

DR. ISABELLE-ANNE BISSON WAS INTERVIEWED BY GRETCHEN FITZGERALD OF SIERRA CLUB CANADA FOUNDATION, ABOUT THE ANIMAL-TO-HUMAN SPREAD OF DISEASE.



Dr. Isabelle-Anne Bisson

WHAT DOES A PANDEMIC HAVE TO DO WITH CONSERVATION? A LOT, ACTUALLY. OUR INCREASING ENCROACHMENT ON WILDLIFE IS AFFECTING HUMAN HEALTH.

Q1 - People are seeing in the news that the coronavirus that causes COVID-19 began in animals and then infected humans. As an ecologist, what made you become interested in the link between wildlife and diseases that affect humans?

We have forgotten that, as humans, we are an intricate part of nature – that we are *Homo sapiens*, a species like any other and there are only imaginary boundaries between humans and non-human animals and all other life on earth. And the planet is mostly a closed system. So watching nature and learning from it is paramount to our health and to our continued survival on the planet. Some human populations understand this well but most of us have lost this connection and it is not serving us well at all. As many studies have shown, many non-human animal species are rapidly declining, and this raises alarm bells for us.

In regard to infectious zoonotic diseases (those that move BETWEEN animals and people) like COVID-19 (or SARS-CoV-2) are not new. The presence and dangers of zoonotic diseases have been well documented by those in veterinary medicine, for example (think of ringworm that can move between you and your dog), and wildlife biologists like me. A good example of a virus that moved from animals and people probably several times is HIV, the virus that can cause AIDS. It was the result of many transmissions of the naturally occurring simian immunodeficiency viruses (SIVs) in primates to humans and vice versa. A seminal paper by Kate Jones and colleagues in 2008 (Nature 451:990-993, <https://doi.org/10.1038/nature06536>) demonstrates that the most common type of infectious disease emerging in human populations between 1940-2004 were zoonotic diseases; they warned that it would be the cause of the next big pandemic. Well, here we are. One of the key factors aside from increased travel? Our encroachment on wildlife habitat and on wildlife in general, i.e., wet markets, where COVID-19

is hypothesized to have originated. So, conservation and ecology has everything to do with a safer and healthier world, not just for humans but for all species; let us not forget that we, too, can infect non-human animals. It goes both ways.

Q2 - Can you describe some of the major findings of your research and how they apply to the current pandemic?

In 2010, I was lucky enough to work as part of the Emerging Pandemic Threats – PREDICT program, a United States Agency for International Development (USAID) funded program. One of the goals of this program was to close the gap between veterinary or wildlife medicine and the public health sector, which traditionally do not really collaborate. The Smithsonian Institution was mandated to test a zoonotic disease detection system using citizen or community member science-based methods. Because microorganisms (viruses, bacteria) that cause zoonotic diseases, are invisible to the human eye, one can sometimes detect it by watching for sick or dead animals (Bisson et al. 2014, *EcoHealth* 12: 98-103, <https://doi.org/10.1007/s10393-014-0988-x>).

A really interesting example of that is the crow mortality monitoring system that was put in place in New York during the West Nile virus outbreak in the early 2000's; the system allowed health officials to understand the geographic scope of the virus. For our research, we pilot-tested and then implemented an animal morbidity and mortality monitoring system using mobile phones in Uganda's Queen Elizabeth Conservation Area. We trained 150 park rangers to use a mobile database where they directly entered animal morbidity and mortality events during their monitoring rounds in the park (watching for poachers or other activities and reporting on wildlife events).

It not only served well in detecting two zoonotic diseases, but it also proved to be an effective management tool for the Uganda Wildlife Authority. For one of the zoonotic diseases detected, the first report was by a ranger that observed signs of the disease in Vervet monkeys (*Cercopithecus aethiops*). These monkeys love to hang around local lodges because tourists feed them. Then lodge workers reported symptoms. The system thus enabled us to put a location and time stamp on the disease emergence with a simple tool that does not require formal education or complicated systems to be put in place. Indeed, it demonstrated that monitoring for zoonotic diseases can be a multi-layered endeavour with one layer existing at the citizen, civil servant or community level. These systems could really help health care workers and other officials to understand the geographic scope of the disease and hopefully put measures in place before it spreads. In other words, we concluded that it was an indispensable part of zoonotic disease monitoring.

Q3 - What do you think we should do to prevent future animal-to-human spread of diseases, internationally and at home? Are there particular areas where Canada should be particularly concerned or active (i.e.: could this spread happen here)?

We absolutely need to get everyone working together, for one thing. As mentioned, conservation is not for the tree hugger anymore (it never was!) As ecologists, conservationists,

environmentalists, etc., we need to convince the public health sector that we need to work together, much like the wildlife and veterinary medicine sector has been doing in the last few years - not just for diseases, but also for climate change. In 2018, after many Quebecers died during the heat wave, Quebec's National Institute for Public Health urged the provincial government to set aside 1% of its budget to create more green spaces to counteract the Urban Heat Island effects. But, *conserving* these green spaces would prove more efficient and less expensive than creating new ones.

We also need to use citizen science as best we can. I understand many shy away from this approach, fearing lower quality outcomes, but it really is an underutilized tool and many papers, like our EcoHealth paper, speak to the fact that if an animal morbidity and monitoring system had been put in place as part of a comprehensive infectious disease program, it could have prevented the spread of infectious diseases between humans and non-human animals.

As for Canada, we are of course not immune to these pandemics, as we have seen - no country is. In the case of the COVID-19 pandemic, travel was the primary factor for introducing the virus into Canada in the first place and then community spread was an important factor once it was here. Many recent zoonotic diseases in Canada like SARS, West Nile virus, and Avian Influenza originated abroad, but who is to say that encroaching on wildlife and wildlife habitat here is not going put us into contact with new disease-causing viruses or bacteria? Climate change is also exacerbating this very concern. For one thing, ticks are moving up north and are not killed by the increasingly mild winters, so tick-borne diseases are a big concern for the public health sector in Canada. Our impact on the environment has direct and indirect consequences on the spread of zoonotics.

Q4 - These are times of uncertainty, stress, and grief. How is this situation affecting you and your work and what do you do to find hope in the current context?

First of all, I want to extend sentiments of peace and support to all Canadians. We are all thinking of you. If you are reading this, you may already be convinced of the powers of nature, both positive and negative. I find peace in nature - I always have. So, filling my bird feeders, watching the wildlife in my backyard, going for walks with my dogs and keeping up with all of the good that has come out of humanity during these times, brings me a lot of comfort. Also, being part of the Sierra Club Canada Foundation family brings me a lot of joy. We have important lessons to learn from all of this, so let's learn together.

DR. ISABELLE-ANNE BISSON IS CO-CHAIR OF THE QUEBEC CHAPTER AND DIRECTOR OF THE SIERRA CLUB CANADA FOUNDATION. Find out more about her research and work [here](#) and [here](#).

Other Reading:

<http://news.sciencemag.org/biology/2014/11/better-wildlife-monitoring-could-prevent-human-disease-outbreaks?rss=1> & <https://news.vice.com/article/monitoring-sick-animals-in-the-wild-could-be-the-key-to-preventing-the-next-ebola-outbreak>