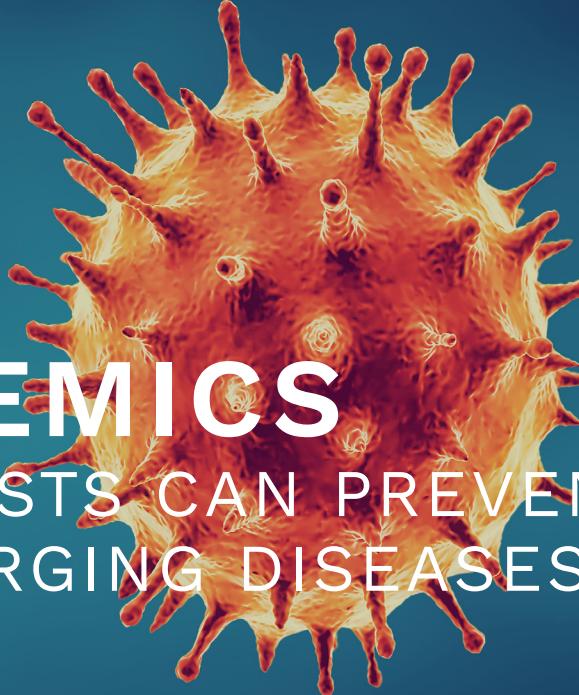


# FORESTS AND PANDEMICS

## HOW PROTECTING TROPICAL FORESTS CAN PREVENT CORONAVIRUSES AND OTHER EMERGING DISEASES

An issue primer for religious leaders and faith communities



### INTRODUCTION

Tropical forests are being destroyed at alarming rates around the world, driving climate change and biodiversity loss, and intensifying poverty. The habitat loss from tropical deforestation is also leading to increased contact between humans and wildlife.

This exposure increases incidence of zoonotic diseases, infectious diseases that are transmitted from animals to humans. As the loss of tropical forests accelerates, the public health danger from deforestation is growing worse.

The COVID-19 pandemic has laid bare a broken relationship with nature. Our global economy, consumption patterns, and production systems not only endanger nature, but our own well-being. The pandemic is a warning sign: failing to care for the planet, for forests and for biodiversity, means not taking care of ourselves.

### KEY FACTS

- Tropical deforestation and the destruction of wildlife habitat create the conditions for the emergence of new diseases to which humans have little resistance, and which can become the basis for pandemics.
- Human encroachment into tropical forests—driven by land conversion for agriculture and demand for commodities like beef, soy, and palm oil—is leading to animal-human interactions that did not exist previously, enabling pathogens once found only in animals to jump to human hosts.
- COVID-19, like Ebola, SARS, Avian flu and other recent epidemics, is an infectious disease that originated from animals.
- The COVID-19 pandemic and the potential for future pandemics are closely tied to tropical deforestation, habitat loss and ecosystem decline, and the many ways that humanity is mismanaging nature.



But COVID-19 has also presented us with an unprecedented opportunity to change course and work toward a new vision of planetary health that includes protection and restoration of tropical forests. Halting and reversing tropical deforestation is a critical part of any strategy to reduce the likelihood of future pandemics, and to redefining our relationship with nature.

As spiritual communities, we understand the moral imperative to act in support of this new vision. Just as with the challenge of climate change, we are faced with the necessity to act now both to protect ourselves, and to bequeath a world to future generations that is not pandemic prone—a world that retains the natural ability to regulate disease. Such a world is not only necessary for our physical health but for our spiritual health as well. Acting to save tropical forests is not just a matter of sound environmental stewardship, but a spiritual act of courage, grace, and maturity.

#### KEY FACTS

- The global trade in wildlife—much of it illegal—is also bringing people into increasing and direct contact with disease-carrying organisms.
- Illegal mining and logging operations have expanded in the absence of active resistance due to the outbreak of COVID-19, increasing more than 50 percent during the first four months of 2020 compared to the previous year. This reflects the weakness of enforcement measures in many deforestation hot spots around the world.
- Stopping tropical deforestation, conserving biodiversity, and better regulating the wildlife trade are necessary steps to reduce disease risk and future pandemics.
- Religious leaders and faith communities, through their moral stance and actions, can help to safeguard human health and restore the balance between people and nature, in part by redefining humanity's relationship with tropical forests.



