Dear M. Hogan,

Re: Links between deforestation and epidemics, pandemics and disease.

In your exchange of views with the European Parliament’s International Trade Committee on April 21, you mentioned that you had not heard about the link between the loss of biodiversity and emerging diseases. We, academics working on emerging pathogens, would like to inform you about the available research that establishes this link. We would also like to urge you and other European Commissioners to protect and restore biodiverse forests, which can serve to reduce the risk of future zoonotic disease outbreaks.

Increase in vector-borne disease: Deforestation on the whole favors mosquitoes that serve as vectors of human disease[1]. Tropical deforestation followed by agricultural land use may generate aquatic habitats conducive to mosquito breeding as natural streams are blocked[2]. Increased temperature and light further leads to changes in predation of vectors[3] and the rate at which the pathogens mature within the vector[4]. Malaria has been linked to deforestation, especially in the frontier regions of the Amazon basin[5-11]. However, forest fragmentation has also been firmly tied to the rise in Lyme disease in North America[12, 13].

Wildlife disease emergence: According to Jones et al.[14], emerging infectious disease events are accelerating. This is even more so for zoonoses, the diseases that originate in wildlife. Zoonotic disease emergence tends to occur at the interface of forest/human settlements[15]. Human encroachment into forests intensifies interactions between humans and animals carrying new pathogens. This increased contact can lead to pathogen adaptation to humans, giving rise to sustained human-to-human transmission (e.g. HIV, Ebola). In the case of Ebola, forest fragmentation and human population density may have contributed to recent Ebola outbreaks (2004-2014) as the disease spilled over from wildlife into humans[16, 17]. SARS-CoV and the current SARS-CoV2 are thought to have their origins in bats in Asia. Rapid deforestation in South East Asia has created new habitats compatible with bat roosting, often concentrating bat numbers and species near human dwellings and livestock[18].

Forest fires and associated health risks: Deforestation and climate change are caught in an unfortunate amplifying feedback loop. Deforestation removes an important global carbon sink, and a hotter, drier climate exacerbates wildfire conditions [19]. The haze generated by forest fires poses health risks, including increased respiratory illnesses[20], which could in turn aggravate symptoms due to SARS-CoV2 and other respiratory pathogens. Haze can also shift movement of bats, as exemplified in the 1998 Nipah virus outbreak in South East Asia[21]. The burning of forests for palm oil plantations went unchecked due to severe droughts during that time. The resulting deforestation and haze reduced fruit yields, which is thought to have caused fruit bats to migrate to fruit orchards in regions unaffected by the haze. This brought Nipah virus-carrying fruit bats in close proximity with live-stock (pigs) and humans, leading the virus to jump from the bat into the pigs and finally humans.

Role of imported commodities on human disease risk: In a recent analysis, the links between malaria, tropical forest deforestation, and the extraction of commodities such as cocoa and coffee have been quantified[22]. This study suggests that consumption of such commodities in Europe,
the United States, China, and Japan drive approximately 20% of the malaria risk in endemic regions. Such studies have yet to be conducted for the emergence of zoonotic diseases with pandemic potential, though the mechanisms detailed above strongly point to this ongoing potential.

As a major importer of commodities that drive global deforestation, we urge the European Commission to act in order to ensure that forests are protected and restored, in order to prevent new emerging disease outbreaks.

Sincerely,

Amy Vittor, MD PHD
Assistant Professor
Division of Infectious Disease and Global Medicine
Emerging Pathogens Institute
University of Florida
Gainesville, FL  32610
Amy.vittor@medicine.ufl.edu

Micah Hahn, PhD, MPH
Assistant Professor of Environmental Health
Institute for Circumpolar Health Studies
University of Alaska-Anchorage
mbhahn@alaska.edu

Gabriel Zorello Laporta, PhD, MPH
Full Research Scientist (Scopus Author ID: 13204727100)
Setor de Pós-graduação, Pesquisa e Inovação
Centro Universitário Saúde ABC
Fundação ABC
Santo André, SP 09060-870 - Brazil
References:


