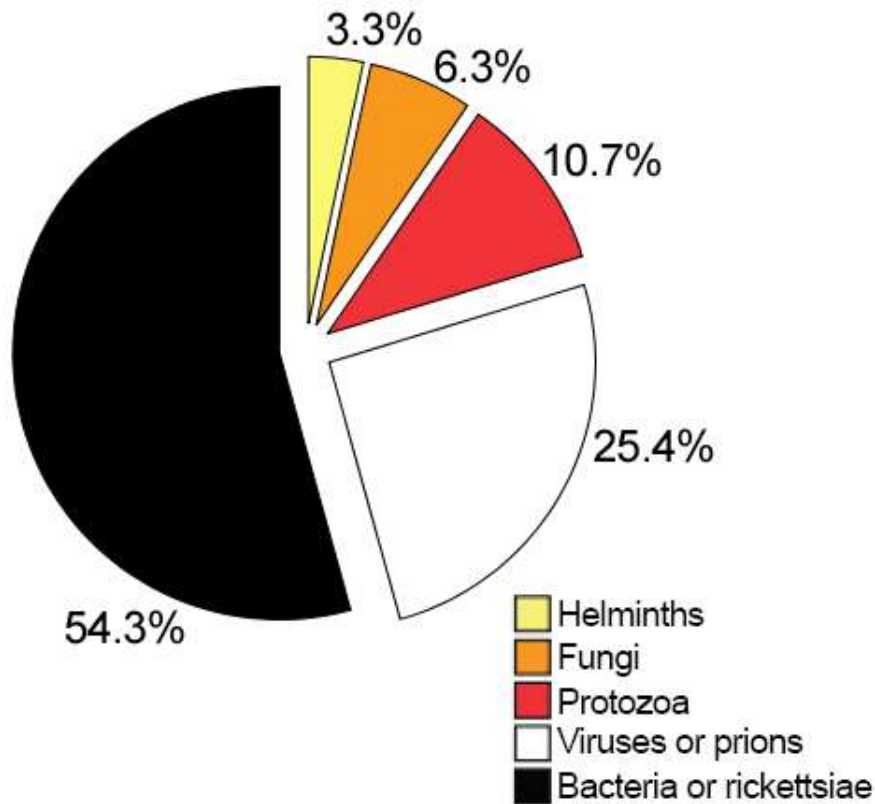


EID events 1940-2004



- Main EID hotspots are in north-eastern US, western Europe, Japan and south-eastern Australia

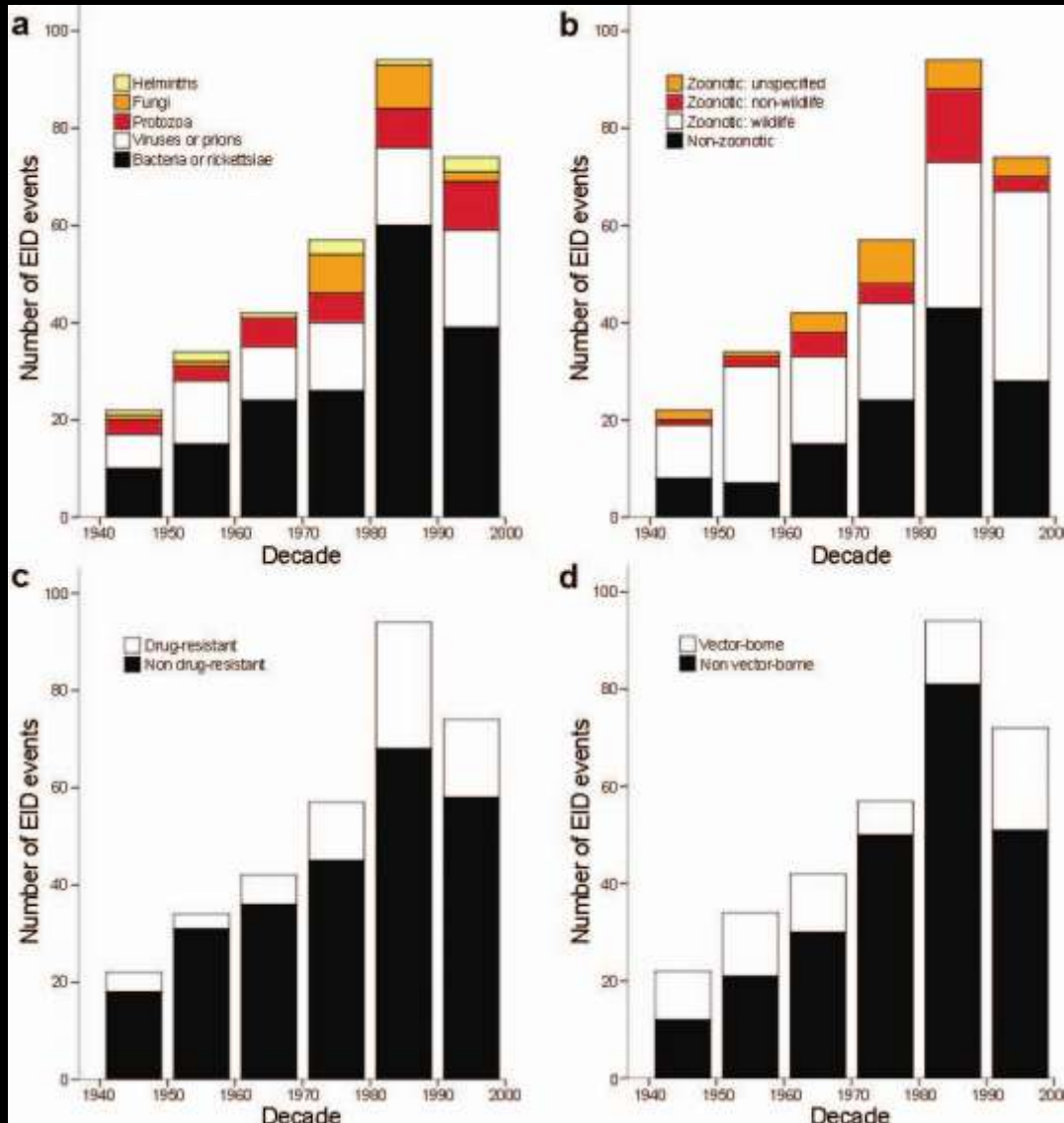
Biological patterns in EID events



- 335 EID events (1940-2004)
- Pathogens causing event mainly bacteria – drug resistant microbes
- 61.4% of EID events are caused by zoonotics – 74% of these from wildlife