# WHAT ARE ZOONOTIC DISEASES?

Zoonotic diseases are infectious diseases that jump from animals to humans. They pose a serious threat to human health, representing more than 60 percent of all infectious diseases in humans (UNEP, 2016, p.18) and some 75 percent of all newly emerging infectious diseases (UNEP, 2016, p.18; Loh et al., 2015, p.432).

COVID-19 is a zoonotic disease. Although the details of its origin and transmission to humans are still uncertain, it is widely believed to have originated in bats and been transmitted to humans through contact with forest-dwelling wildlife. Bats are a particularly potent source of pathogens, and research over the past two decades has found that they are natural reservoirs for numerous zoonotic diseases (Zhou et al., 2020, p.270; Warrick et al., 2020, p.6).

However, many other forest animals are potential sources or intermediate hosts that may pass along a disease picked up from another species. For example, until recently, pangolins, an anteater-like animal that inhabits

Asian and African forests, were thought to be the intermediate host for COVID-19—the species that passed the novel coronavirus directly to humans (Koumoundouros, Science Alert, 14 May, 2020).

## Examples of Zoonotic Diseases

COVID-19  
Ebola  
Lyme Disease  
SARS (Sudden Acute Respiratory Syndrome)  
MERS (Middle East Respiratory Syndrome)

Dengue  
Malaria  
Avian Flu  
West Nile Virus  
HIV-AIDS

Zika  
Swine Flu  
Rift Valley Fever  
Rabies



# WHAT IS THE CONNECTION BETWEEN DEFORESTATION AND ZOONOTIC DISEASES?

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The COVID-19 pandemic and the risk of future pandemics are closely tied to tropical deforestation, habitat loss and the degradation of ecosystems around the world. Tropical forest loss is connected to zoonotic diseases in several ways, including loss of ecosystem services, forest and habitat fragmentation, biodiversity loss, wildlife trade, and forest fires.

## LOSS OF ECOSYSTEM SERVICES

Forests provide a range of ecosystem services important for economic functioning and human wellbeing, including carbon storage, nutrient cycling, pollination, and water and air purification. One such service of great interest today is *disease regulation*. Studies show that as forests are cleared or degraded, their capacity to check the spread of disease is reduced. Thus, ecosystem degradation is associated with increased disease transmission

(Keesing et al., *Nature*, 2010, p.647). In fact, analysis shows that land-use change (including deforestation and forest conversion) is the leading driver of new diseases passed from animals to humans, and it is likely to increase in the future (Loh et al., 2015, p.435). Indeed, scientists have been warning for years that tropical deforestation increases the risk of infectious diseases, epidemics and even pandemics. But the disease-enhancing potential of tropical deforestation is not confined to the introduction of new diseases. Forest loss can also increase the spread of existing diseases, with malaria a prime example. The mosquito species most responsible for transmitting malaria in Latin America thrives in recently cleared patches of forest, on the margins of the remaining forest. In these areas there is more standing water for breeding, higher temperatures to encourage mosquito development, and higher human biting rates. When people settle in these patches, malaria transmission can increase (Borges and Branford, 2020, p.8; Robbin, 2016, p.1-6).

## **FOREST AND HABITAT FRAGMENTATION**

Forest fragmentation—the breaking up of large, contiguous, forested areas into smaller pieces of forest—leads to increased contact between humans and wild animals, which in turn helps to spread disease. Studies show that disease emergence in areas of extensive deforestation and forest conversion has most often occurred through direct contact with animals (Loh et al., 2015, p.435). The reason is that human encroachment into nature creates more forest edges. These edges are places where human settlements, fields and habitations border remaining forest areas where wildlife populations survive. More forest edges mean more contact between humans and wildlife (Bloomfield et al., 2020, p.985-987). Therefore, as forest fragmentation increases and forest edges grow, the likelihood of disease transmission through human-wildlife contact grows.

