

# **Potential role of international environmental law and One-Health Approach to protect the Arctic Indigenous Peoples from climate-sensitive zoonotic diseases**

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*The Arctic Region faces higher risks of infectious viruses contained under the melting permafrost or deep ocean sediments due to the faster temperature rise. These infectious viruses might be transmitted by the surrounding animals, such as reindeer and seals, as hosts or vectors to the Arctic Indigenous Peoples, who are involved in livelihoods dependent on ecosystems such as hunting, fishing and livestock farming, and live in remote areas and have limited access to the health system. For better handling of climate-sensitive zoonotic diseases, more comprehensive support is crucial by the Arctic Council or relevant sovereign countries. It is necessary to identify and monitor areas of high risk, such as old burial sites or virus research institutes, and strengthen the monitoring of animal trading around Indigenous Peoples. Other actions include effective management of the Arctic tundra and wetlands through more systematic participation or involvement of Indigenous Peoples with their traditional ecological lifestyle*

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*and knowledge to live in harmony with nature, and resiliency efforts to recover from the pandemic in a formal decision-making process to develop adaptation plans. Wider recognition and application of WHO's One Health approach, Human Rights-Based Approach to climate change such as right to health or right to a clean environment, or Nature-based Solutions (NbS) are also effective in collaboration with health-related organizations. In addition, more holistic and multifaceted approaches are necessary by combining all the indirect, but relevant aspects of international environmental law such as the Paris Agreement, the Convention on Biological Diversity, the CITES, the Ramsar Convention, and relevant domestic laws.*

## **COVID-19 and the Arctic Indigenous Peoples**

The Coronavirus Disease of 2019 (COVID-19/SARS-CoV-2) posed a serious global health threat to humans, including Indigenous Peoples, who have a long history of struggling with infectious diseases brought about from outside, and faced serious risks to their survival themselves (McNeill, 1998). COVID-19 has also been a resilience challenge for Arctic peoples (Arctic Council Sustainable Development Working Group and Harvard Kennedy School Belfer Center for Science and International Affairs Arctic Initiative, 2021) with 0.4 million infected and the 6,600 dead in the Arctic region as of 2021. Research conducted through the Arctic Council was delayed due to COVID-19 (Arctic Council, 2021) and again because of the uncertainty within the Arctic Council after the Ukraine War under Russia's Chairmanship (2021-2023) (Koivurova et al., 2022). In particular, this has delayed Arctic Council research related to climate-sensitive zoonotic diseases and a project on biosecurity in the Arctic. The next steps in the Arctic Council under Norway's Chairmanship (2023-2025) (Arctic Council, 2023) should include taking over and resuming those urgent bottom-up efforts among the like-minded Arctic States. This need not diminish the the firm position by the like-minded Arctic States toward the Ukraine War.

The average lifespan of the Inuit people in Alaska after COVID-19 was shortened by 6.6 years, the highest compared among other races (Schöley et al., 2022). Many of them were essential workers, who had already experienced social disparity, widespread chronic diseases, and poor healthcare systems. Air pollution due to forest fires in Alaska has been another factor, since lungs damaged by air pollution are vulnerable to COVID-19 (Underwood, 2020: 626).

For example, the Indigenous Yanomani peoples in the Amazon rainforest, who are forced to live in inferior urban environments or remote areas with poor hygiene facilities, also experienced a COVID-19-related mortality rate that was twice that of other Brazilians partly due to vast forest fires caused by Brazil's deforestation policy (Prist, 2023). They also suffered from attacks by illegal gold miners, against which the 2021 Supreme Court Decision ADPF (Action of Violation of a Fundamental Precept) 709 ordered the government to protect their rights and health, including possible infection of COVID-19 of Indigenous Peoples. Traditional knowledge is passed down from generation to generation, so the death of elderly people represented a huge loss of culture for many Indigenous communities. Indigenous Peoples, with limited access to health services and vaccination, were later given priority access to vaccines, but some refusals have accelerated efforts

to record their ancient knowledge and insights. Their traditional lifestyle to live together in groups and share food, utensils, and hammocks also made it very difficult to keep social distance (APIB, 2020; Junior, 2021: 83-99).

In Greenland, there were only 4 COVID-19 cases as of March 2020, but Greenland immediately banned both international and domestic flights to prevent the virus from spreading. However, at the local level, small and remote Indigenous communities faced with the lack of testing facilities and staff, in addition to logistical challenges related to being independent on Denmark's health system (Arctic Council, 2020). In its history, Greenland was also affected by the Plague, which was most likely brought by mice on ships (Hirsch, 2015: 498).

The Sámi people, living or moving across borders in Norway, Sweden, Finland, Russia, were hit by the strict movement restrictions. For example, Norway's recommendation to discontinue non-essential travel was upgraded to border closures (Mainichi Newspaper, 2021). The Sámi Council would have faced great difficulty in approaching four sovereign countries with different situations, policies, and health data gathering systems (Robert et al., 2018: 3-4; Malkhazova et al., 2022: 424-460), despite the existence of cooperation between the three Nordic Sámi parliaments. Therefore, transboundary vector or syndromic surveillance around reindeers, early identification of threats of infectious diseases, and prevention and adaptation efforts would be beneficial with support from the Arctic Council's Emergency Prevention, Preparedness and Response (EPPR) Working Group. The Arctic Council could also play a role in connecting relevant domestic institutions in the above three EU/EEA countries, in particular Finland which financially supports the Sámi Parliament and has access to the EU health information system, including the European Environmental and Epidemiology Network (E3) (McMichael, 2015: 62) and the newly established European Health Emergency Preparedness and Response Authority (HERA) after COVID-19. At the international level, new International Health Regulations (2005) by the World Health Organization (WHO) and the Global Early Warning System for Major Animal Diseases including Zoonoses (GLEWS) also could be useful for Arctic Indigenous Peoples.

As discussed later, an emerging risk is climate-driven zoonotic diseases. The possible exposure to viruses under the melting permafrost due to climate change, in particular the increasing spillover risk, and the northward movement of species may increase the possibility of contracting infectious diseases in the Arctic Region (Lemieux, et al., 2022). At the same time, the traditional lifestyles of Indigenous Peoples to live in harmony with nature, and their knowledge and ability to adapt to environmental changes (Ellen et al., 2000) may give us vital information and lessons about the resilient recovery from future possible pandemics.

Although climate change brings new threats to the Arctic Indigenous Peoples, there are not many research articles from the international environmental law point of view. The aim of this paper is to grasp the current situation of climate-sensitive infectious diseases in the Arctic Region based on the latest science and analyze how international environmental law or principle could contribute to

protect the health of the Arctic Indigenous Peoples from those diseases.

### **Climate change-sensitive infectious diseases in the Arctic**

Siberia's highest temperature record of 38°C in 2020 (Ciavarella et al, 2020) increased heat strokes (Grigorieva and Revich, 2021: 1331) and respiratory diseases due to the subsequent wildfires and black carbon in the atmosphere (Ohata et al., 2021: 15861-15881).

The Arctic has experienced a three to four times higher average temperature increase of 3.1°C (1971-2019) than global average (AMAP, 2021; IPCC, 2021:120; IPCC, 2019) (Rantanen et al., 2022) that may have additional serious health impacts such as heatstroke and related mental health problems, as well as an increased in traditional infectious diseases, such as encephalitis by ticks in Russia and Canada, and vibrio parahaemolyticus and toxoplasmosis in Alaska (Wernham, 2015:16). Indigenous Peoples already experience inferior health conditions and environment compared to majority or settler populations, except the Sámi of Fennoscandia and northwest Russia (Young and Chatwood, 2015: 203-211; Møller, 2018: 90-106).