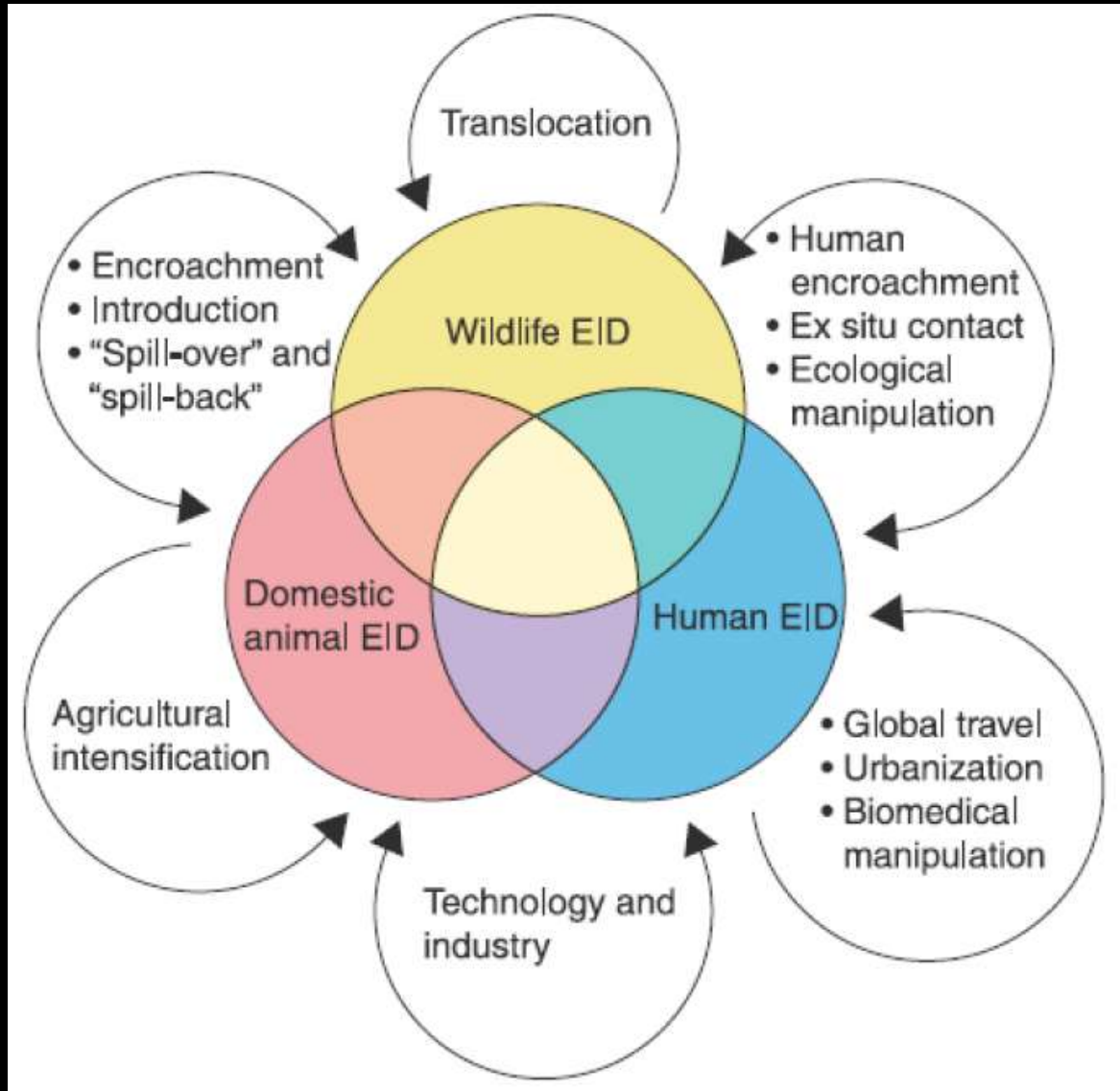


Temporal patterns in EID events



- Significant increase since 1940 (controlling for reporting effort), reaching a peak in 1980s – AIDS/HIV?
- Zoonotics from wildlife are causing the majority of events in recent decade and are significantly increasing

