



Population Growth and Pandemics

Review



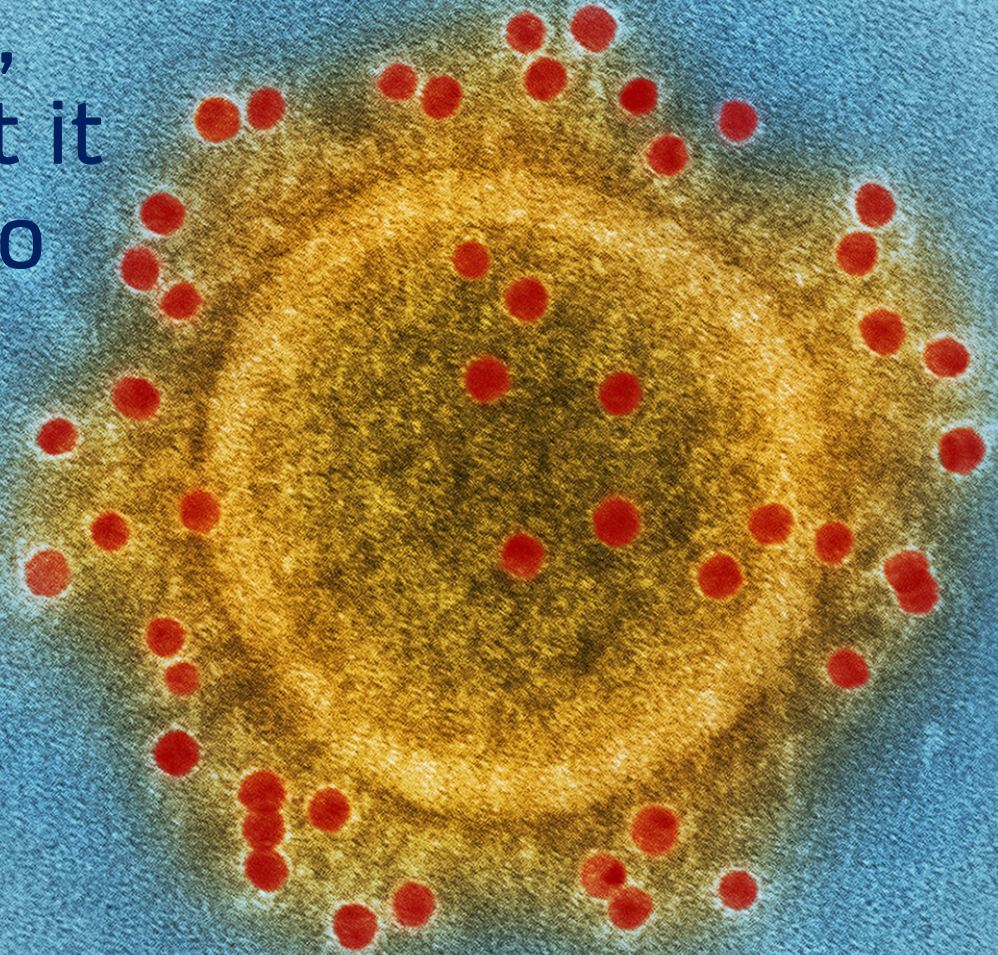
- Population growth is one important contributor to climate change and increases climate vulnerability throughout the world.
- Some of the world's fastest growing regions are also the most vulnerable to climate change. In this context, population growth means that more people will be exposed to climate impacts who lack the resources necessary to readily adapt and recover.

Review

- The world's most climate vulnerable populations will experience severe climate impacts despite contributing the least to the problem.
- Climate solutions must include grassroots leadership and be rooted in principles of human rights and social justice.



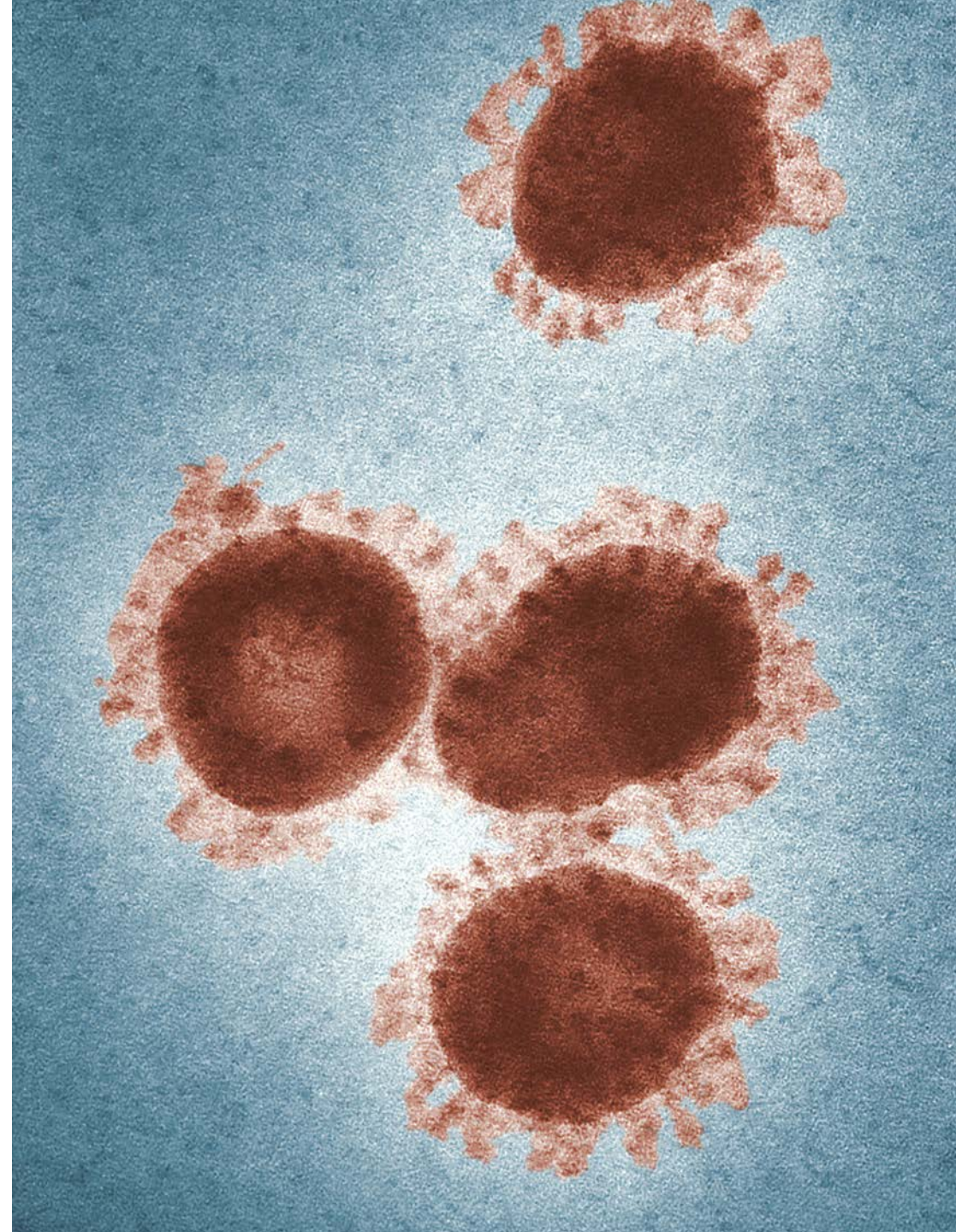
Covid-19 is a **zoonotic disease**, which means that it was transferred to humans from an animal host.



Viral animal-to-human spillovers are increasing because of habitat destruction and damage to ecosystems.

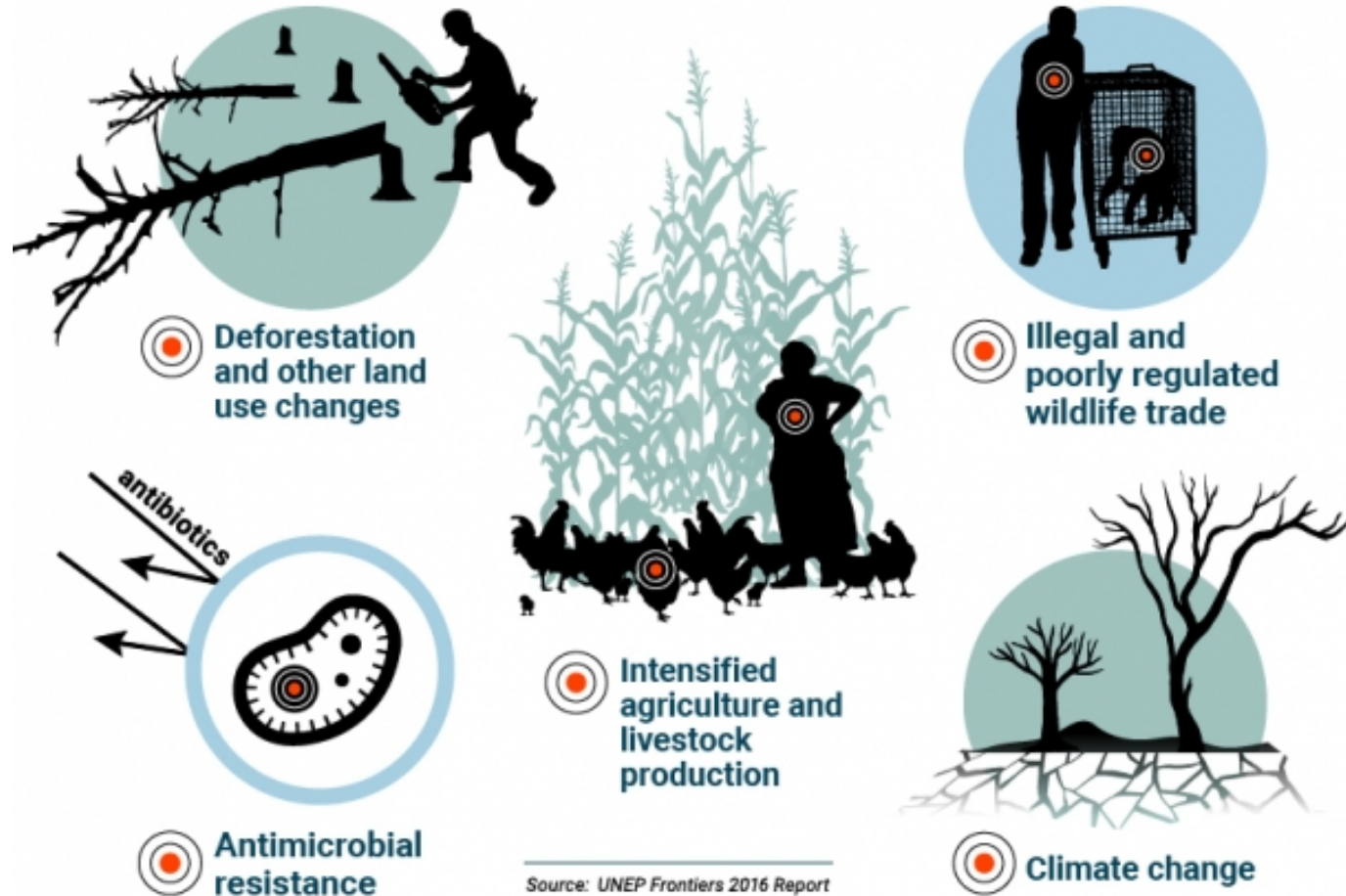
An estimated 75% of new infectious diseases are zoonotic, or a direct result of human-to-animal contact.

