

# Infectious Diseases

## in the Era of Climate Change and Planetary Health

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Chair, Thematic Working Group on Climate-Resilient and Sustainable Health Systems, Health Systems Global

Chair, Working Group on Adaptation, Risk, and Resilience, Lancet Commission on Sustainable Healthcare

Chair, Committee on Environmental Health and Ecology, Philippine Medical Association

Convener, Planetary Health Philippines

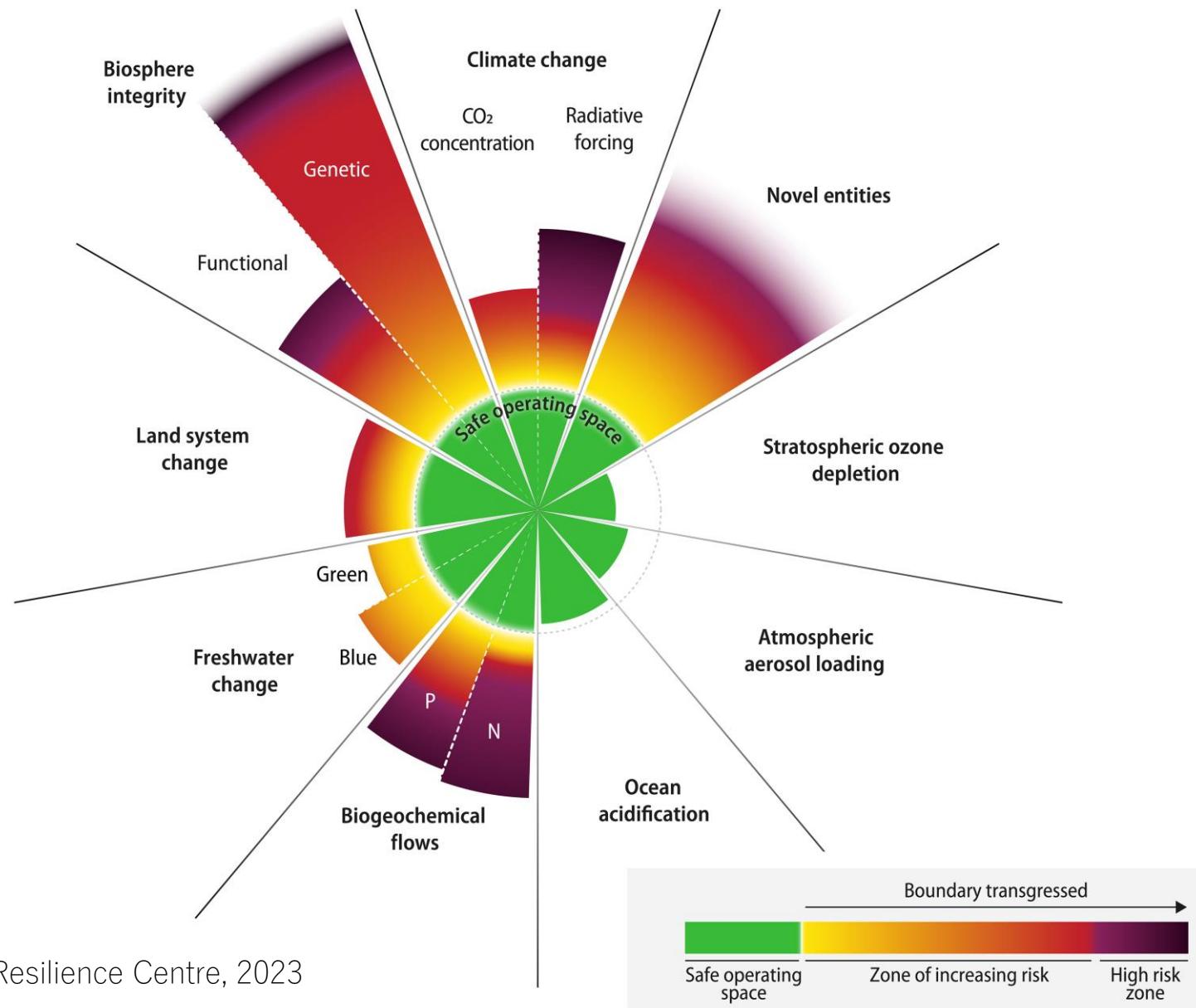


# Planetary Health

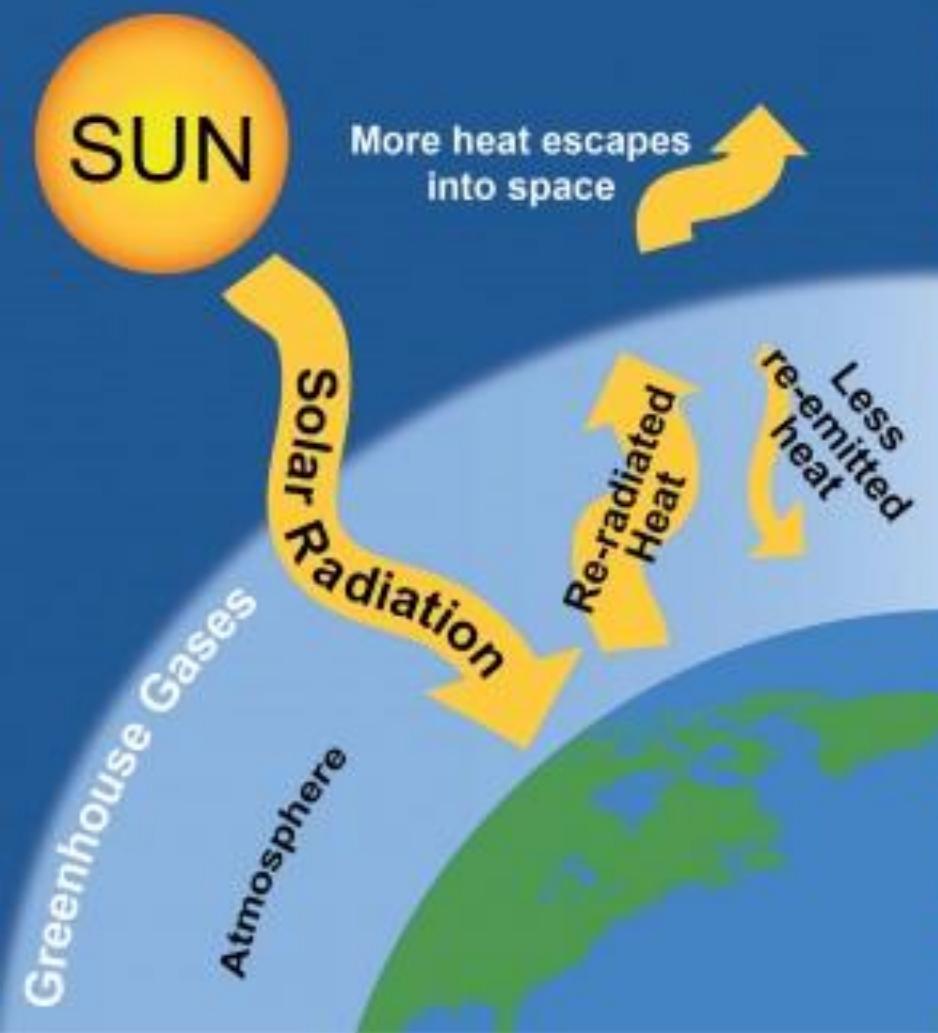


Our patients? PEOPLE and PLANET

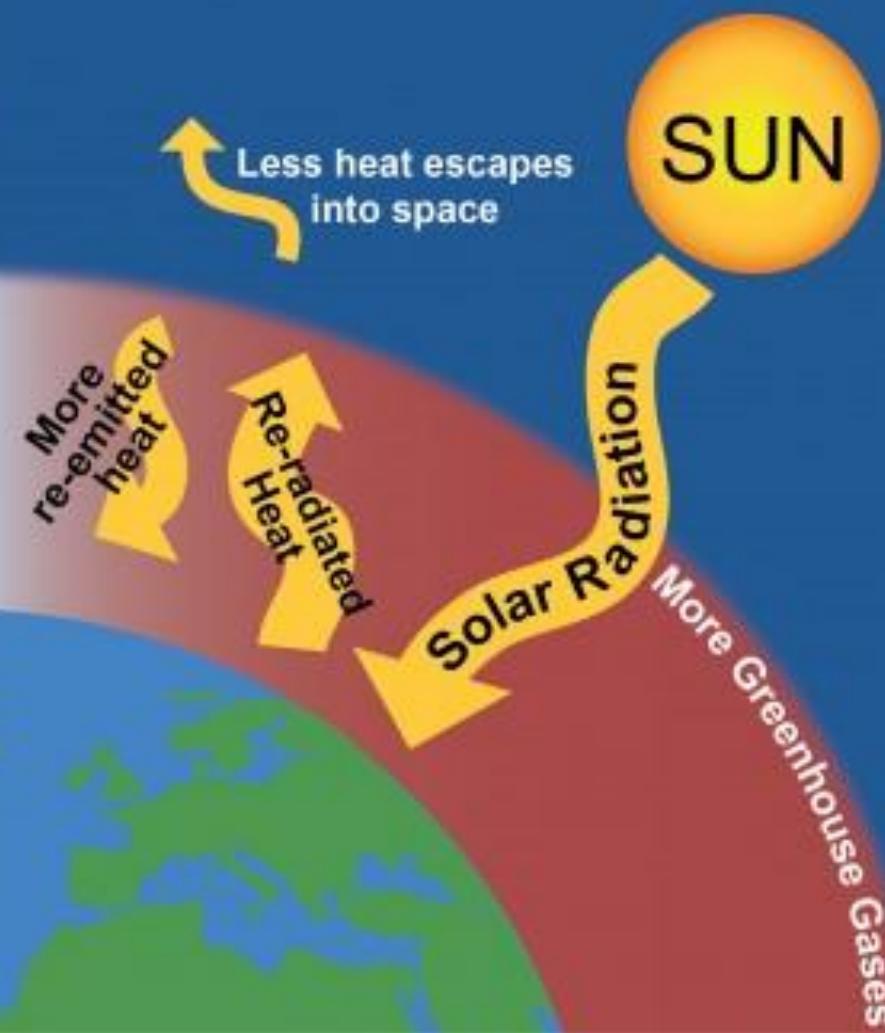
# Planetary Boundaries



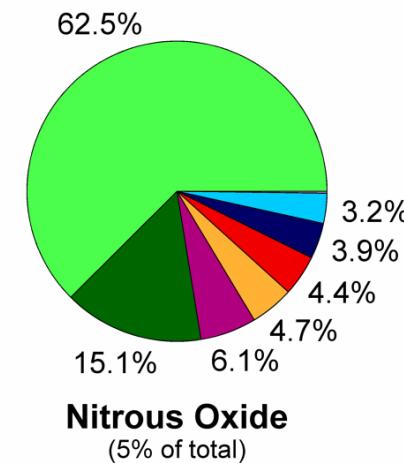
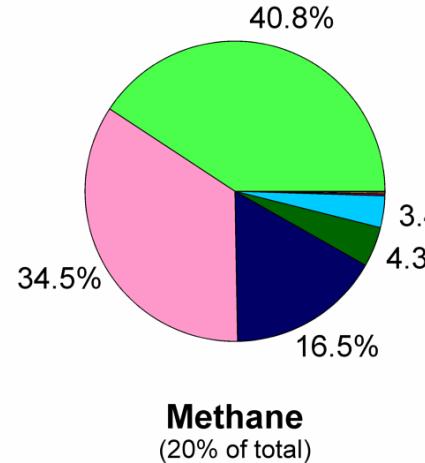
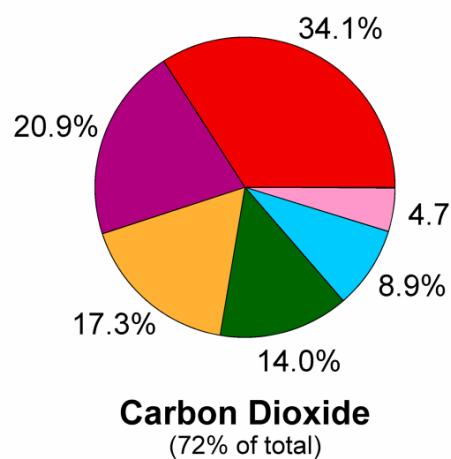
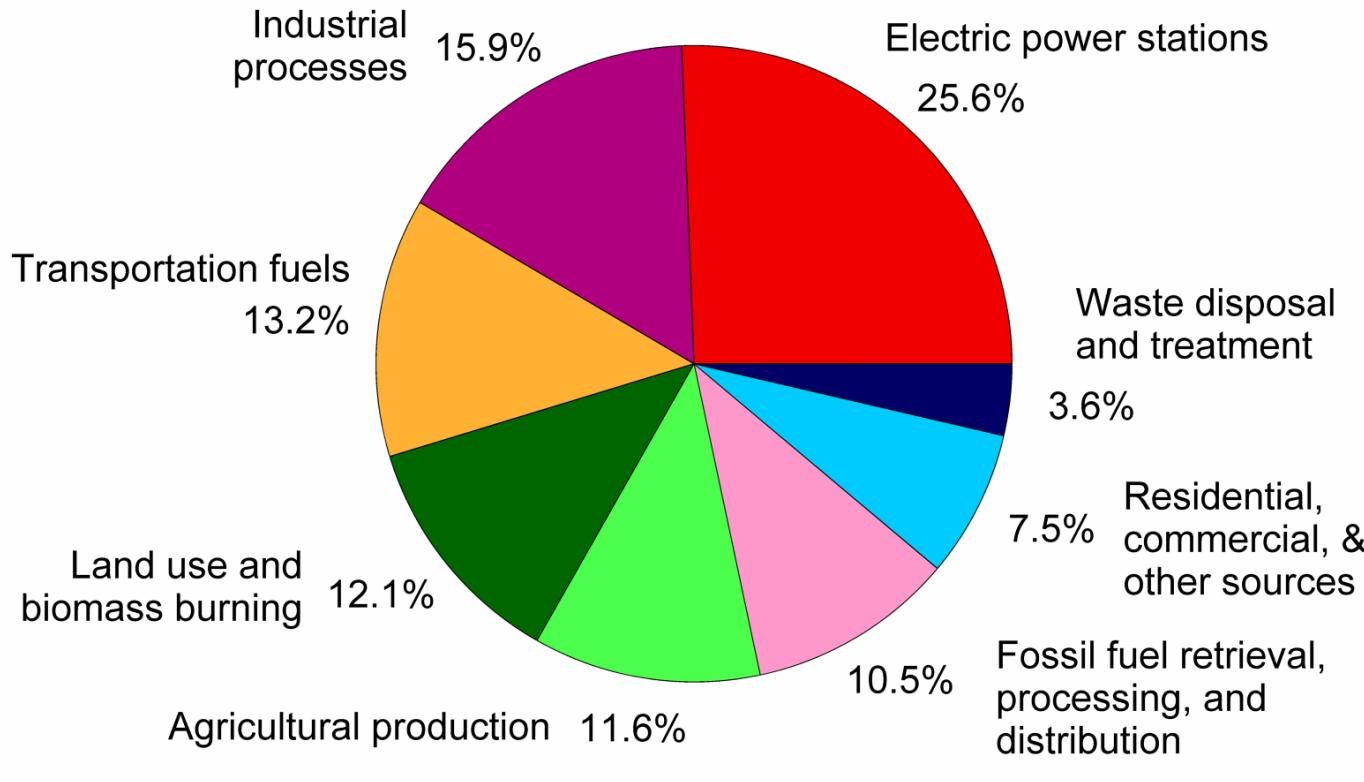
## Natural Greenhouse Effect