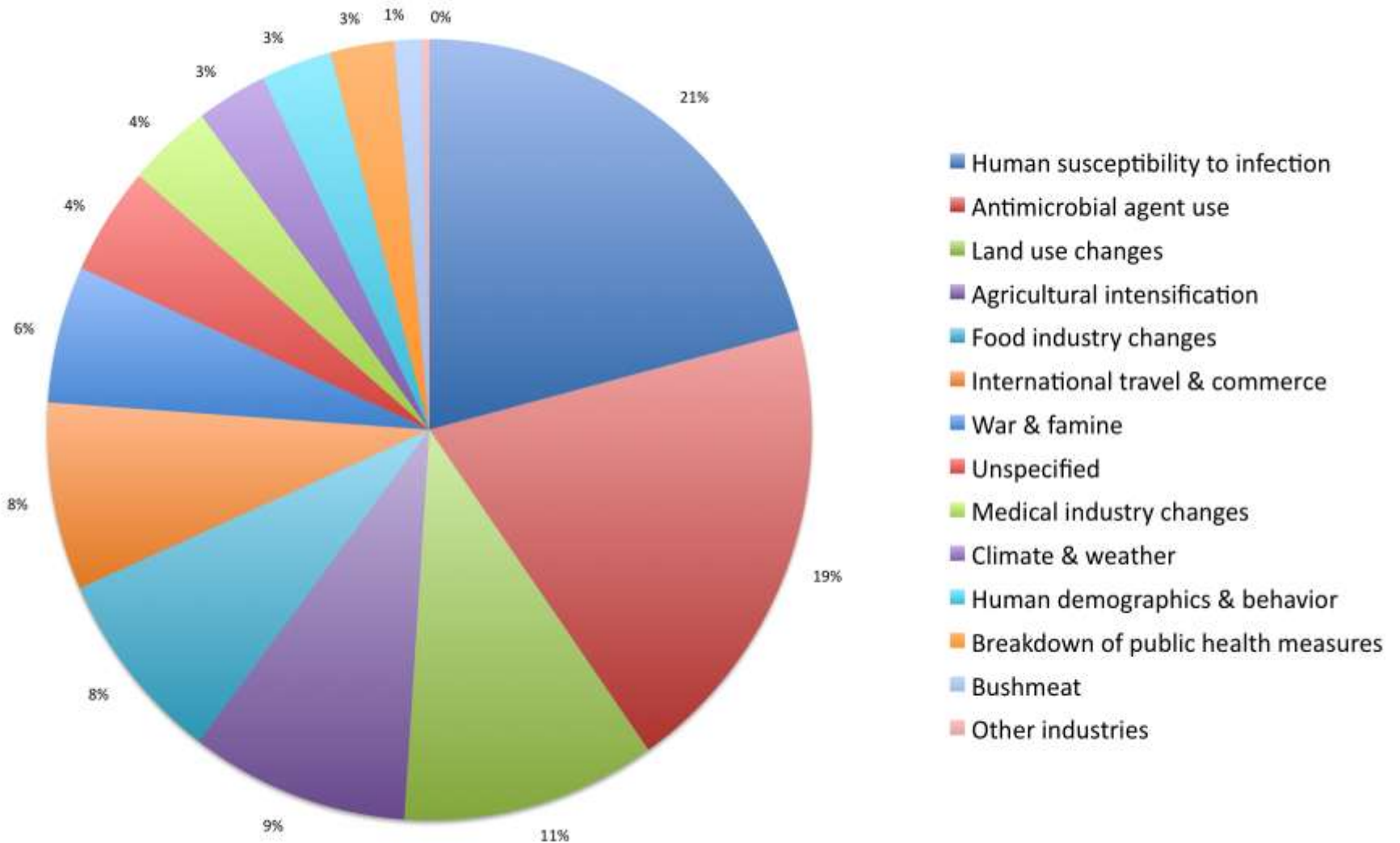
Drivers of disease emergence



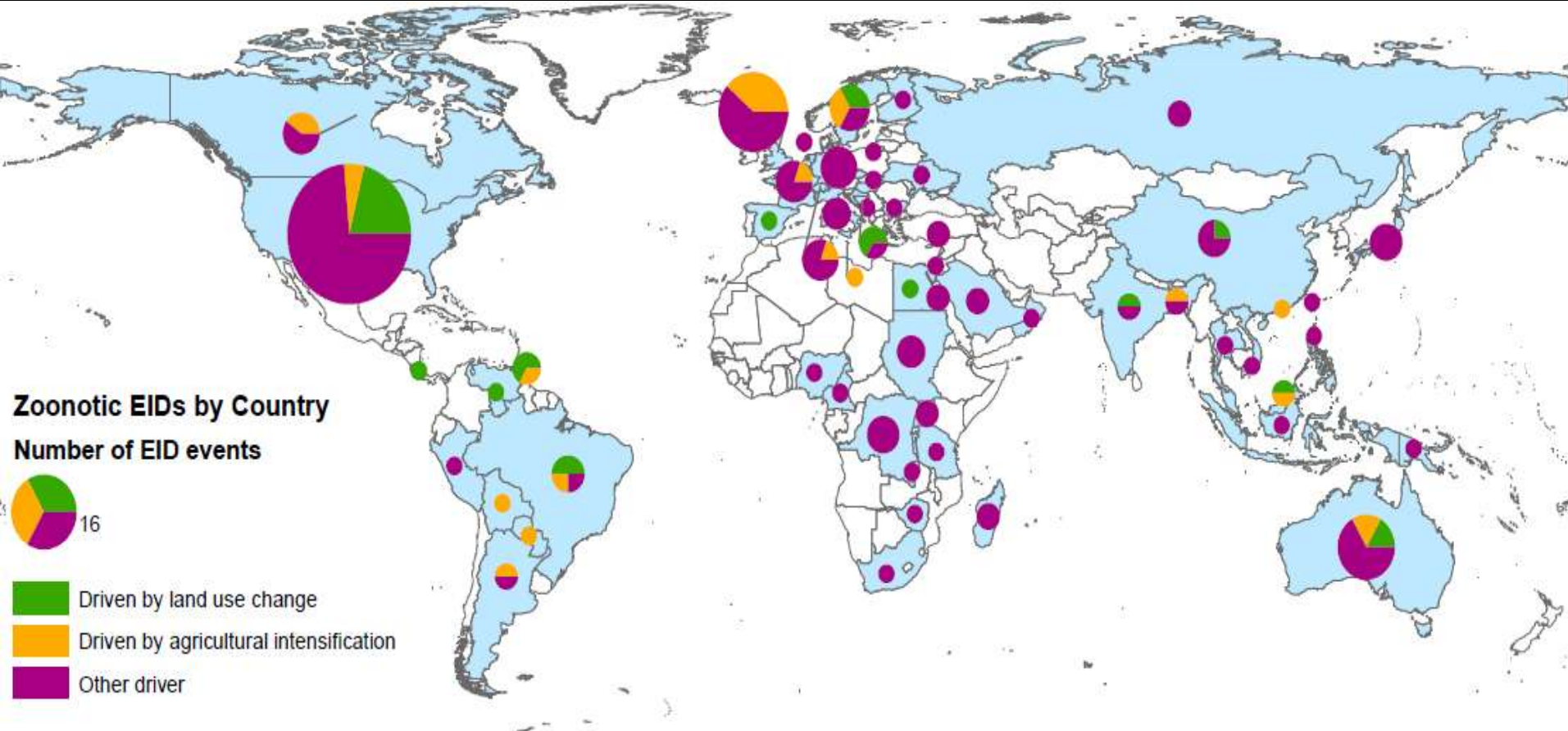
Close relationship between human, wildlife and domestic animal populations within the background of EID drivers