The risk of disease transmission due to forest fragmentation is particularly high where humans intermix with nonhuman primates such as chimpanzees and apes. Human encroachment in such disturbed areas can strongly affect cross-species infection rates (Pongsiri et al, 2009, p.949). A 2020 Stanford study of small-scale farmers living around Kigale National Park in Uganda found that the more the forest was fragmented—the more edges it had—the greater the chance of contact between the farmers and non-human primates as farmers entered these areas to hunt and collect building materials. The result was greater likelihood of disease transmission (Bloomfield et al., 2020, p.985, 995-997).

## **BIODIVERSITY LOSS**

Scientists have found a clear link between biodiversity loss and increased pathogen transmission and disease outbreaks, a pattern that seems to occur across many different ecosystem types (Keesing et al., Nature, 2010; p.647). One reason is that when deforestation and habitat fragmentation remove some species from a forest, the remaining animals and plants, freed of their predators and competitors, can reach abnormally high densities. As the density of hosts for a disease organism increases, the

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**As forest fragmentation increases and forest edges grow, the likelihood of disease transmission through human-wildlife contact grows.**

## TROPICAL FORESTS: PRIMARY HEALTH CARE PROVIDER TO MILLIONS

Healthy forests and ecosystems are an important source of medicines and other human health benefits. In many parts of the world, tropical forests are the local pharmacy and a primary source of health care and medicine for local people. Many of the Western medicines in use today are derived from plants found in tropical forests. Medications to treat or cure inflammation, rheumatism, diabetes, muscle tension, surgical complications, malaria, heart conditions, skin diseases, arthritis, glaucoma, and hundreds of other maladies, come from forest plants. Further degradation and destruction of the world's tropical forests will not only drive the spread of infectious diseases, but also eliminate potential pharmaceuticals for industrialized countries and, more importantly, weaken the sole health care option for many of the world's most vulnerable and marginalized populations.

spread of disease may increase as well (Keesing et al., *Nature*, 2010, p.648; Doshi and Gentile, 2020, p.6).

One example of this is West Nile virus. Studies have shown a strong correlation between areas where bird biodiversity was low and human incidence of West Nile virus was elevated. Birds are known as the intermediate host for West Nile virus, and the birds surviving in the low bird diversity areas tended to be better hosts for West Nile virus, whereas in high-diversity areas, many of the birds were not good hosts. The result was greater infection of humans in the low-diversity areas. (Keesing et al., *Nature*, 2010; p.647).

Another example is Lyme disease. Over the last 25 years, Lyme disease infection rates have skyrocketed in the United States due to the fragmentation of forest patches, which has favored the rise of the white-footed mouse population—an intermediate host of the disease. As forests have fragmented, predators and competitors of the white-footed mouse, such as bobcats, foxes, and skunks, have declined in number, leaving the mice as a potent reservoir of Lyme disease (Keesing et al., *Nature*, 2010, p.649; Doshi and Gentile, 2020, p.6). A number of other examples of biodiversity loss driving disease spread have been documented as well, including malaria, Hantavirus, and Schistosomiasis (Pongsiri et al, 2009, p.949).

## WILDLIFE TRADE

Trade in forest wildlife (much of it illegal) is big business that routinely brings people into direct contact with potentially dangerous disease organisms. China is the largest buyer of illegal wildlife products and the United States is the second largest buyer (Doshi and Gentile, 2020, p.4). Pangolins, for example, are the most heavily poached and trafficked mammals in the world. They are traded primarily for their scales, which are believed to treat a number of health conditions in traditional Chinese medicine, and as bushmeat. While they may not be associated with the current COVID-19 pandemic, pangolins are a known source of coronaviruses and provide a graphic demonstration of the health dangers of unregulated wildlife trade, to say nothing of

its environmental costs (Koumoundouros, 2020; Doshi and Gentile, 2020, p.4; Heinrich et al., 2016, p.242)

Workers who take part in the illegal trade in wildlife or who market bushmeat often labor in dangerous conditions when they transport, process, and sell wildlife. For example, retail sales of bushmeat often take place at open-air markets with minimal sanitation. Illegal trade in wildlife provides similar opportunities for exposure (Doshi and Gentile, 2020, p.3-4). Moreover, workers in the legal and illegal wildlife trades often live in rural areas without adequate health care. This greatly diminishes the chances of early detection and containment of emerging diseases resulting from their contact with wildlife (Doshi and Gentile, 2020, p.3-4).