- **Zika** - mosquitos
- **Ebola** - bats and/or nonhuman primates
- **SARS** - bats
- **AIDS** - chimpanzees
- **Avian influenza** - poultry
- **MERS** - bats
- **Influenza A** - wild birds to pigs to humans
- **COVID-19** - bats





What factors are increasing zoonosis emergence? (Diseases transmitted from animals to humans)



Population growth drives deforestation, intensified agriculture, and climate change.



Zoonotic Diseases

- Virus “hotspots” include the native habitats of zoonotic disease hosts like rodents and bats.
- While the majority of the world’s mammals are rodents, bats make up about 50% of mammals in the most biodiverse tropical regions.





Viral Spillover

- **Exotic wildlife trade** (for consumption, traditional medicine, and pets), especially at “wet markets,” increases the risk of animal-to-human spillover. Exotic meat sales are becoming more popular in the world’s quickly growing megacities (defined as a city with more than 10 million people).
- **Intensified agriculture** also increases this risk, as livestock are kept in crowded, often unsanitary spaces and fed antibiotics and hormones meant to help prevent sickness and promote fast growth.
- **Habitat destruction** - As the world’s population continues to grow, humans are coming into closer contact with vectors and pathogens by destroying wildlife habitats and reducing the number of predators. Without predators, the amount of rodents and other disease carriers quickly increases.





Spillover Example: Nipah Virus

- Scientists believe that this virus was transferred to humans because of environmental change and agricultural intensification.
 - When rainforests were cleared and repurposed to produce palm oil, lumber, and livestock, native fruit bat populations were forced to relocate.
 - Some fled to areas surrounding pig farms, where mango and other fruit trees were prevalent.
 - Bat feces and saliva infected the pigs, and the pigs spread the virus to farm and industry workers.





Pandemics and Population Growth

- The continued growth of the human population is worsening the threat of infectious disease outbreaks.
 - Scientists believe that animal-to-human interaction will continue to increase.
- The world population has increased from 1 billion in 1800 to 7.8 billion today.
- Although growth *rates* are falling, the world's population is projected to continue to grow into the next century.
 - The UN projects that the population will grow to around 8.5 billion in 2030, 9.7 billion in 2050, and 10.9 billion in 2100.

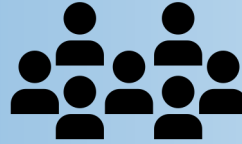




The interconnected challenges facing the world today

Population growth

7.8bn people today expect
9.8bn by 2050



Demand for food and energy
Pressure on scarce resources
Negative environmental impact

Source: United Nations, 2020

Climate change

Linked to fossil fuels and tropical
deforestation



CO₂ rising 10 times faster than any sustained rise in
800,000 years
Pushes planetary boundaries
Accelerated biodiversity loss

Source: NASA, NOAA, IPCC, 2020*

Deforestation

Four commodities:
Soy, palm oil, beef, lumber

15,000 sq miles tropical land destroyed each year



Human intrusion biodiversity hotspots
Disruption and disturbance
Ecosystem degradation

Source: NASA, NOAA, IPCC, 2020*

Consumption and production

Increasing demand for
animal protein



More than **50bn** animals consumed



50bn



1.5bn



1.5bn



1.5bn

Unsustainable production and consumption
Reduce food waste, increase plant-based
Tackle overuse and misuse of antibiotics

Source: World Economic Forum 2020

Health and wellbeing

Ensure healthy lives
Combat communicable disease



Emergence of infectious disease
Underprepared health systems
Dislodged viruses

Source: Forbes 2020

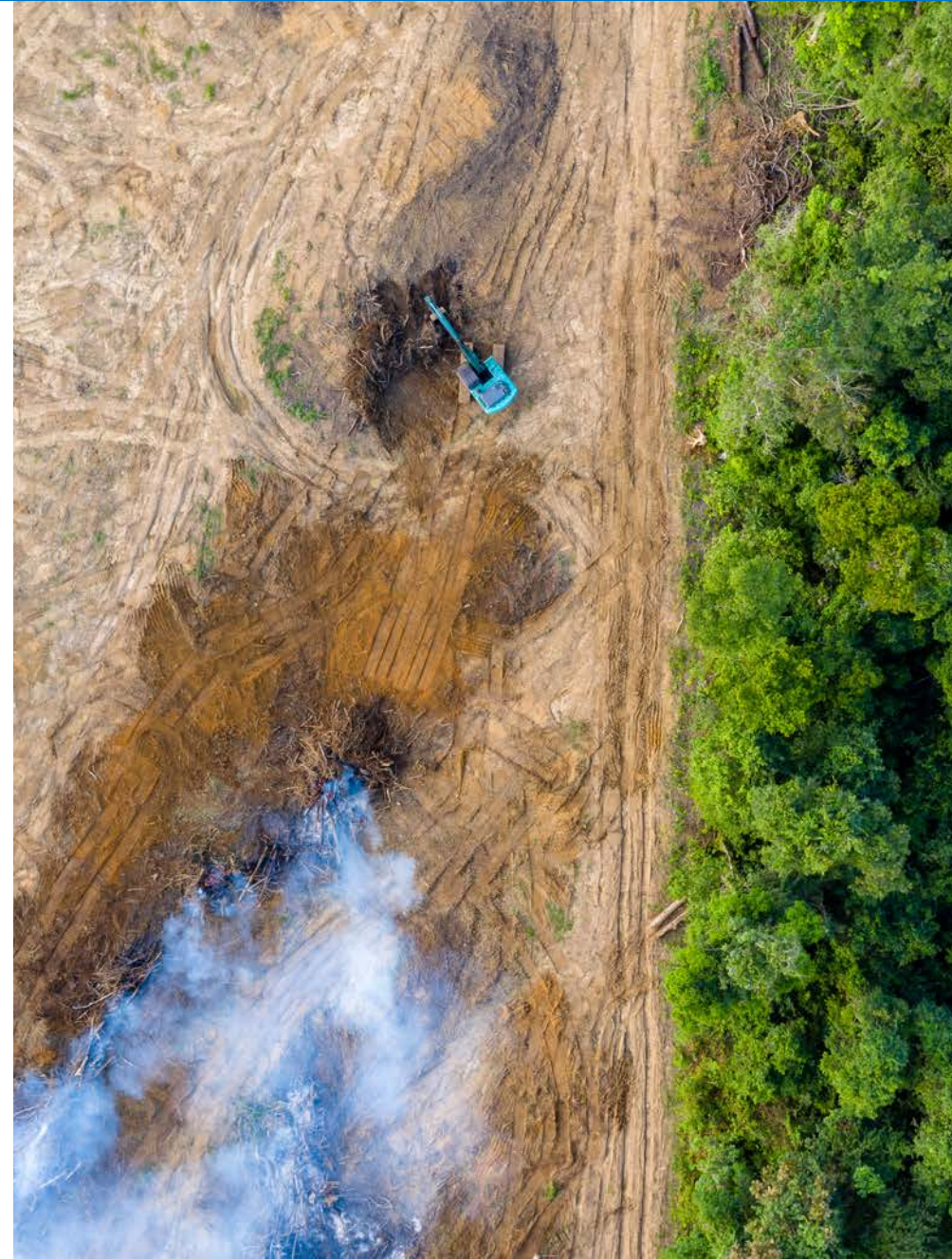


Case Study: Brazilian Amazon

- Deforestation in the Brazilian Amazon is increasing substantially. Since 2019, the rainforest has opened for loggers, ranchers, and miners, which has caused a spike in forest clearance.
 - From January to March of 2020, deforestation rose by 51% compared to 2019 levels.
- Forest clearance and low rainfall during dry seasons creates conditions for large wildfires.

Source: IPAM 2020

Rainforest being cleared to make way for palm oil and rubber plantations in the Amazon. Adobe Photos



Case Study: Brazilian Amazon

- Even during the COVID-19 lockdown, many believe illegal loggers and miners have continued to work in the Amazon with little to no regulation.
- As the exploitation of the Amazon's natural resources continues, COVID-19 is spreading to indigenous communities throughout the region.
 - Smoke from wildfires increases the mortality risk, as it contains pollutants that have been linked to increased risk of dying from the virus.
 - Both smoke from forest fires and COVID-19 attack the respiratory system.

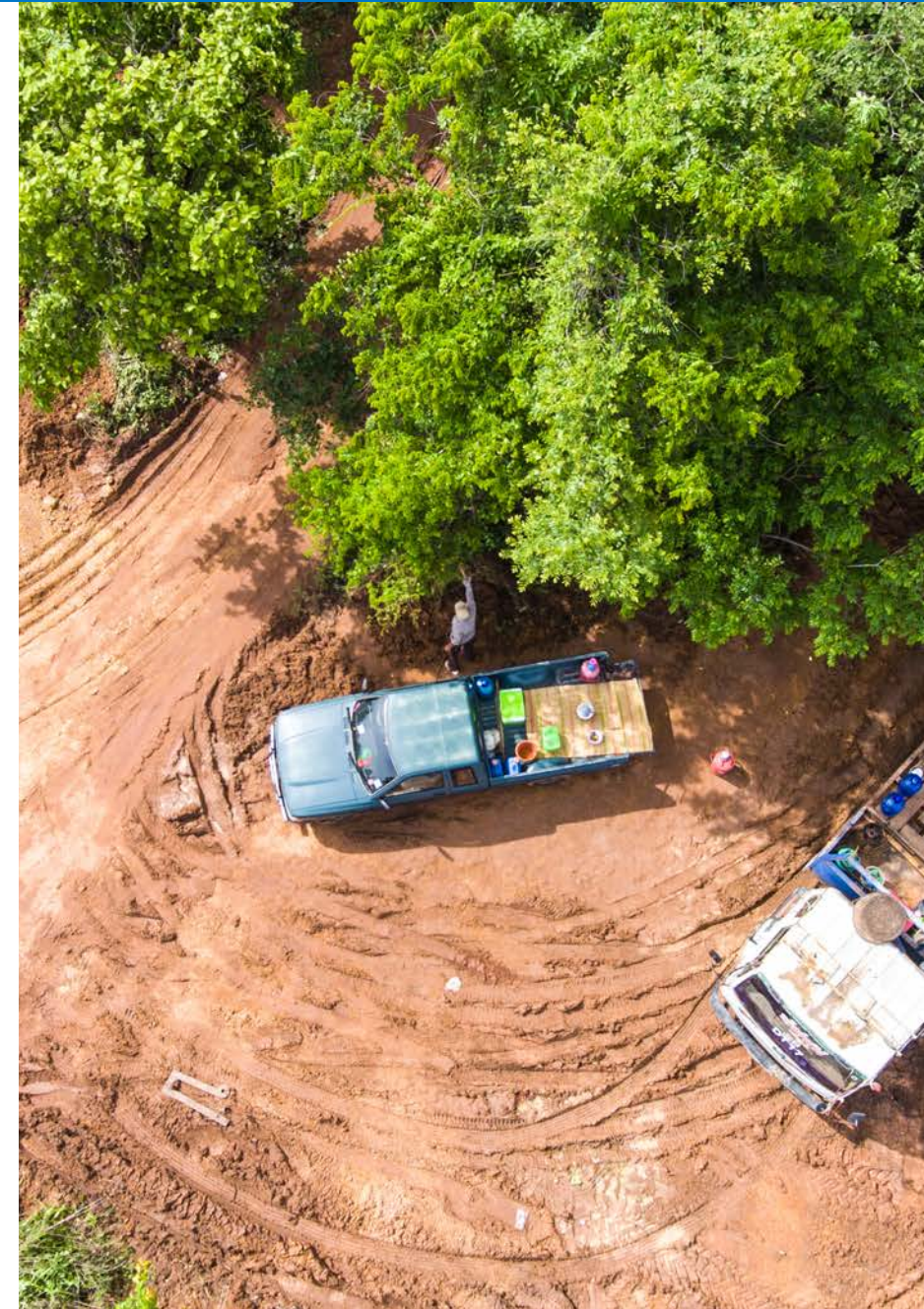


Case Study: Brazilian Amazon

“Today, with this new scourge spreading rapidly throughout Brazil, native communities, some living in isolation in the Amazon Basin, could be completely eliminated, without any defense against the coronavirus.”

“Without any protection against this highly contagious virus, the Indians face a real risk of genocide, through contamination caused by illegal invaders on their lands.”

– *Sebastião Salgado, Brazilian photojournalist, and Lélia Wanick Salgado, Brazilian author, film producer, and environmentalist*



Case Study: Brazilian Amazon

- In the first quarter of 2020, unprotected forests accounted for 46% of registered deforestation—an increase of 30% from 2019.
- Without further protections, the Amazon rainforest and its inhabitants—both human and animal—will be more exposed to large-scale forest clearing and subsequent wildfires.
 - With less rain and drier grasslands, fires can spread quickly and are largely impossible to control.



Case Study: Brazilian Amazon

- Deforestation is also a major contributor to climate change, because forests store large amounts of carbon dioxide (CO₂) from the atmosphere as they grow.
- When forests are cleared or burned, the carbon that was once stored in branches, leaves, trunks, and soil is released into the atmosphere, mainly in the form of CO₂.
 - Carbon emissions from human processes are one of the primary greenhouse gases accelerating climate change.
 - From 2015-2017, the global loss of tropical forests released about 4.8 billion tonnes of CO₂ per year.
 - This accounted for 8-10% of annual human emissions of CO₂.

Political Economy of Pandemics

- Deforestation, along with intensive farming and climate change, is among the main drivers of increased virus transmission from animals to humans.
- Studies have shown that the global approach to the production of goods causes a higher level of resource depletion in low-income countries than in higher-income countries. This includes the production of key agricultural products like:
 - Beef
 - Palm oil
 - Coffee
 - Cocoa



Political Economy of Pandemics

- The agricultural sector is one of the most important sectors of Brazil's economy.
 - Ag makes up 4.4% of Brazil's annual GDP.
 - About 10% of Brazil's workforce is employed in the agriculture industry.
- Brazil is a leading producer of coffee, sugar, soybeans, and beef.
- Agriculture and deforestation account for about 70% of Brazil's greenhouse gas emissions.



Political Economy of Pandemics

- The environmental degradation caused by intensified agriculture and the production of cash crops leads to the loss of large, predatory animals first.
 - Without predators, the world's most common vectors, including bats, rats, and mosquitoes, are left to multiply.
 - Natural resource depletion increases the competition for dwindling resources.
 - As a result, vectors are pushed further and further into communities and urban areas in search of food and shelter.
 - This forces animals to come into closer contact with humans.





Political Economy of Pandemics

“It is time to connect the dots. Global infectious disease pandemics like COVID-19 and others are the indirect result of a global economic order that depends on unequal access to power and resources. While environmental harm is localized and thus out of sight for most consumers, the consequences are not. They are far-reaching and, as we now know, potentially deadly.”

- Kelly Austin, Associate Professor, Department of Sociology and Anthropology, Lehigh University





Zoonotic Diseases

“The risk of disease emergence and amplification increases with the intensification of human activities surrounding and encroaching into wildlife habitats, enabling pathogens in wildlife reservoirs to spill over to livestock and humans.”