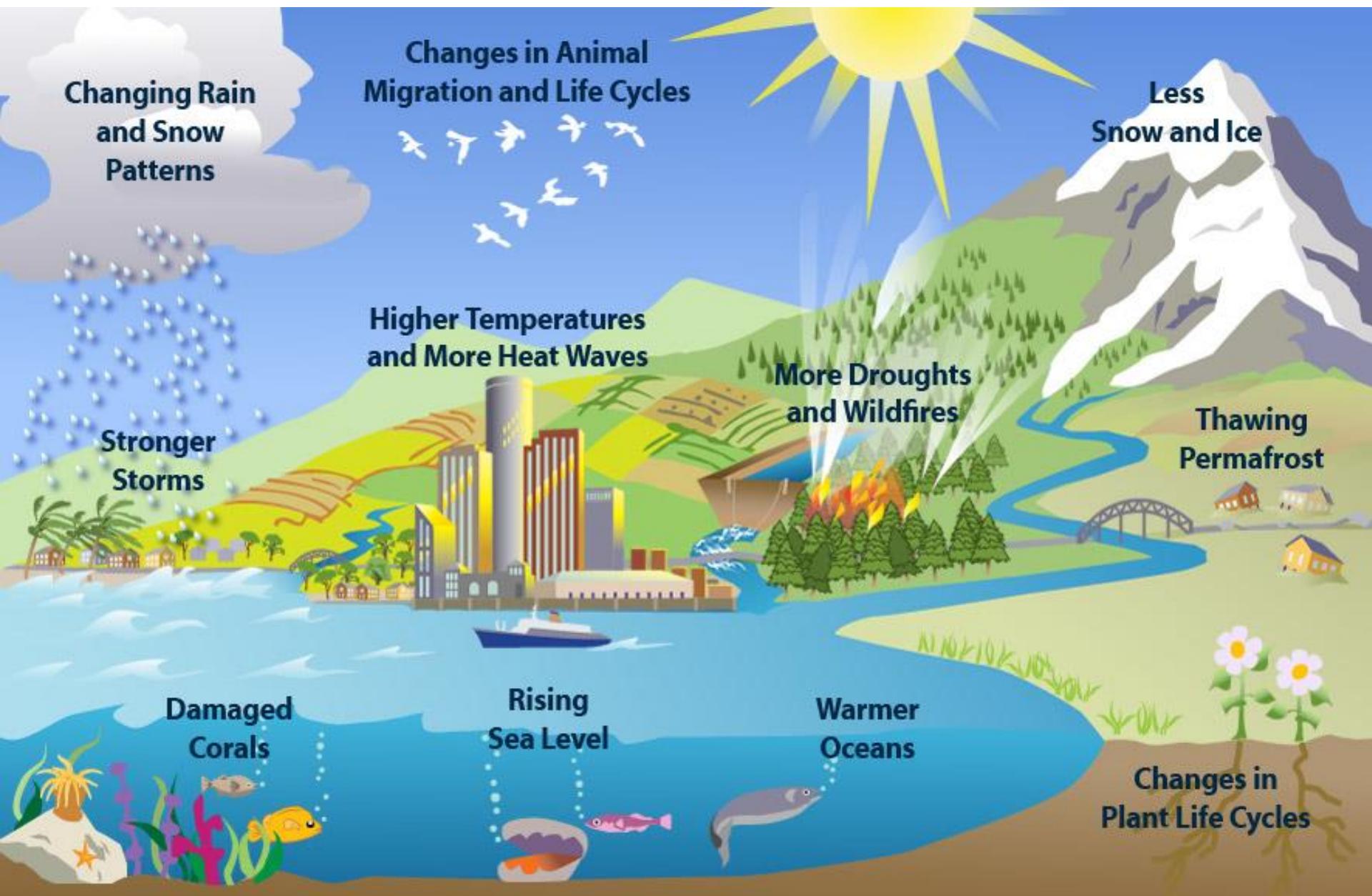


## Human Enhanced Greenhouse Effect

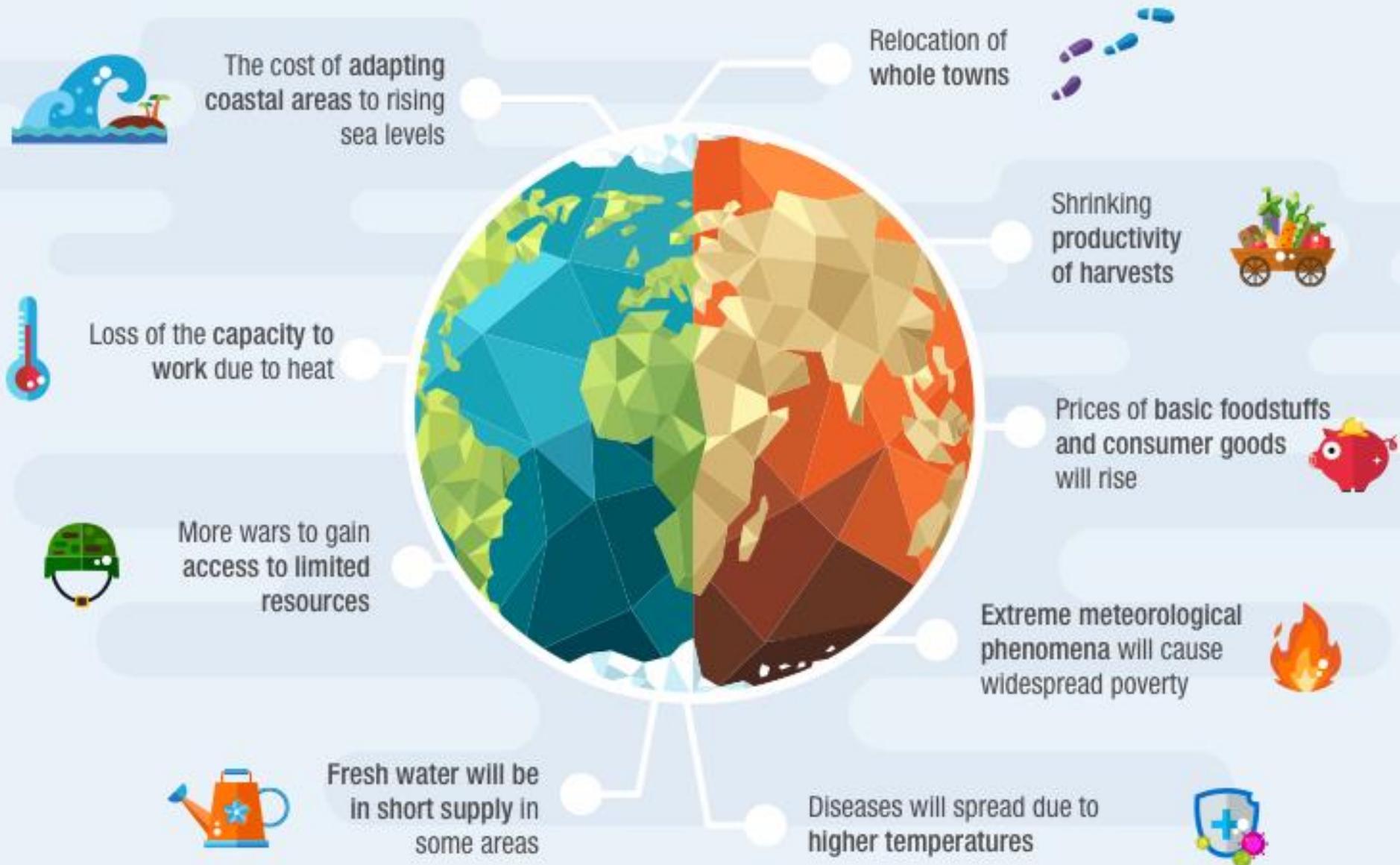


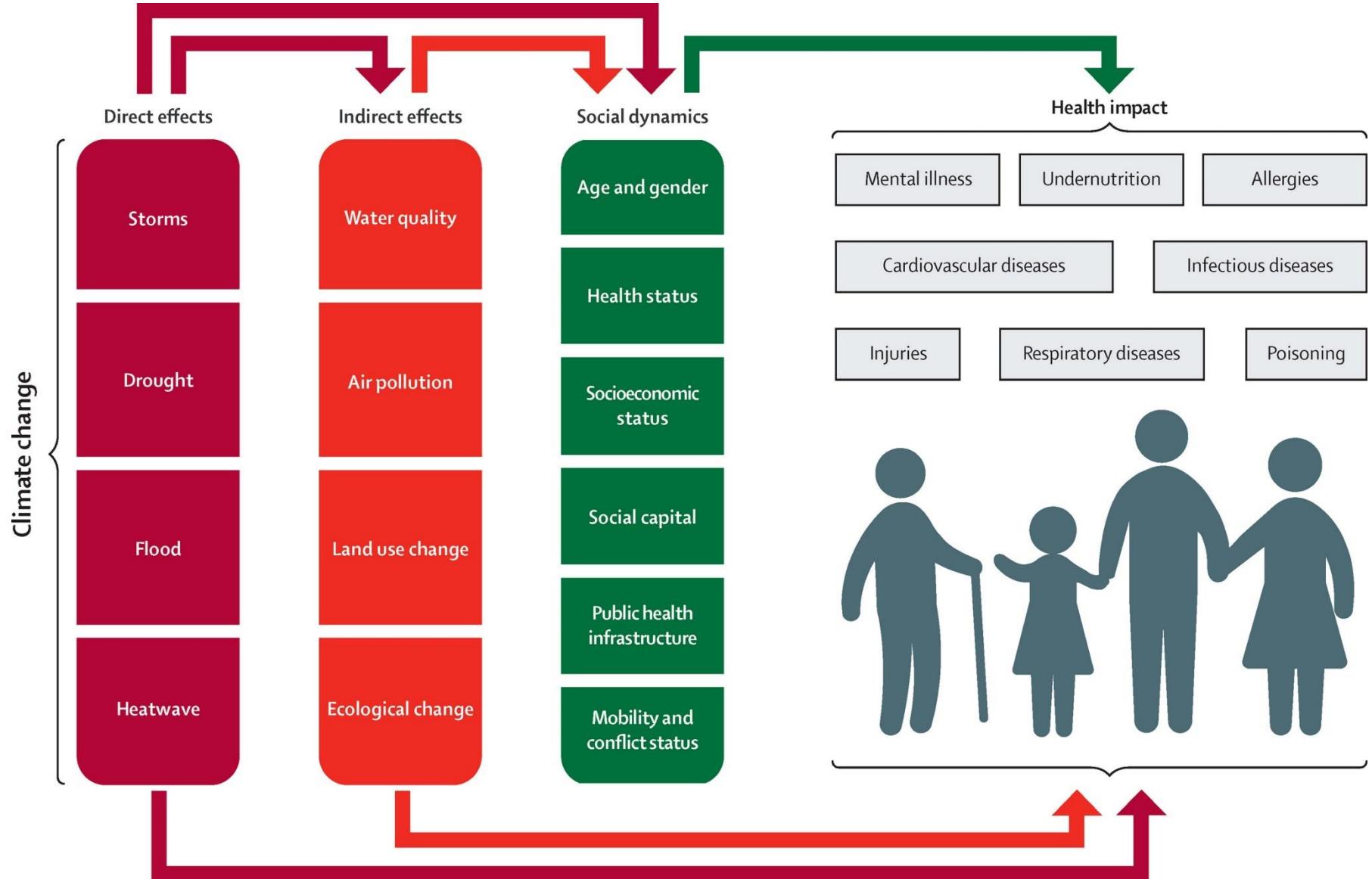
# Annual Greenhouse Gas Emissions by Sector





# SOCIAL AND