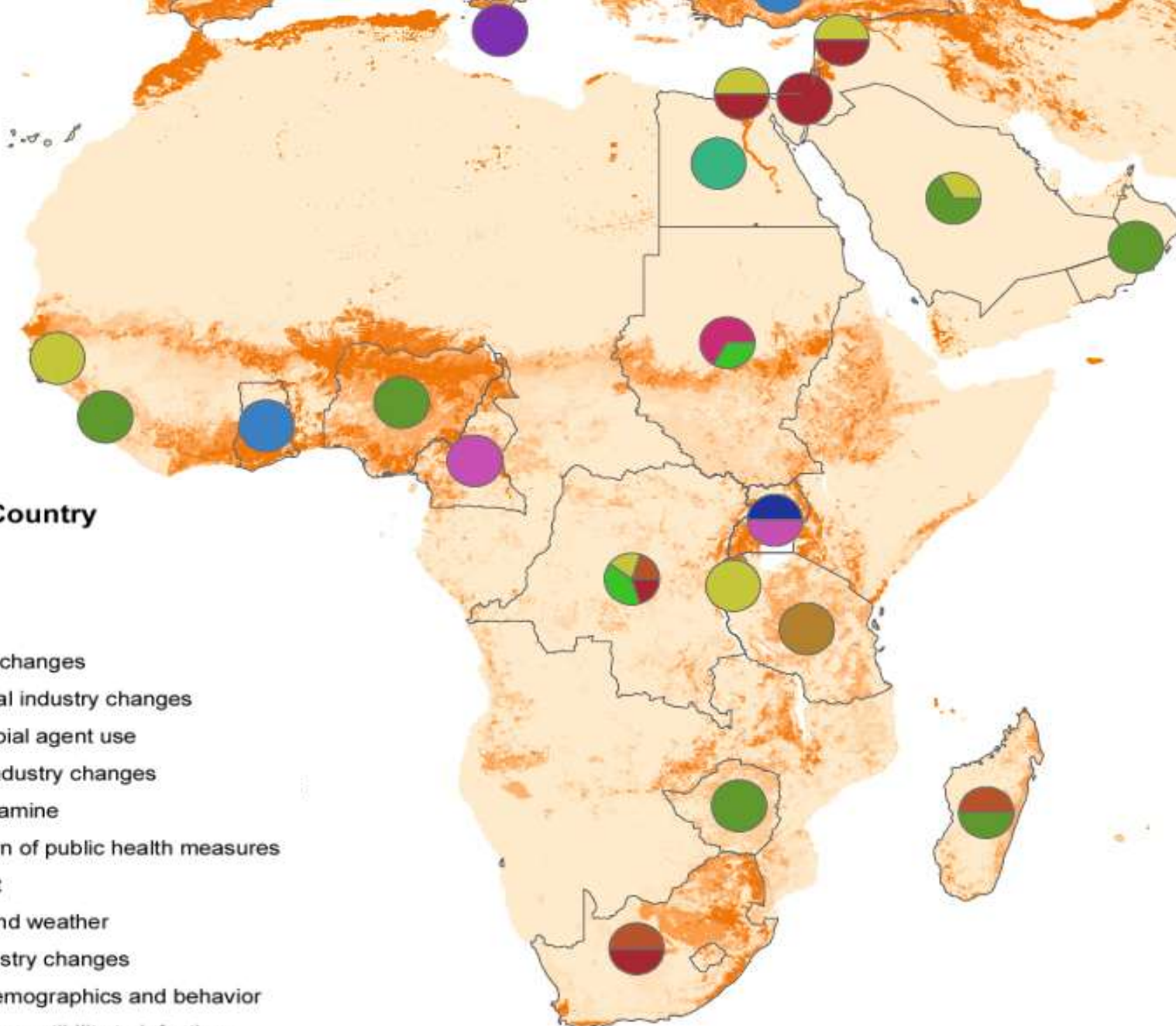
EID Drivers



EID Drivers



Proportion of EIDs (1940-2004) by country caused by different drivers. Size of the circles is proportional to the number of EIDs



All EIDs by Country

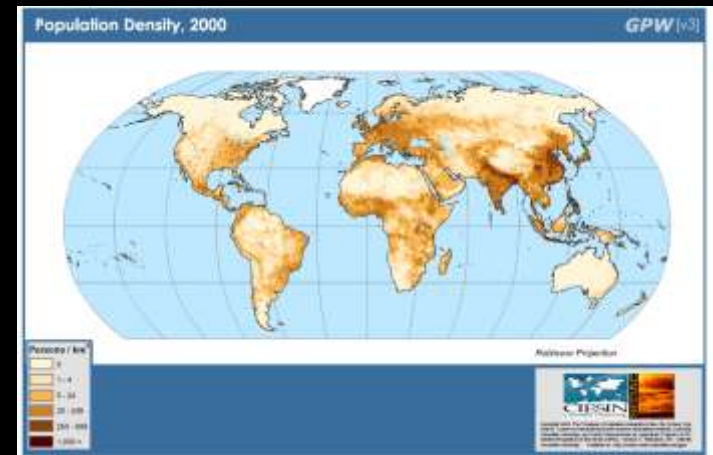


- Land use changes
- Agricultural industry changes
- Antimicrobial agent use
- Medical industry changes
- War and famine
- Breakdown of public health measures
- Bushmeat
- Climate and weather
- Food industry changes
- Human demographics and behavior
- Human susceptibility to infection
- International travel and commerce
- SUM OTHER

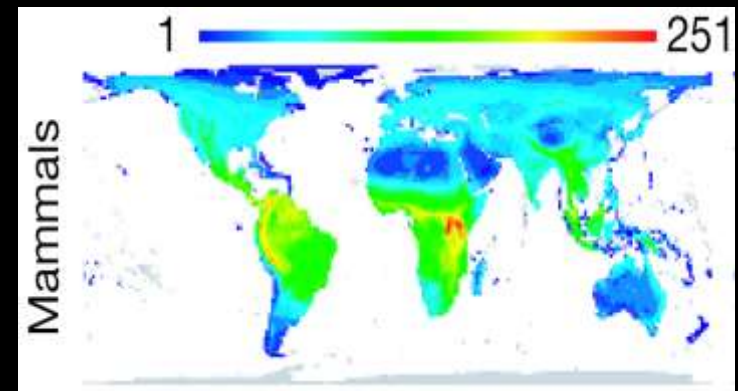
Drivers of emergence



- **Socioeconomic**
 - Human population density
 - Human population growth
- **Environmental**
 - Latitude
 - Rainfall
- **Ecology**
 - Wildlife host species richness

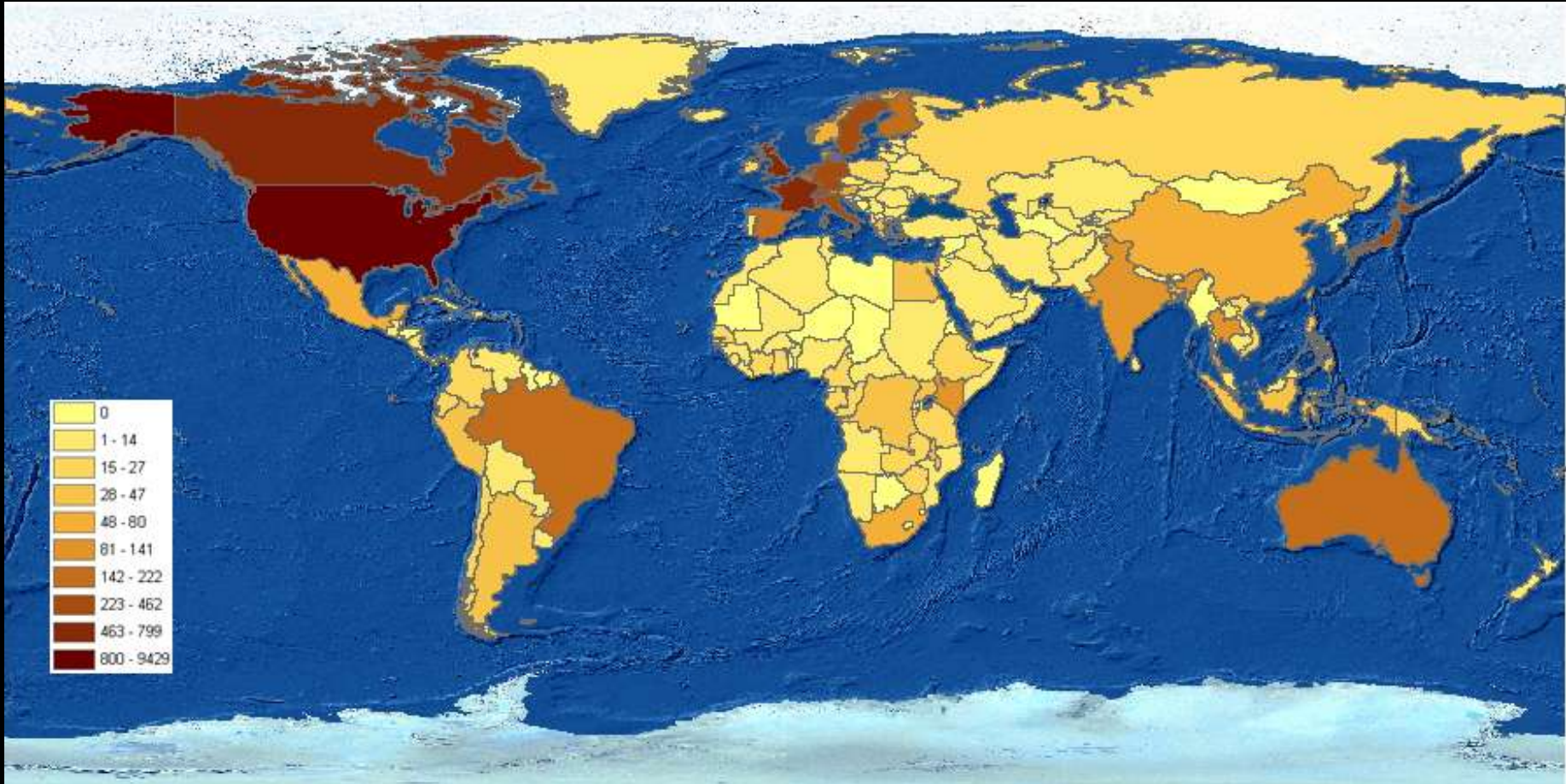


(<http://sedac.ciesin.columbia.edu/gpw>)



Grenyer *et al.* 2006 *Nature*

Spatial reporting bias by country



The frequency of the country listed as the address for authors in each article in the Journal of Infectious Diseases from 1973

Modelling EID events: Results



Multivariate spatial logistic regressions split by event

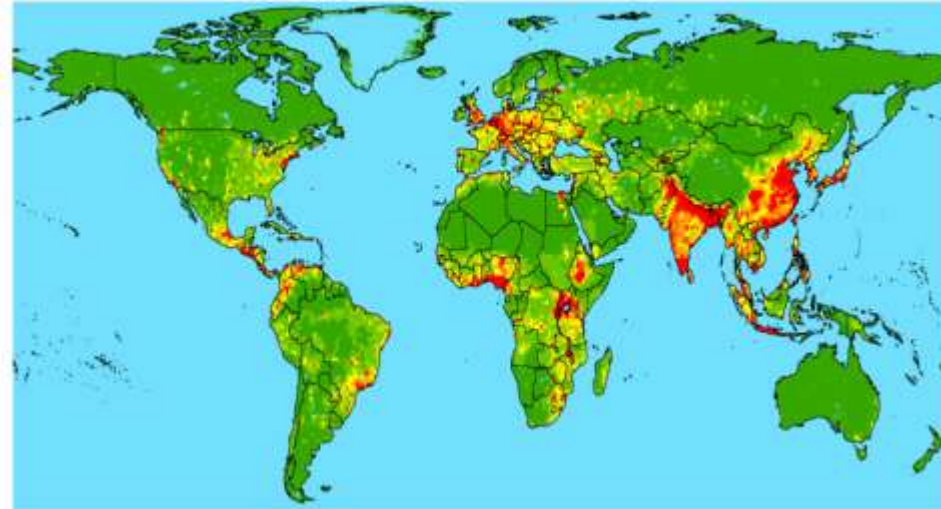
Pathogen Type No. of EID event grid cells	Zoonotic: Wildlife 177-189		Zoonotic: NonWildlife 50-53	
	b	B	b	B
log(JID articles)	0.31-0.34***	1.36-1.40	0.40-0.50***	1.49-1.64
log(Human Pop. Density) (Persons/km ²)	0.54-0.61***	1.72-1.83	0.87-0.99***	2.39-2.70
Human Pop. Growth	-0.16-0.38	0.85-1.46	0.60-1.28**	1.82-3.59
Latitude (decimal degrees)	0.00-0.01	1.00-1.01	0.03-0.04#	1.03-1.04
Rainfall (mm)	0.09x10 ⁻³ -0.14x10 ⁻³	1.00-1.00	0.37x10 ⁻³ -0.51x10 ⁻³	1.00-1.00
Wildlife Host Richness	0.01-0.01**	1.01-1.01	-0.01--0.01	0.99-0.99
Constant	-8.90--8.29***		-13.23--11.69***	
Pathogen Type No. of EID event grid cells	Drug-Resistant 62-66		Vector-Borne 100-105	
	b	B	b	B
log(JID articles)	0.48-0.54***	1.62-1.71	0.16-0.22***	1.18-1.25
log(Human Pop. Density) (Persons/km ²)	1.06-1.37***	2.87-3.92	0.43-0.57***	1.53-1.77
Human Pop. Growth	1.00-1.62***	2.73-5.06	-0.23-0.47	0.79-1.61
Latitude (decimal degrees)	0.04-0.07**	1.04-1.07	-0.02-0.00	0.98-1.00
Rainfall (mm)	0.27x10 ⁻³ -0.56x10 ⁻³	1.00-1.00	0.01x10 ⁻³ -0.34x10 ⁻³	1.00-1.00
Wildlife Host Richness	0.00-0.01	1.00-1.01	0.00-0.01	1.00-1.01
Constant	-17.45--14.03***		-7.81--7.24***	

b = regression coefficients, B = odds ratio for the independent variables in the model, *** p < 0.001, ** p < 0.01.