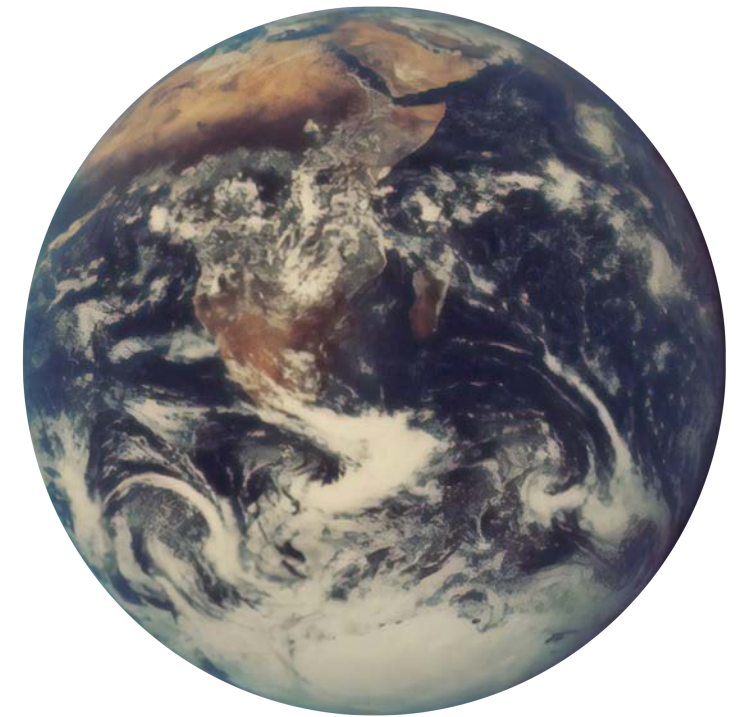
“There’s a [c]ritical relationship between a healthy environment and healthy people, and how human activities often undermine the long-term health and ability of ecosystems to support human well-being.”

—UN Environment Programme



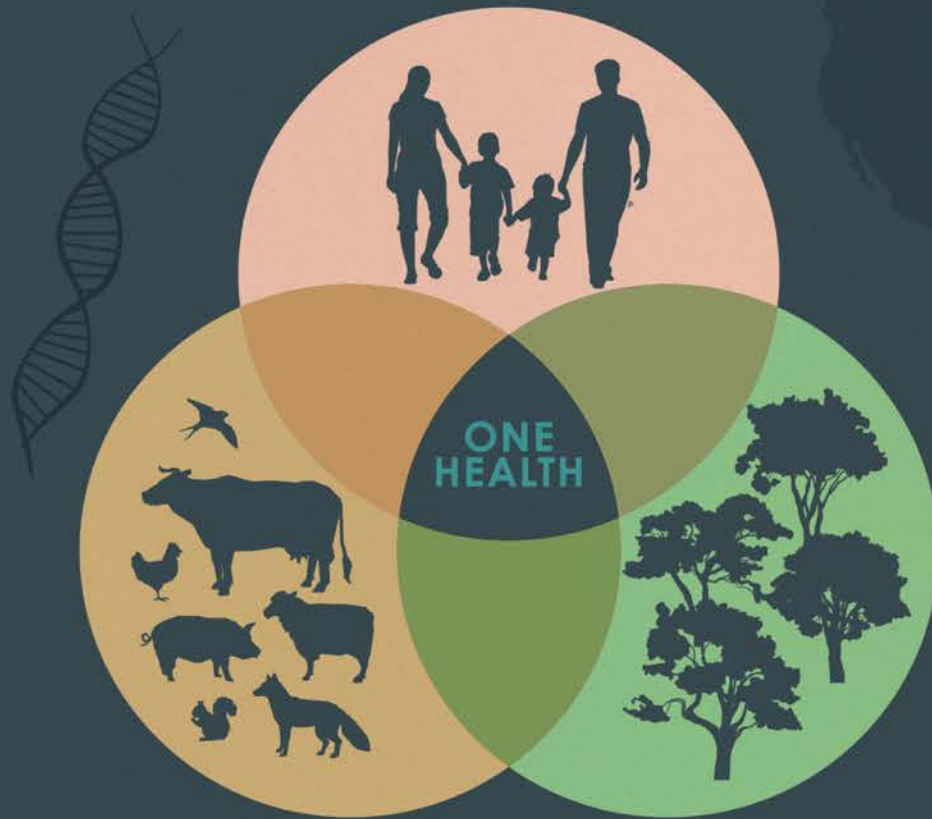
One Health Solutions

- The One Health approach recognizes that the health of humans is intimately tied to the health of other living things and the global environment.
 - This approach is collaborative and comprehensive. It works across disciplines and at the local, regional, national, and global levels.
- The goal of One Health is to increase health outcomes by better understanding the interconnections between humans, animals, plants, and their shared environment.



ONE HEALTH TO PREVENT

pandemics



ONE HEALTH is an approach that recognizes that the **health of people** is closely connected to the **health of animals** and our **shared environment**.

ONE HEALTH Is not new, but it has become more important in recent years. This is because many factors have changed interactions between people, animals, plants, and our environment.

Human populations are growing and expanding into new geographic areas. As a result, more people live in close contact with wild and domestic animals, both livestock and pets. Animals play an important role in our lives, whether for food, fiber, livelihoods, travel, sport, education, or companionship. Close contact with animals and their environments provides more opportunities for diseases to pass between animals and people.