ECONOMIC IMPACT OF CLIMATE CHANGE



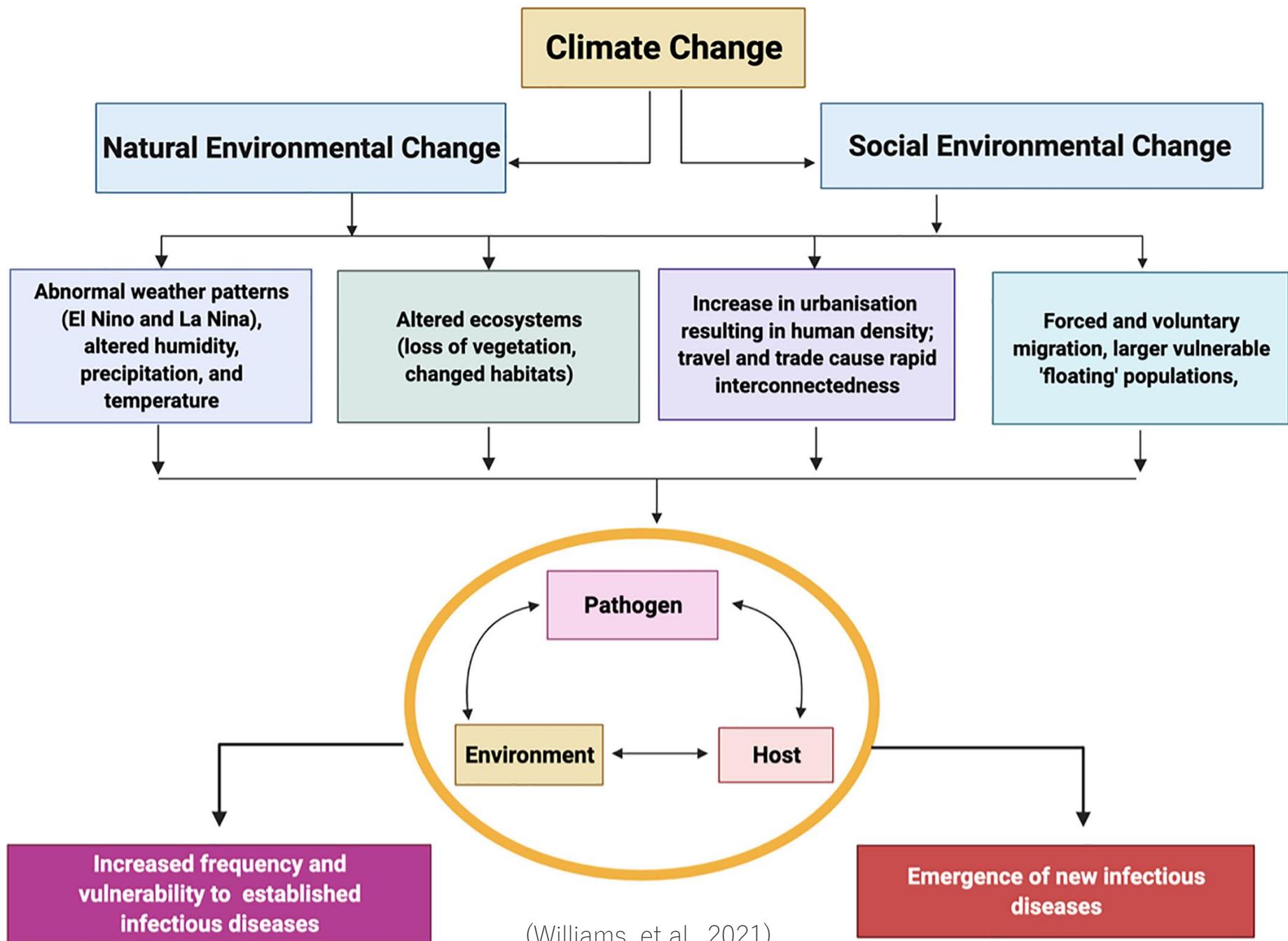


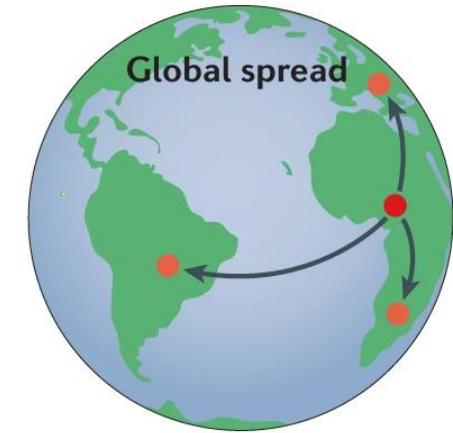
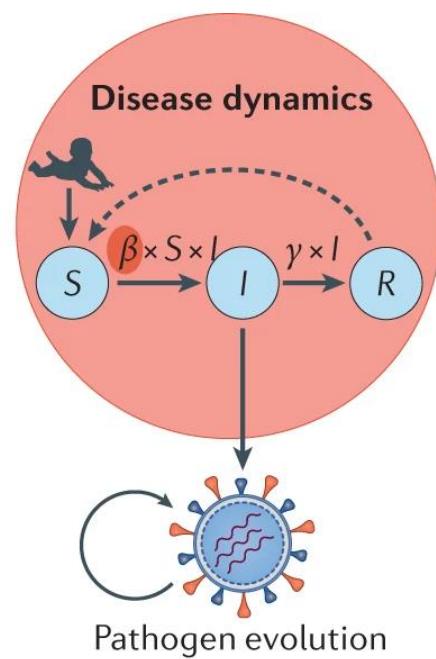
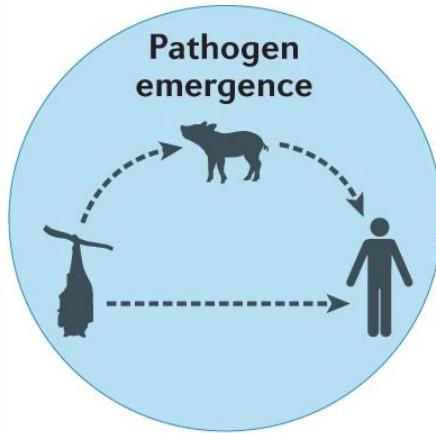
(Watts, et al., 2015)

## The planet's health is essential to prevent infectious disease

The new field of planetary health examines the link between human health and the environment to prevent viral pandemics such as Zika and Ebola



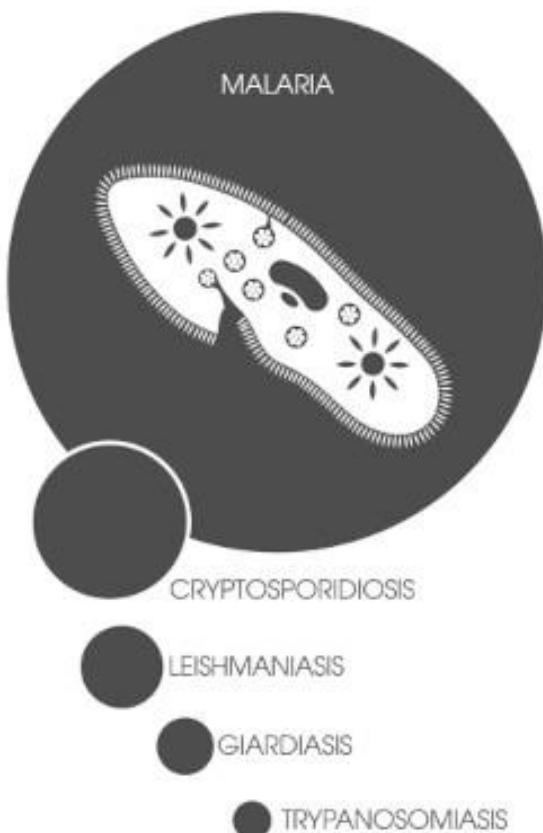




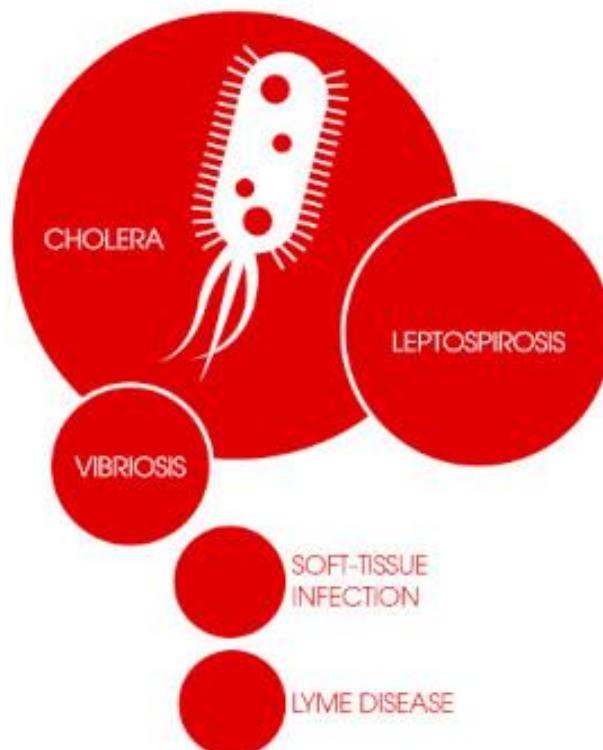
<b>Climatic change</b>	Drives range shifts for reservoir species	Affects transmission and susceptibility	Affects the geographical range of vectors
<b>Technological change</b>			
Transportation	Improved global surveillance		Air transit and high-speed rail affect pace and range of spread
Health care		Vaccination affects dynamics	Improved care reduces burden
<b>Demographic change</b>			
Population growth and land use	Increased contact with reservoir species	Population numbers affect evolution, birth rates affect dynamics	Larger population travelling
Urbanization	Depends on species	Density affects contact rate	Urban population more connected
Ageing	Imunosenescence affects spillover risk	Ageing population increases transmission	Possible larger burden

## Infectious diseases most aggravated by climatic hazards

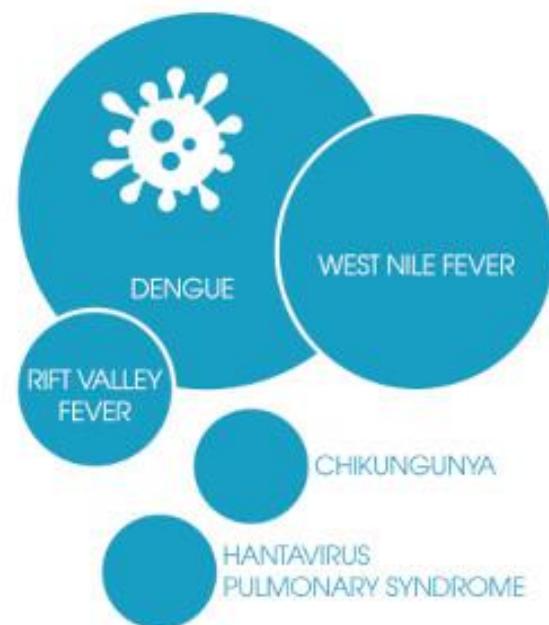
### PROTOZOA



### BACTERIA



### VIRUS



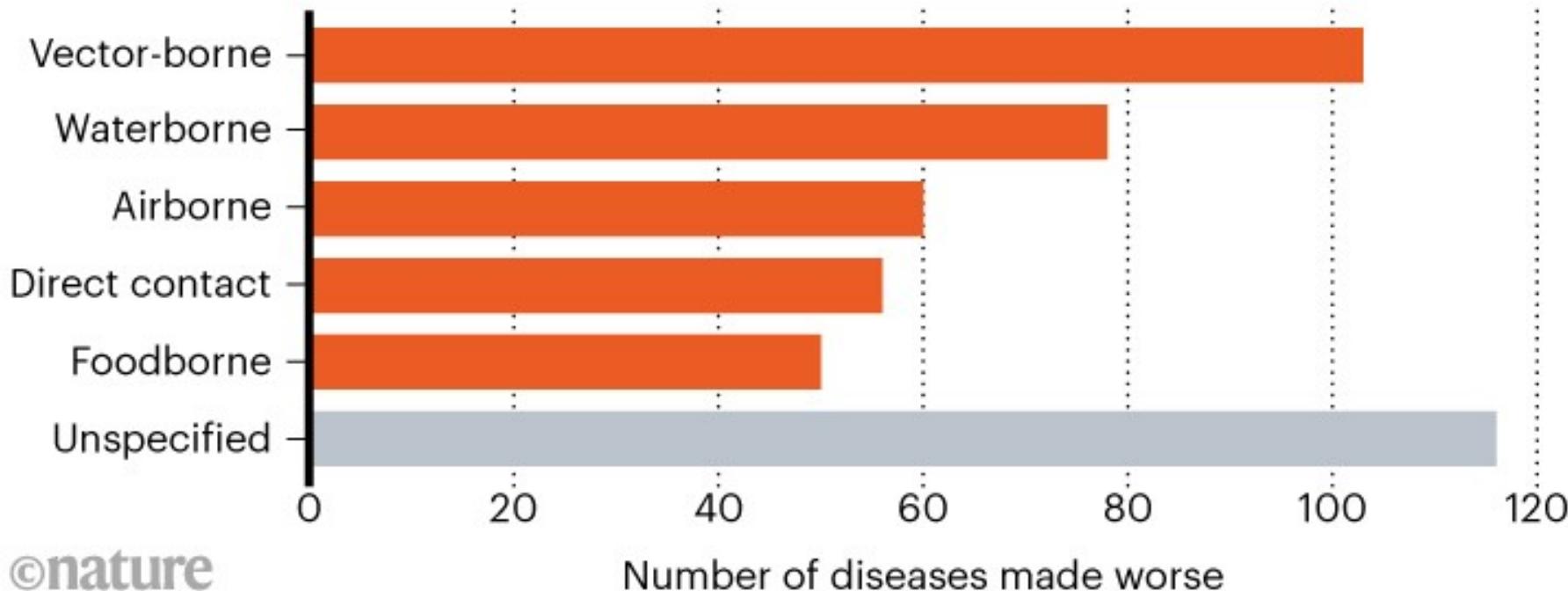
Source: Mora et al. Nature Climate Change, 2022

# Over half of known human pathogenic diseases can be aggravated by climate change

[Camilo Mora](#) , [Tristan McKenzie](#), [Isabella M. Gaw](#), [Jacqueline M. Dean](#), [Hannah von Hammerstein](#), [Tabatha A. Knudson](#), [Renee O. Setter](#), [Charlotte Z. Smith](#), [Kira M. Webster](#), [Jonathan A. Patz](#) & [Erik C. Franklin](#)