## FOREST FIRES

Forest fires—a leading cause of deforestation—are also strongly associated with increased disease transmission. Tropical forest fires like those in Brazil in 2019 can disrupt and reorganize ecosystems in ways similar to logging and forest conversion to agriculture, with the same effects on the spread of disease (Borges and Branford, 2020, p.6).

Indeed, the recent increase in Amazon forest fires could make Brazil the next frontier in emerging infectious diseases. A group of international experts on zoonotic diseases meeting in Columbia in August 2019 noted that the Amazon wildfires could change the habitat and behaviors of animal species that act as reservoirs for endemic diseases, increasing the risk of disease cross-over from animals to humans (Borges and Branford, 2020, p.6).

Extensive fires in Indonesia in 1988 provide another example of potential health risks of forest fires. The fires created conditions that fostered the emergence of the Nipah virus, a disease with a very high mortality rate among those infected. The fires drove fruit bats from their forest homes into nearby orchards to feed. Pigs then ate fruits that the bats had nibbled, contracting the virus. The virus ultimately jumped to humans from contact with the pigs (Borges and Branford, 2020, p.6).





## THE VULNERABILITY OF INDIGENOUS PEOPLES AND FOREST COMMUNITIES

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The challenges that indigenous peoples face as guardians of the planet's rainforests are aggravated by the threat of disease outbreaks, as illegal loggers, miners and others encroach onto their lands and territories. Primary dangers include people entering indigenous territories for the development of mining activities, logging, oil exploration and extraction, industrial agriculture, religious proselytization, or military activities.

Infectious diseases like coronaviruses pose a grave health threat to indigenous peoples around the world. Indigenous peoples are particularly vulnerable to external diseases and tend to have poor access to healthcare and essential services. Externally-introduced contagious diseases pose a particularly high risk to indigenous peoples living in voluntary isolation, with many notable examples of the damaging effects of epidemics introduced from outside their communities. It is worth recalling that an estimated 90 percent of the original inhabitants of the Americas died as a result of European colonization, largely because of infectious diseases brought by Europeans.

Both legal and illegal resource extraction and deforestation frequently continue (and may grow considerably) during lockdowns associated with disease outbreaks, despite isolation orders that governments issue. Indeed, illegal mining and logging operations have expanded 55 percent during the first four months of 2020 compared to the previous year. In April alone, as COVID isolation measures came into force, deforestation increased some 64 percent compared to April 2019. This reflects the weakness of enforcement measures in many deforestation hot spots around the world—already a well-recognized problem even before the pandemic disrupted law enforcement activities.

The challenges facing indigenous peoples during the COVID-19 pandemic are at once a human rights and public health issue, as well as an environmental crisis. Study after study shows that indigenous peoples and forest communities are the best guardians of tropical forests. When they have secure rights to their lands, territories and natural resources, rates of deforestation are significantly lower. Any threat to the health, safety and wellbeing of indigenous peoples is therefore a threat to rainforest health and to the health of the planet.

An aerial photograph showing a large area of land that has been cleared of its forest cover. The ground is brown and shows deep, parallel tracks from heavy machinery, likely a bulldozer or excavator. In the center-right of the image, there is a small fire or burn pile, with white smoke rising into the air. The surrounding area is covered in dense green forest. A small blue construction vehicle is visible on the left side of the cleared area.

## STOPPING DEFORESTATION TO AVOID FUTURE PANDEMICS

Preventing deforestation and maintaining healthy biodiversity can reduce the conditions that lead to the spread of zoonotic diseases. To halt and reverse tropical deforestation will require recommitting to the global forest and biodiversity protection goals that the international community has already established as part of its climate and biodiversity frameworks. These include stepping up efforts to end tropical deforestation and restore degraded forests.

Just as important, a new international consensus is needed that recognizes the linkages among global forest, biodiversity, and public health goals, including the prevention of future pandemics.

One important policy priority is expanding and enforcing protected areas to ensure that forests remain intact and do not become fragmented. Policies

that preserve contiguous forested areas could reduce the risk of disease transmission associated with small and scattered forest patches. In other words, from a public health perspective, an important goal of our land-use policies should be to preserve larger tracts of healthy and biodiverse forest habitats, to reduce the potential for contact with human populations (Pongsiri et al., 2009, p.950).

Biodiversity conservation efforts more broadly are also critical to protecting humans from the spread of zoonotic diseases. Greater biodiversity and ecosystem integrity can help regulate diseases by supporting a diversity of species, so that it is more difficult for one pathogen to spread rapidly or dominate. As such, efforts to preserve biodiversity, enhance ecosystem integrity and protect forests are necessary steps toward reducing disease

incidence and lowering the risk of future pandemics (Keesing et al, 2015, p.651; Pongsiri et al., 2009, p.950; UNEP 2016, p.26).

Likewise, development programs and forest conservation policies must be revamped to incorporate health considerations. Historic underinvestment in the health sector in developing nations has unfortunately combined with rapid expansion of development activity to undermine tropical forests and create conditions for the rapid emergence of infectious diseases (UNEP 2016, p.26). Policymakers must begin to grasp the link between their health, development, and natural resource management policies in order to counter this threat effectively—what has been termed a “One Health” approach. Such an approach would make it easier to take into account the long-terms costs and consequences of their policies for people and nature.

At a practical level, supporting community-centered forest conservation and sustainable agriculture—with an explicit goal to safeguard public health in rural settings—should be a key response from national policymakers and the international donor community to the COVID-19 pandemic. The tagline should be that healthy forest and farm ecosystems support healthy communities through reduced disease transmission.

**"Policies that preserve contiguous forested areas could reduce the risk of disease transmission associated with small and scattered forest patches."**

## INTERNATIONAL LEVERS TO PROTECT FORESTS

A number of existing international frameworks can be used to address the challenge of forest loss and degradation:

- The UN Framework Convention on Climate Change and the new generation of Nationally Determined Contributions (NDCs) can and must prioritize the protection and restoration of tropical forests.
- The UN Convention on Biological Diversity must also put the protection and restoration of forests at the center of the New Deal for Nature.
- The UN Sustainable Development Goals provide an integrated framework for action across sectors, effectively linking targets on environment and forests with health concerns.
- New York Declaration on Forests must continue to report on progress toward its deforestation and restoration goals.
- The UN Decade of Ecosystem Restoration—set to begin in 2021—may provide a useful and timely framework for much of this work.



## HOW RELIGIOUS LEADERS AND FAITH COMMUNITIES CAN GET INVOLVED

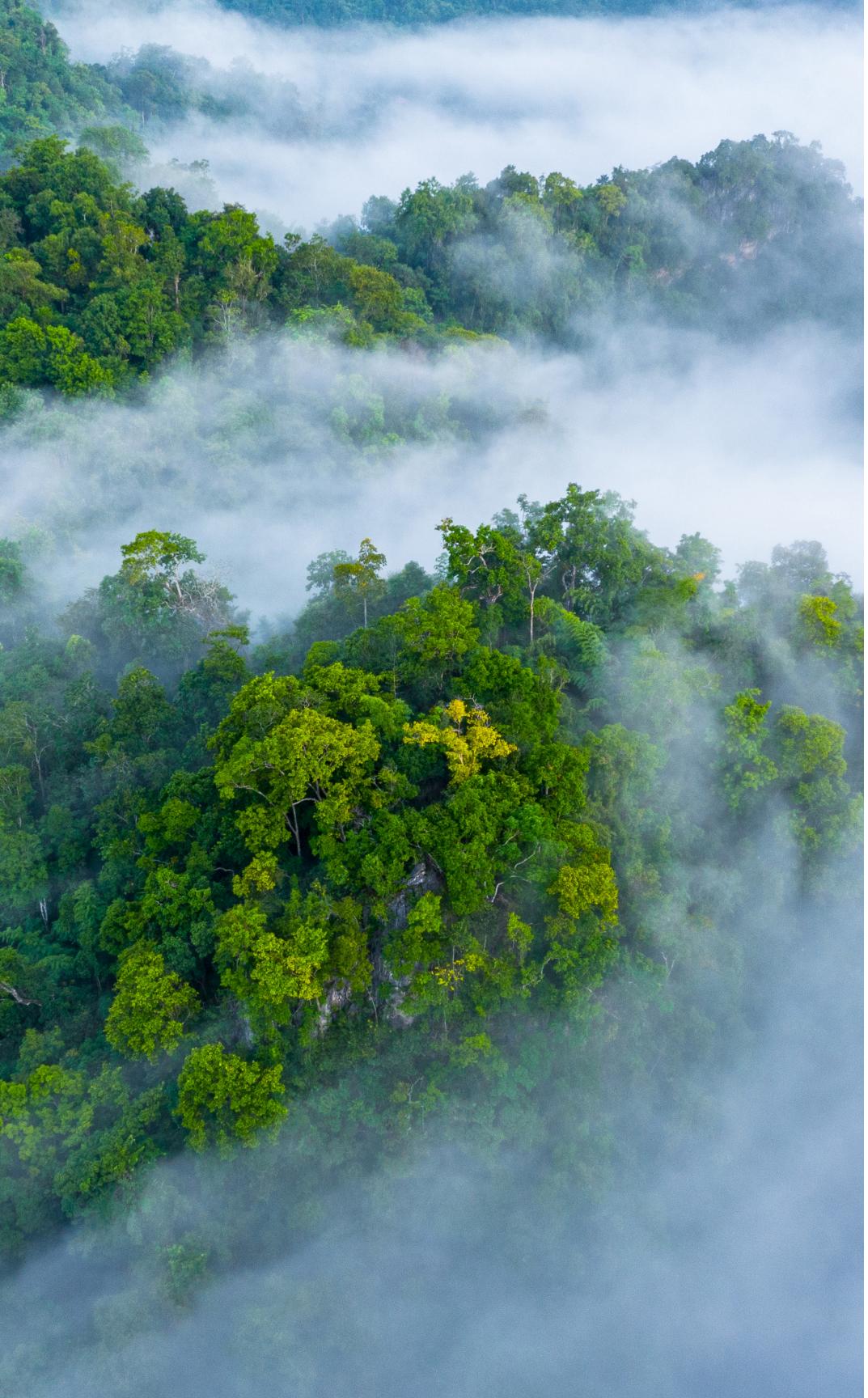
The COVID-19 pandemic has brought into sharp relief how we are all interconnected—with each other and with nature. It offers a moment for all of us to reconsider our relationship with the planet and with forests. We have an unprecedented opportunity to reimagine the economic systems and development patterns that produced the pandemic, and to shape a more sustainable future.

Religious leaders can help usher in the transformational change that is so urgently needed—a move away from unmitigated growth at all costs and toward social and environmental responsibility across all sectors. Although rapid change is difficult, the COVID-19 crisis has shown it is possible, as we have witnessed our global economy and social systems shift practically overnight. In recovering from this pandemic shock, we have the chance to “build back better”—to create new incentives for sustainable and equitable

growth. But this will require the courage not to slip back into business as usual as we rebuild our economies, subsidizing resource extraction and outdated agricultural models that destroy tropical forests (Settele, et al, 2020; Planetary Emergency Partnership, 2020).

Religious leaders and faith communities have an essential role to play in educating our constituencies about the connections between tropical deforestation, habitat loss and pandemic disease outbreaks, and advocating with government authorities at all scales to prioritize the protection of forests and nature as a policy response. Several key objectives should be pursued:

**Raise awareness.** Most people are not yet familiar with the important connections between tropical deforestation and disease outbreaks, nor are they aware of the protective health effects of keeping nature and rainforests



intact. Religious leaders are in a unique position to share this information with their communities and to raise awareness on this issue.

**Demand that policymakers commit to “building back better” with their economic recovery plans.** How political leaders decide to stimulate the economy in response to the COVID crisis will determine whether we amplify or mitigate the environmental conditions behind the pandemic. If these “recovery packages” relax environmental laws and promote the resumption of current practices unchanged, forest conditions will continue to deteriorate. Rather, these stimulus plans should be designed with strong incentives for industries to shift to sustainable, low-carbon practices, redirecting harmful subsidies when possible. Religious leaders and their communities can call on policymakers to summon the courage to make their economic packages truly transformative “recovery plans” that invest in people and nature rather than repeat unsustainable patterns.

**Stress the forest and human health connection.** The link between forest destruction and fragmentation and the spread of disease is well established. The way we currently use forests and exploit forest wildlife increases the risk of passing animal diseases to humans, and measurably increases the risks of future pandemics. Fighting deforestation is an important way to fight pandemics and keep our communities safe. This can be a central message when addressing the coronavirus-related health concerns of congregations. Much as with climate change, we have the moral responsibility not to leave our children a world that is biologically impoverished and unable to provide the disease regulation services that healthy forest ecosystems provide.

**Advocate for forest protection as a disease prevention priority.** Finding alternatives to deforestation is not only critical to addressing climate change and meeting sustainable development goals (on water, poverty, food security, biodiversity, etc.), but is also a matter of good health. Our thinking about disease prevention must change so that we integrate the protection, restoration and

sustainable management of forests as preventive measures for future pandemics. This includes ensuring that the collection and trade of forest wildlife—a potent source of direct contact with disease organisms—is safe, legal, and humane.

**Participate in forest restoration activities.** Community-based tree-planting and other forest restoration projects that help restore the health of local forest ecosystems and forest biodiversity are a concrete way to improve the disease regulation service that healthy forests provide. Such projects make the spiritual act of stewardship tangible and personal. They also reinforce the value of community action in meeting global forest restoration goals one landscape at a time, with each community empowered to contribute.

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**"Religious leaders and their communities can call on policymakers to summon the courage to make their economic packages truly transformative "recovery plans" that invest in people and nature rather than repeat unsustainable patterns."**



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## ABOUT THIS PRIMER

This primer is part of a series of briefs meant to inform and inspire faith communities to action to help safeguard tropical forests and their inhabitants. Through facts, graphics, analysis, and photos, these primers present the moral case for conserving and restoring rainforest ecosystems, supported by the latest science and policy insights. They bring together the research and practical tools that faith communities and religious leaders need to better understand the importance of tropical forests, to advocate for their protection, and to raise awareness about the ethical responsibility that exists across faiths to take action to end tropical deforestation.

## PARTNERS

The Interfaith Rainforest Initiative welcomes engagement by all organizations, institutions and individuals of good faith and conscience that are committed to the protection, restoration and sustainable management of rainforests.



Norwegian Ministry  
of Climate and Environment



Norway's  
International Climate  
and Forest Initiative



World Council  
of Churches



## INTERFAITH RAINFOREST INITIATIVE

The Interfaith Rainforest Initiative is an international, multi-faith alliance working to bring moral urgency and faith-based leadership to global efforts to end tropical deforestation. It is a platform for religious leaders and faith communities to work hand-in-hand with indigenous peoples, governments, NGOs and businesses on actions that protect rainforest and the rights of those that serve as their guardians. The Initiative believes the time has come for a worldwide movement for the care of tropical forests, one that is grounded in the inherent value of forests, and inspired by the values, ethics, and moral guidance of indigenous peoples and faith communities.

## QUESTIONS?

The Interfaith Rainforest Initiative is eager to work with you to protect tropical forests and the rights of indigenous peoples. Contact us at [info@interfaithrainforest.org](mailto:info@interfaithrainforest.org).



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