The earth has experienced changes in climate and land use, such as deforestation and intensive farming practices. Disruptions in environmental conditions and habitats can provide new opportunities for diseases to pass to animals.

The movement of people, animals, and animal products has increased from international travel and trade. As a result, diseases can spread quickly across borders and around the globe.

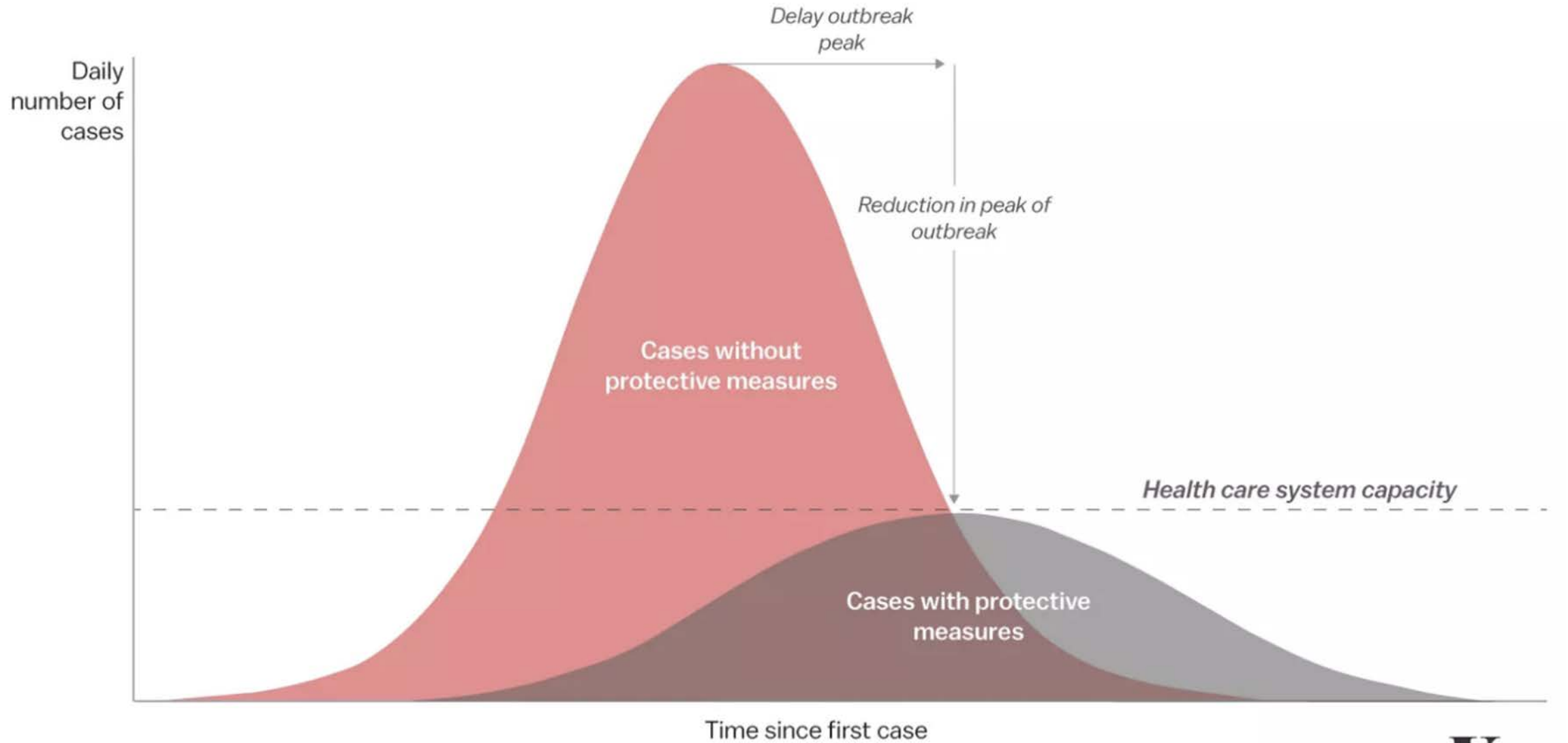




“Covid-19 is climate on warp speed. Everything in climate is decades; with Covid it’s days. Climate it’s centuries; Covid it’s weeks.”