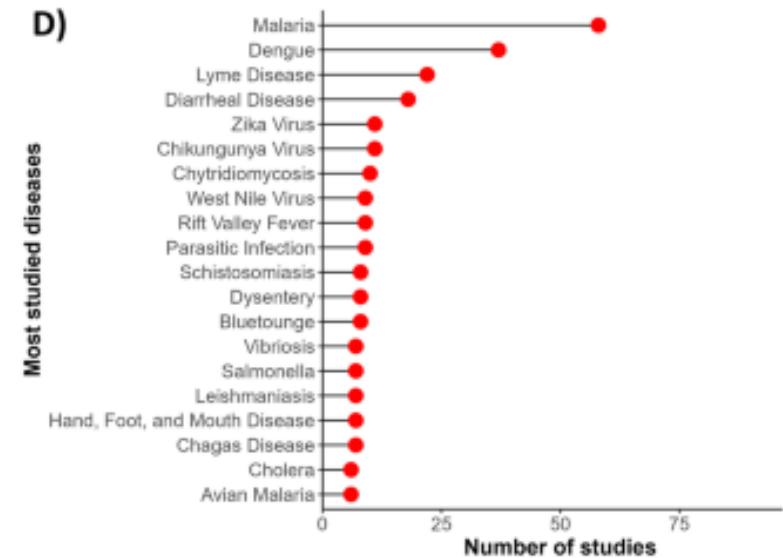
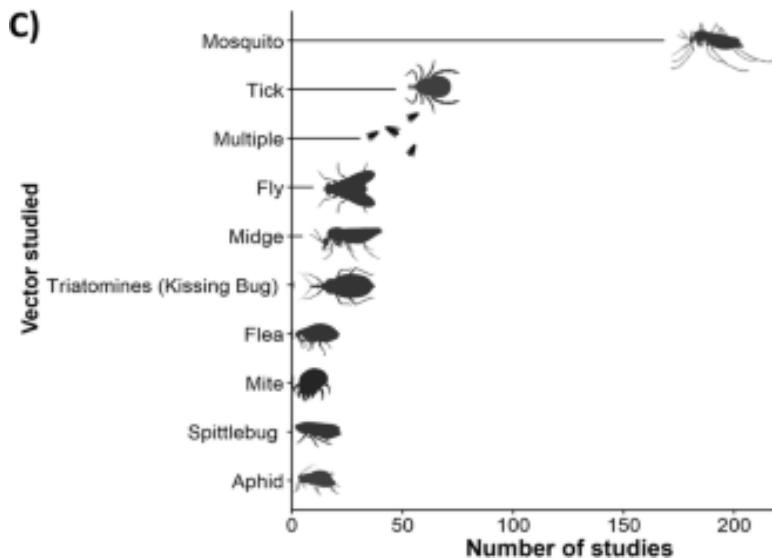
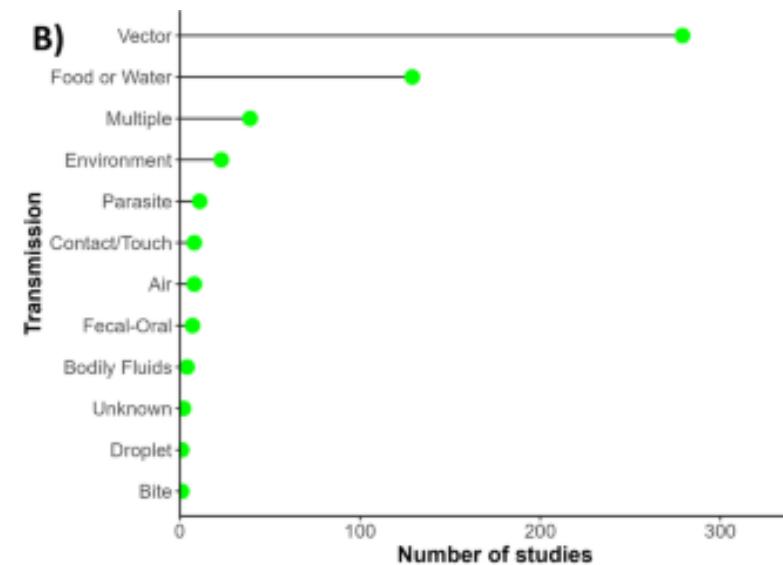
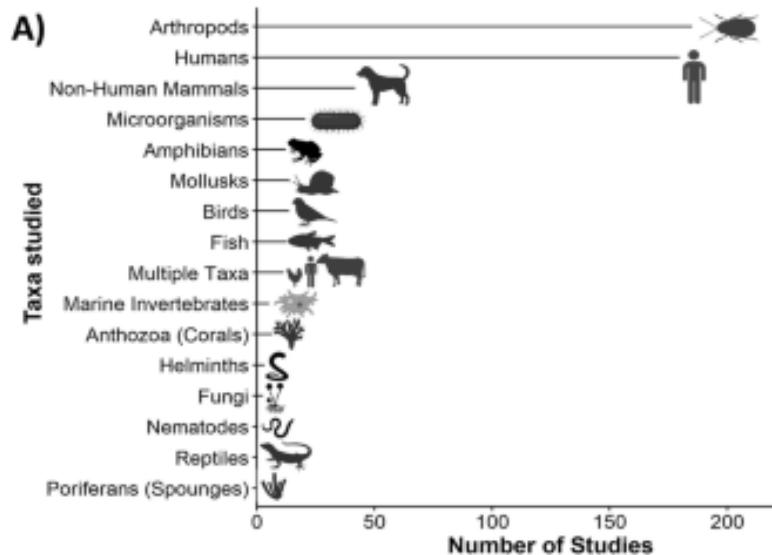
## MODE OF TRANSMISSION

Climate change has exacerbated more than 100 infections spread by vectors, such as mosquitoes, ticks, fleas and birds.

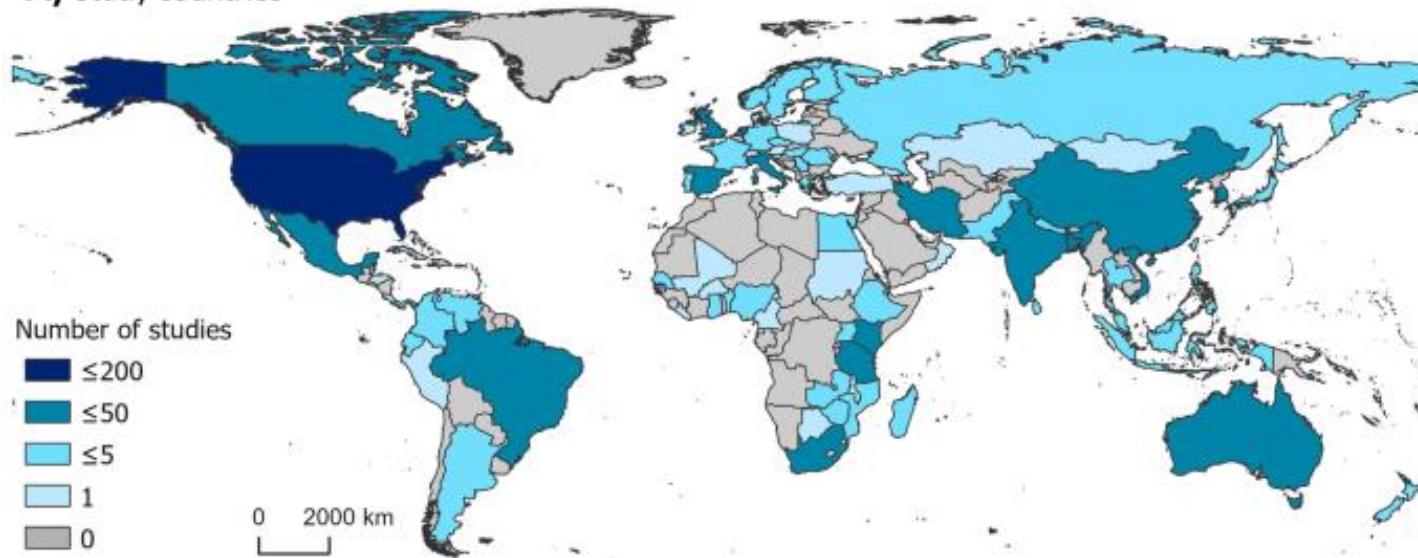


# Climate change and infectious disease: a review of evidence and research trends

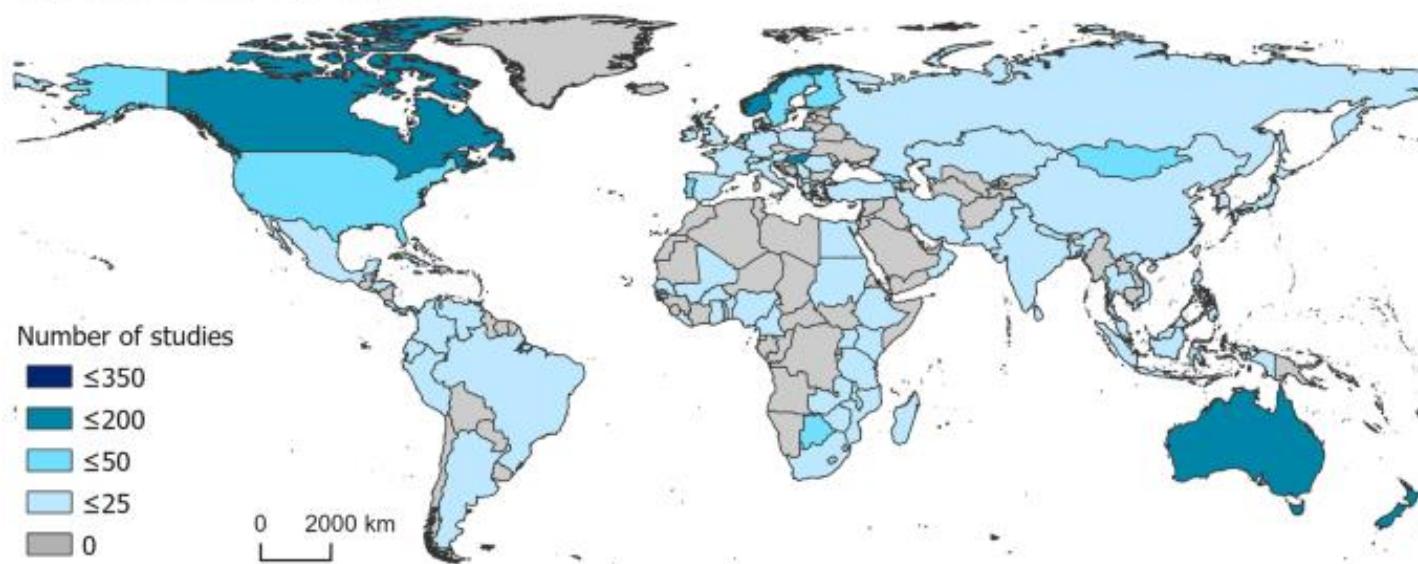
[Paige Van de Vuurst & Luis E. Escobar](#) [✉](#)



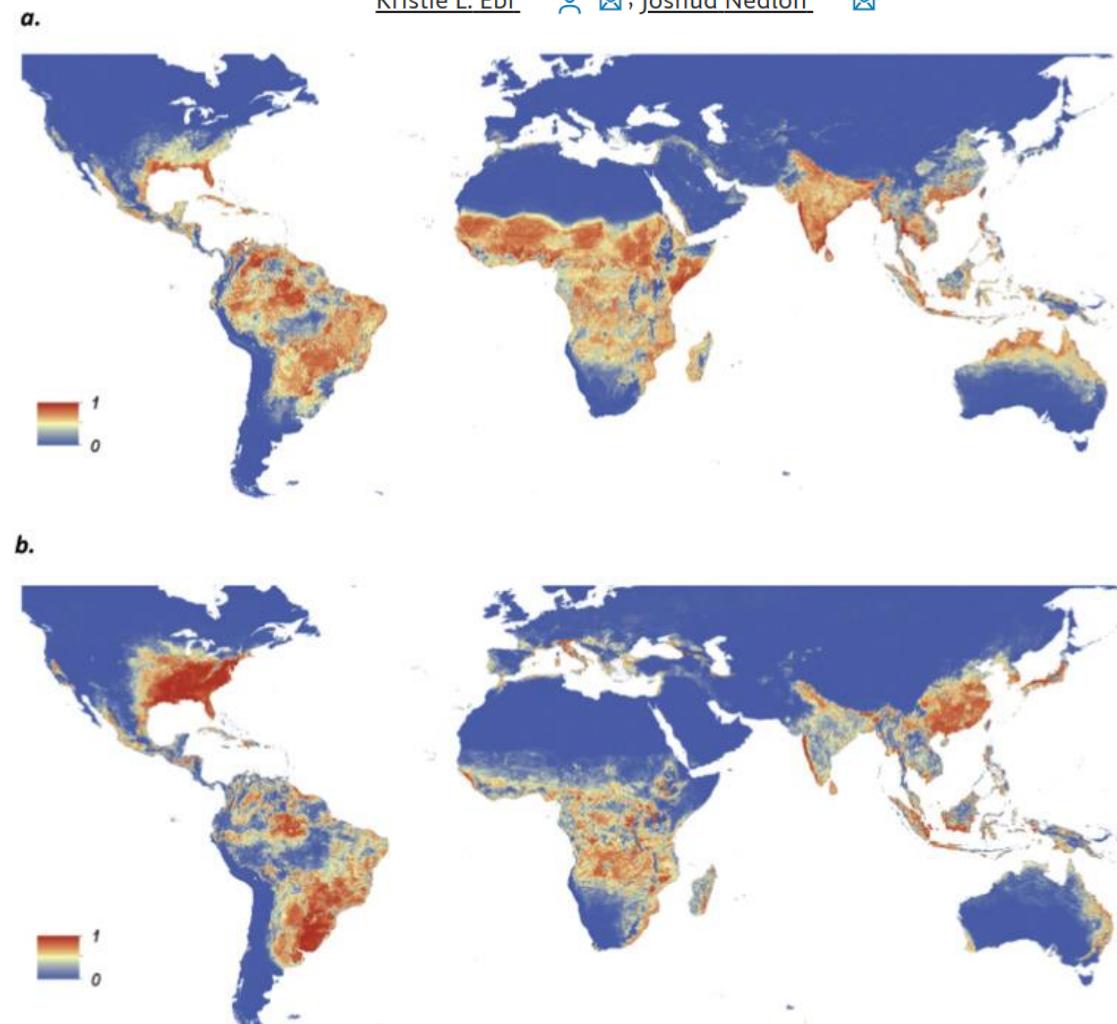
**A) Study countries**



**B) Research effort per capita**



# Dengue cases are surging around the world. Some blame a changing climate.



Dengue in a changing climate

Kristie L. Ebi <sup>a 1</sup> , Joshua Nealon <sup>b 2</sup>

## WILD ANIMALS



Loss of natural habitats and biodiversity

Wild-animal trade  
Increased contact & zoonotic spillover

Increased contact and cross-species transmission



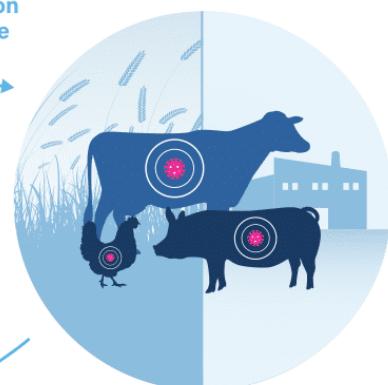
## ECOSYSTEMS & BIODIVERSITY

Deforestation, land-use change, urbanisation

Increased contact & zoonotic spillover



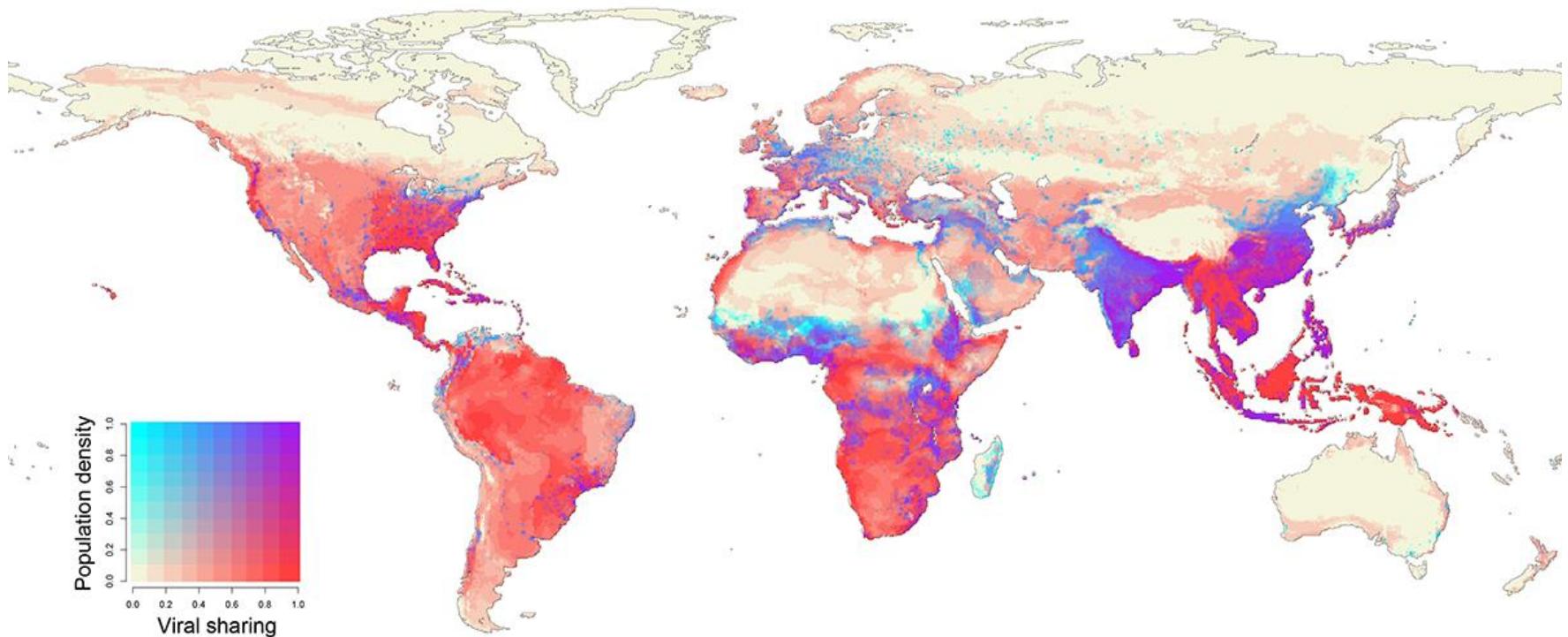
Intensification of agriculture  
Ideal conditions for viral mutation, spread, and spillover



## ANIMAL AGRICULTURE

Negative impact on natural habitats, climate, and biodiversity

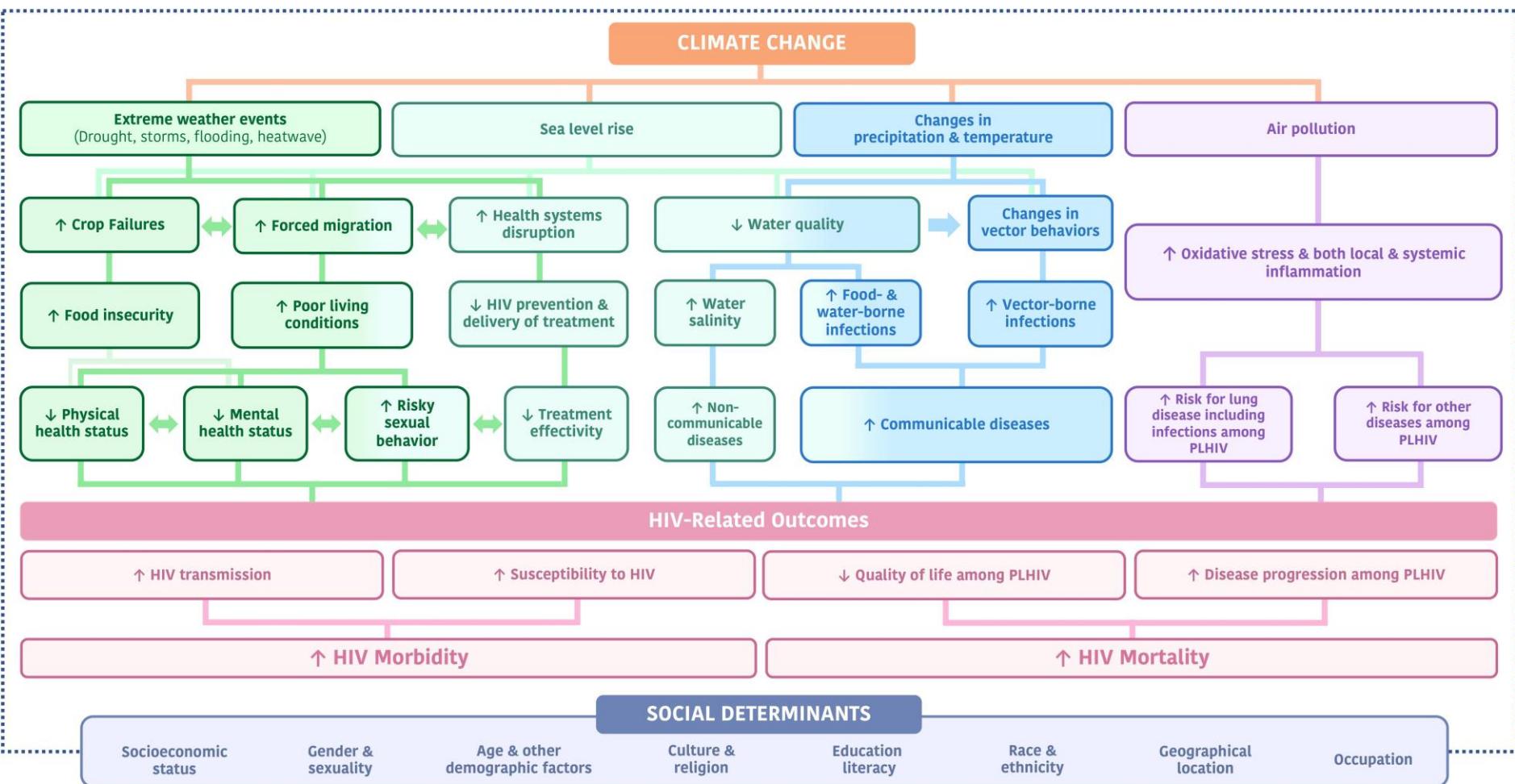
# New Study Finds Climate Change Could Spark the Next Pandemic



'Zoonotic spillovers' expected to rise with at least 15,000 instances of viruses leaping between species over next 50 years

(Carlson, et al., 2022)