Modelling EID events: Visualisation



Zoonotic: Wildlife EID Events



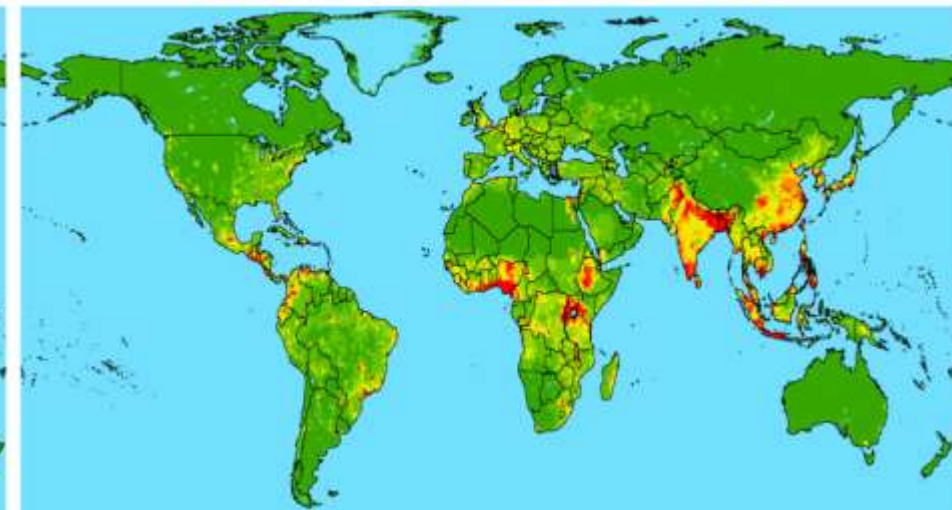
Zoonotic: NonWildlife EID Events

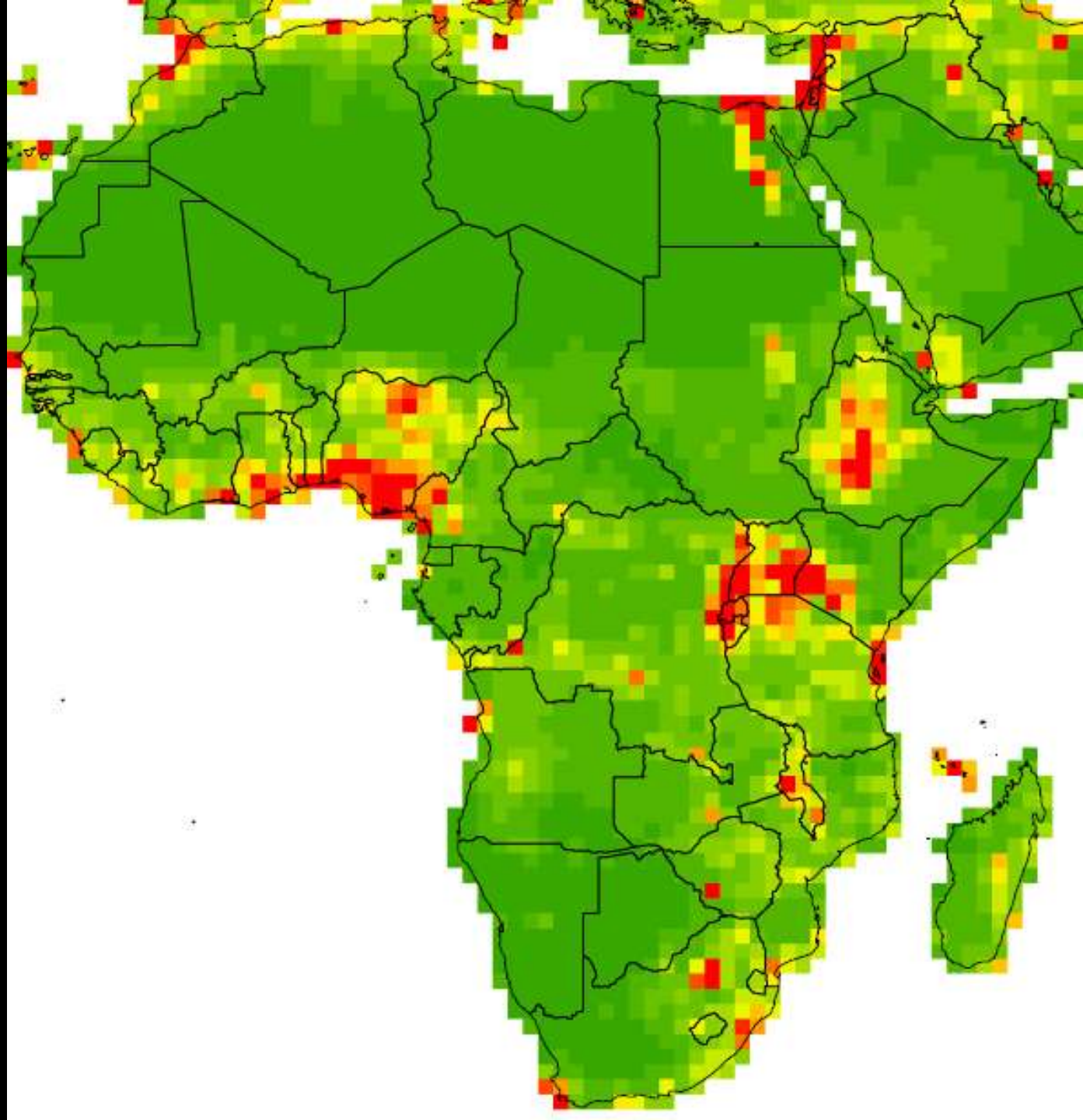


Drug-resistant EID Events



Vector-borne EID Events







USAID
FROM THE AMERICAN PEOPLE

UC DAVIS
VETERINARY MEDICINE
Wildlife Health Center

PREDICT



GVFI
Global Viral Forecasting Initiative



- Strategic selection of geographic locations and species for surveillance
- Improvements needed to existing models
 - greater resolution of models
 - influence of other drivers and improvement of bias
 - pandemic potential from initial emergence
 - predictive models to understand effect of future global change
 - better disease database

Collaborators and funders



- **Peter Daszak, Tiffany Bogich, Sebastian Funk, Parviesz Hosseini, Nikki Patel**, The Wildlife Trust, New York. **Marc Levy, Adam Storeygard, Deborah Balk**, Center for Environmental Research and Conservation (Columbia University). **John Gittleman** and **Sonia Altzier**, (University of Georgia). **Amy Pedersen** (University of Sheffield). **Charlie Nunn** (Harvard).



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