- Gerot Wagner, NYU Climate Economist

Flattening the curve

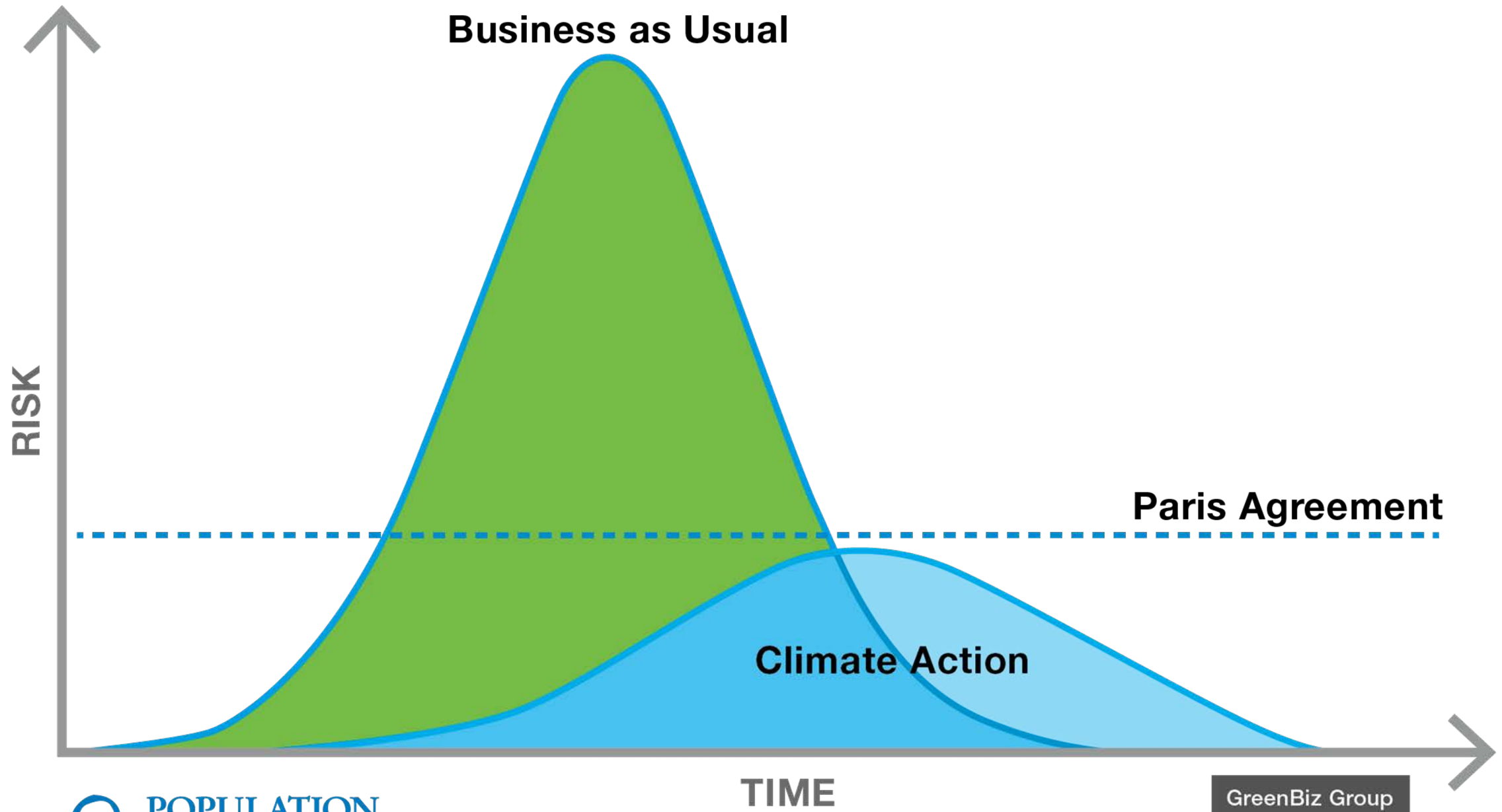


Source: CDC

Christina Animashaun/Vox

Vox

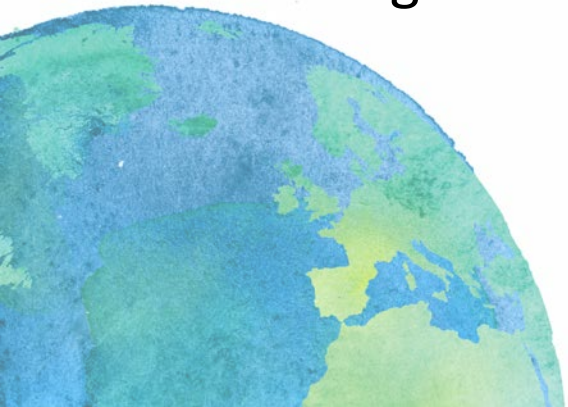
Can We Flatten the Climate Curve?





Final Thoughts

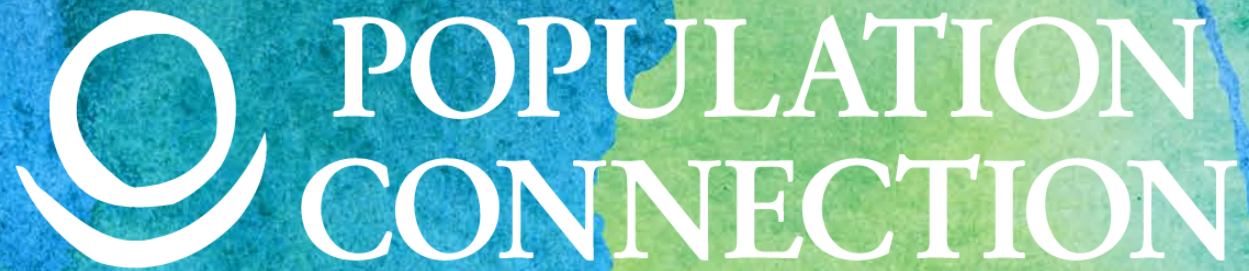
- Zoonotic disease emergence is linked to human population growth, habitat destruction, wildlife trade, agriculture, antimicrobial resistance, and deforestation.
- In order to prevent the next pandemic, humans must reduce our impact on plants, animals, and the living environment. A greater understanding of the interconnections between human health and ecosystem health must be integrated into our social, political, and economic systems.





“Nature sustains us. It’s where we originated. The lesson from this pandemic is not to be afraid of nature, but rather to restore it, embrace it, and understand how to live with and benefit from it.”

– Thomas Lovejoy, Professor of Environmental Science and Policy, George Mason University



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