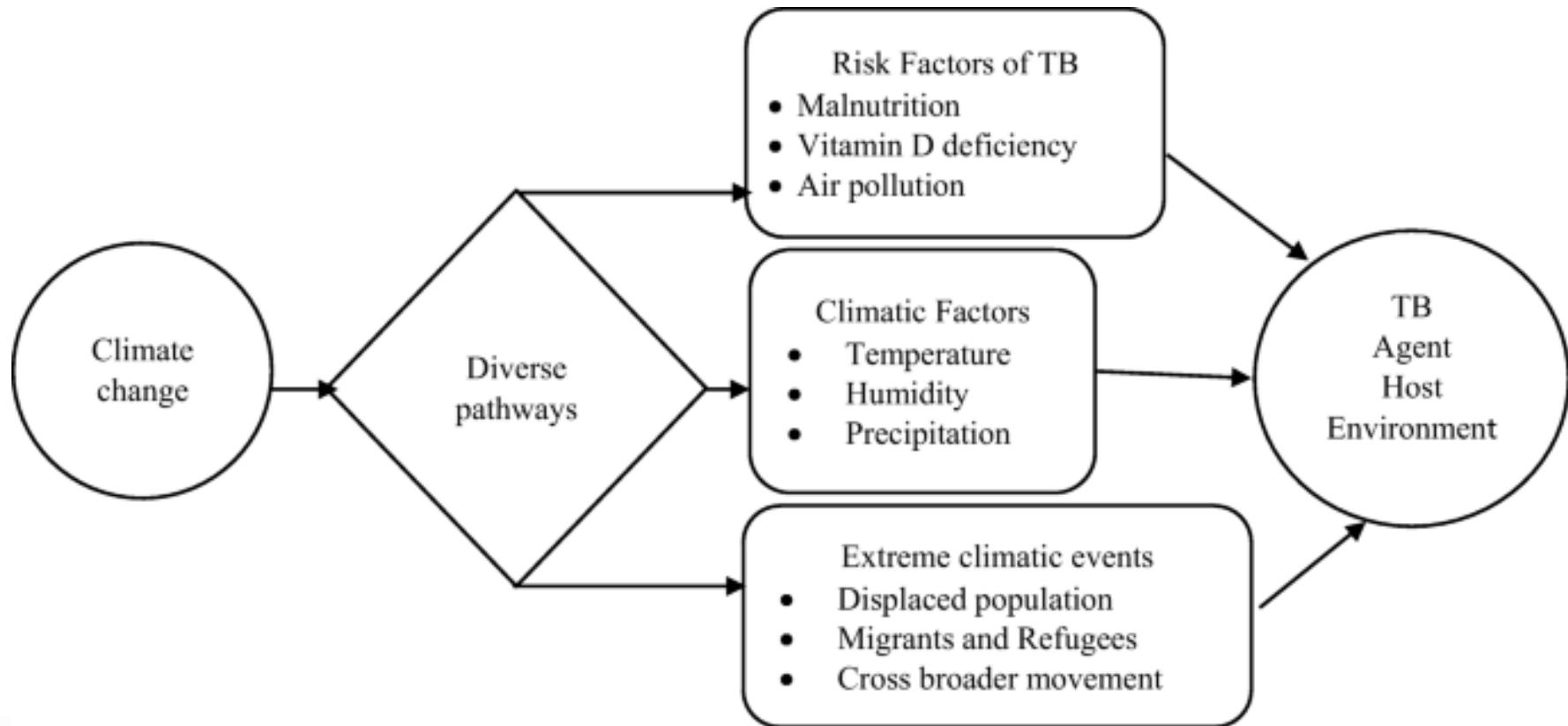
# Pathways Linking Climate Change and HIV/AIDS



(Guinto, et al, 2022)

# Is tuberculosis being left out of climate-health debate?

By **Jenny Lei Ravelo** // 23 March 2023



Review Paper | Published: 16 March 2021

A scoping review on climate change and tuberculosis

[Bijay Maharjan](#) [Ram Sharan Gopali](#) & [Ying Zhang](#)

# U.N. climate chief says two years to save the planet



World likely to breach 1.5C climate threshold by 2027, scientists warn

The medical community is operating as if the global climate system is doing okay!



The COVID-19 outbreak is adding to plastic pollution

# Are we ready to build health systems



that consider the climate?

(Mayhew, et al., 2013)

# MITIGATION

ACTION TO REDUCE EMISSIONS  
THAT CAUSE CLIMATE CHANGE

Sustainable transportation



Clean energy

Energy efficiency



# ADAPTATION

ACTION TO MANAGE THE RISKS OF  
CLIMATE CHANGE IMPACTS

Disaster management & business continuity



Flood protection



Infrastructure upgrades

Water conservation



New energy systems



Local food



Education



Complete communities

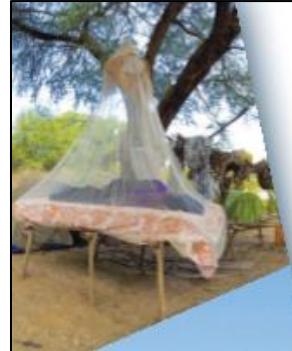


Urban forest



**World Health  
Organization**

## Countries commit to develop climate-smart health care at COP26 UN climate conference



### Climate-Smart Healthcare

Low-Carbon and Resilience  
Strategies for the Health Sector

#### Sustainability

- Lifestyle disease prevention
- Care closer to home
- Low VOC materials
- Local food suppliers
- Waste recycling
- Air quality

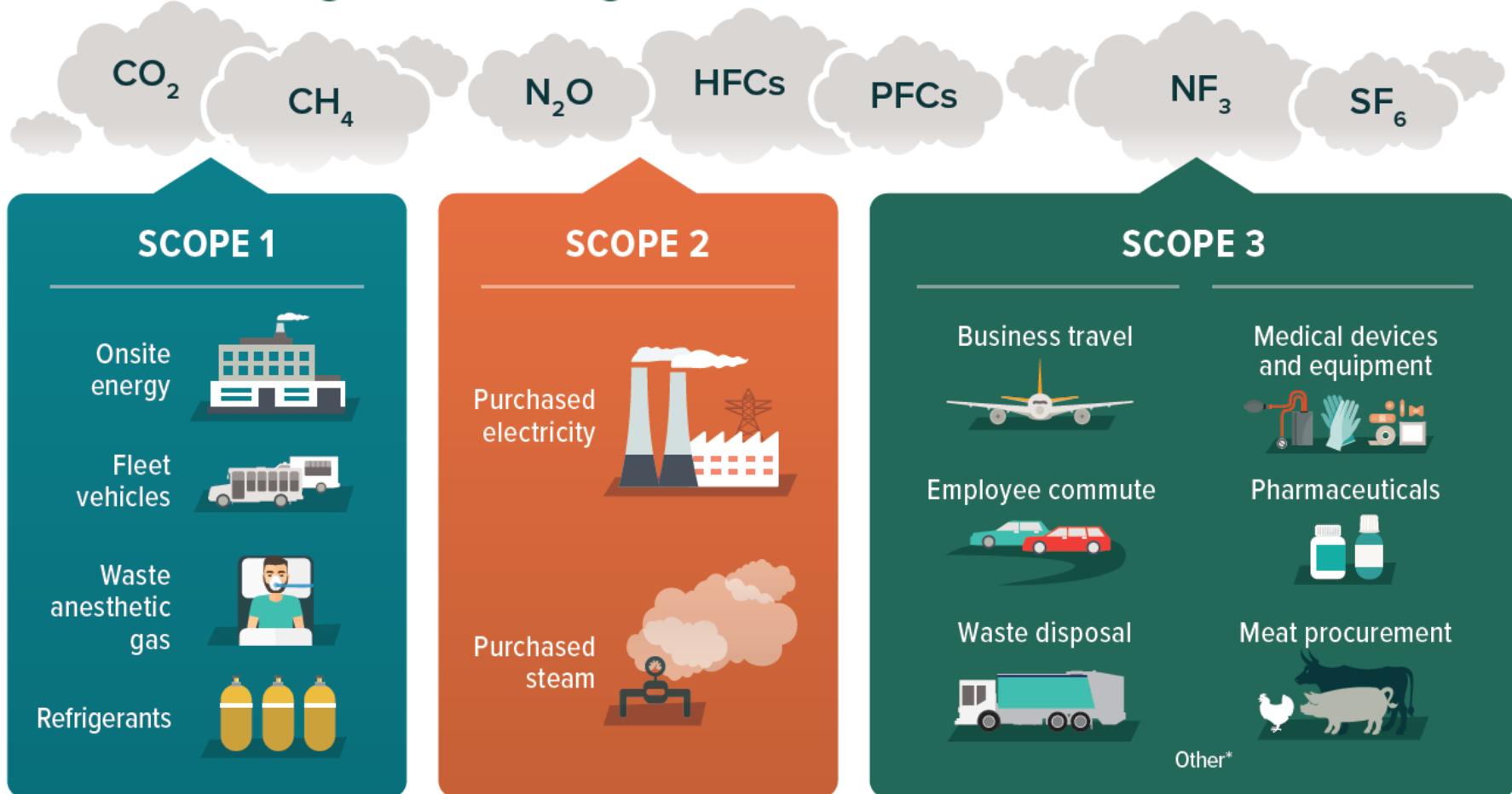
#### Sustainability and Resilience

- Health system strengthening
- Universal health coverage
- Energy, water efficiency
- Daylighting
- Natural ventilation
- Rainwater capture
- Solar shading

#### Resilience

- Risk and disaster preparedness and planning
- Climate related disease monitoring
- Flood barriers
- Elevation
- Backup generators

# Common greenhouse gas emission sources in health care



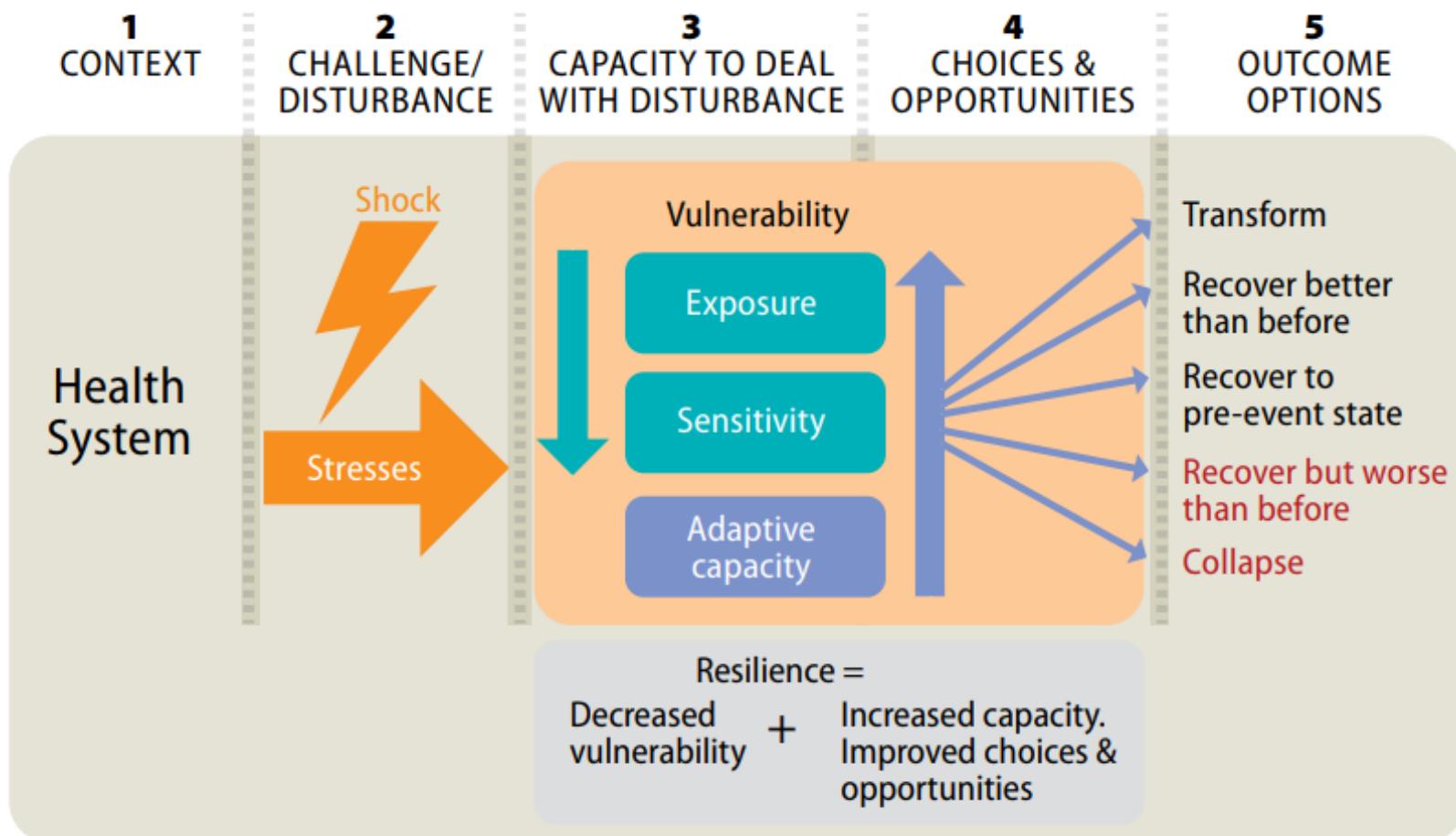
Carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF<sub>3</sub>), and sulphur hexafluoride (SF<sub>6</sub>)

\*Scope 3 other: These are the most common emissions for health care, but there are other relevant categories in Scope 3. To review all 15 categories covered in Scope 3, visit the [GHG Protocol Scope 3 Guidance](#).

Source: Practice Greenhealth

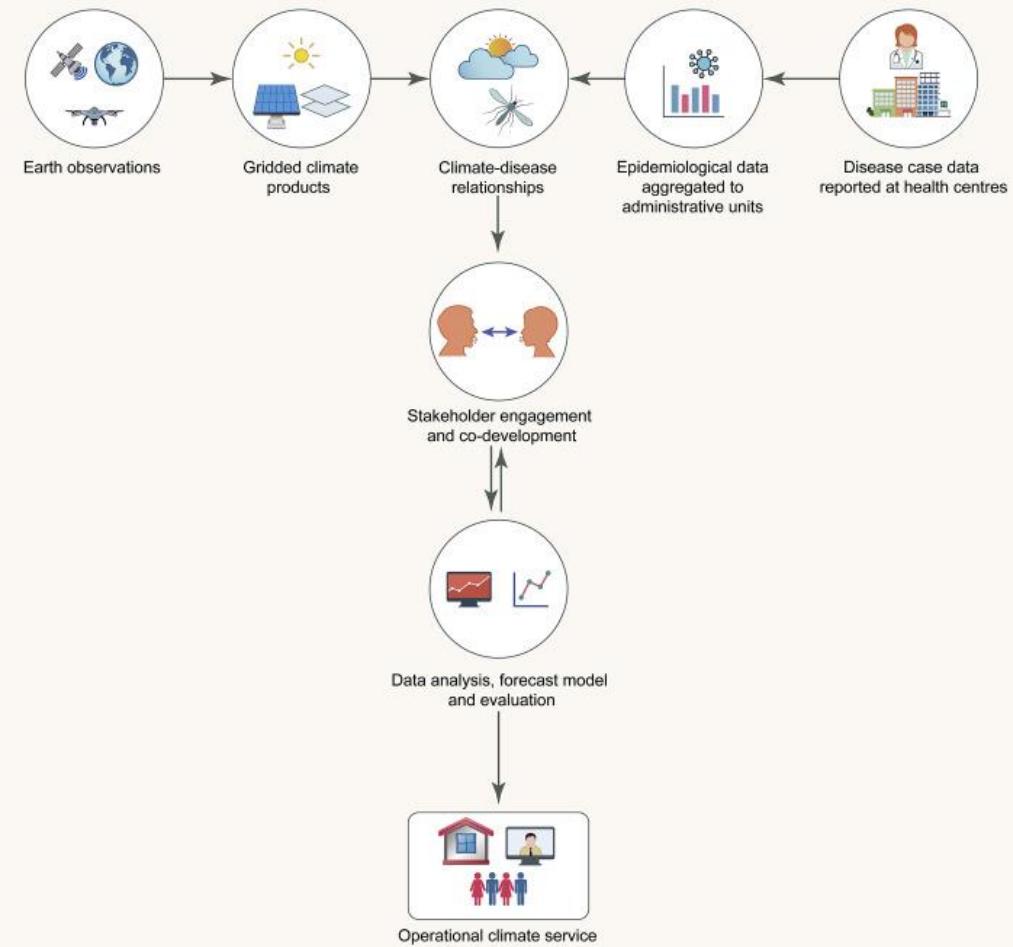


# Climate-resilient health systems





# Climate Services for Health



(Fletcher, et al., 2021)

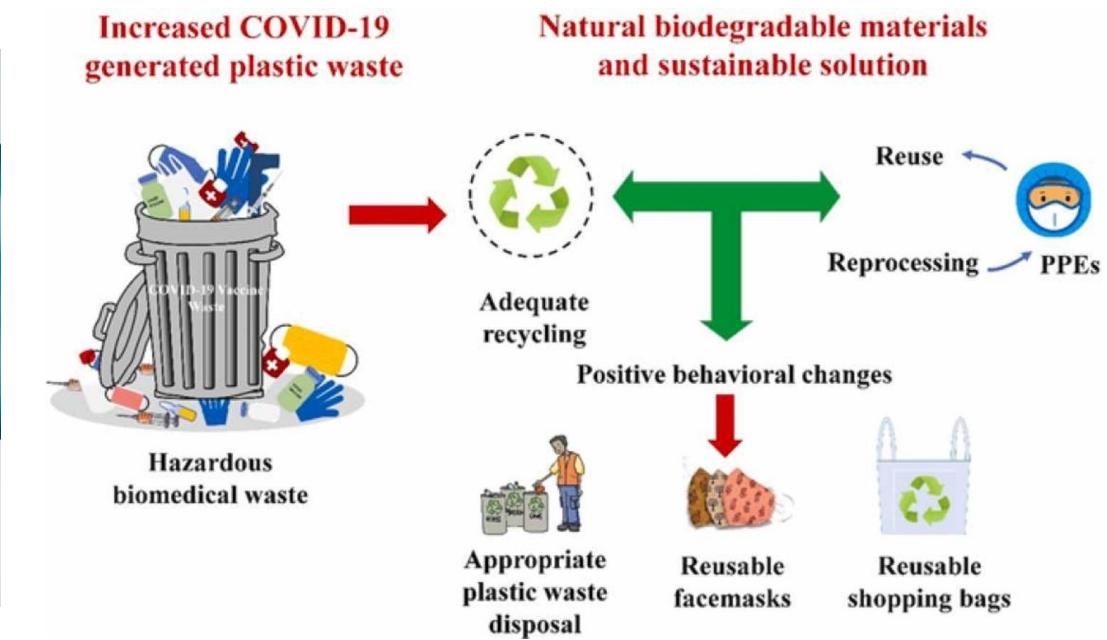


# Opinion: Vaccine innovation is a critical response to the climate crisis

Climate is increasing the rate of certain diseases and negatively impacting health.

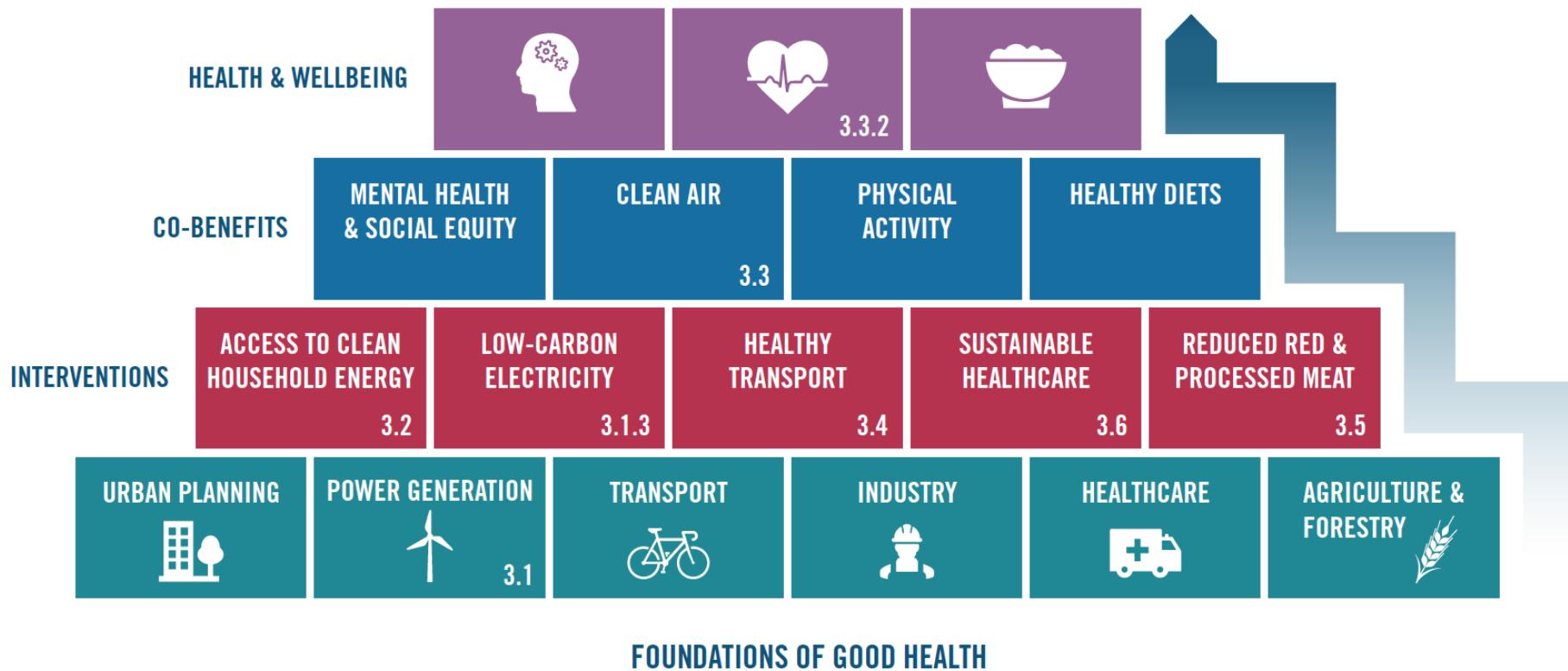
Continued innovation of vaccines to fight climate-sensitive diseases will undoubtedly be a critical tool in the public health response.

By **Thomas Triomphe** // 25 April 2023



(Hasija, et al., 2022)

# Improving the Health of People and Planet Through Cross-Sectoral Action



(Lancet Countdown on Health and Climate Change)

CLIMATE CHANGE  
+ IS A +  
HEALTH EMERGENCY



# Advancing the health of people and planet

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