The impacts of climate change are already at a critical stage in Alaska with rises in sea level, melting permafrost, and increasing floods, which result in forced relocation and new climate-sensitive diseases. For example, the Inupiat in Nuiqsut, Alaska experience health, mental and nutrition effects due to food and water insecurity, and respiratory problems due to smoke, and worry about new zoonotic diseases due to sick caribou and fish (ANTHC Center for Climate and Health, 2014). The Yupik village of Newtok, Alaska was forced to relocate due to climate change for the second time following the first move in 1949, and faces the risk of contracting infectious diseases due to the collapse of burial sites and the need to drink untreated water. In fact, the Inuit in the northern region of Alaska changed their traditional practice of drinking untreated water after suffering from water-borne infectious diseases caused by mass precipitation and melting of the ice. Adaptation strategies are necessary to cope with the health impacts of climate change and the decreased access to traditional healthy food (Brubaker, et al, 2011: 6-11; Harper, et al, 2011: 93-108; Matinez and Sheats, 2015: 431-465; Welch, 2019; Driscoll, 2016: 410-411). Similar water-borne diseases might also be a concern in Greenland as a result of increased precipitation instead of snowfall due to higher temperatures. In fact, Greenland observed rainfall on top of ice for the first time in 2021. Furthermore, possible Anthrax outbreaks in northern Canada may also jeopardize the ongoing recovery efforts for the already threatened bison, and pose a serious human health risk, as well as to wildlife, and domestic livestock. In this sense, pre-planned Anthrax Emergency Response Plans (AERPs) could minimize the risk of public health and reduce environmental impacts (Nishi et al., 2002: 245-250; Douglas, 2013: 172-177).

Another study shows that the mass mortality of sea otters in Alaska may have been caused by viral transmission, which is considered to move six times faster than land species across the Arctic Ocean due to the melting of ice. As a result of the changing climate, species have already started to move towards the colder poles, and they bring with them new microbiomes into virgin areas

(Pecl et al., 2017). What will happen to the Arctic ecosystem, once the Arctic Ocean is ice free in September, which is predicted to happen before 2050 and as early as 2035 (IPCC, 2021; IPCC, 2023)? Contact with other species that would not have happened without the melting Arctic ice, might also bring unexpected and sometimes negative viral transmissions. Climate change-driven alterations in the Arctic environment can influence habitat availability, species distributions and interactions, breeding and physical and psychological health of marine mammals and may drive exposure to new or unknown pathogens (Wormer et al., 2019). According to the Alaska Center for Climate Assessment and Policy (ACCAP), hunters also reported deteriorated health conditions of seals, other wild animals, fish, and sea mammals infected with parasites in Canada and Russia (AFPBB, 2021).

In this sense, the role of the Local Environmental Observer (LEO) Network under the Arctic Council is crucial in monitoring, detecting, and sharing unusual animal, environment, and weather events among local observers and experts with traditional knowledge on the ground. COVID and global politics have prevented some in-person interactions, but this network was reactivated in 2023 to hold community events to bring together relevant stakeholders, including Russia (National Snow and Ice Center 2023). Such a bottom-up network may serve as a crucial platform to continue urgent research and communication even under these difficult circumstances.

The Arctic Region faces a higher risk of infectious viruses contained under the permafrost or deep ocean sediments, which might be transmitted by hosts or vectors such as reindeer or seals to the Indigenous Peoples who are involved in livelihoods dependent on ecosystems such as hunting, fishing and livestock farming. In fact, the unknown ancient, but live and possible infectious Pandoravirus was found under the permafrost in Yakutsk, Siberia in 2022 (Alempic et al., 2022). Another study also warned that the virus, which was contained in the Arctic ice, but released from lake sediment or soil due to glacier melt, brings the risk of viral spillover among host animals, although the release of viruses does not directly lead to pandemics or outbreaks (Lemieux et al., 2022).

An animal's exposure and contagion mediated by reindeer as vector to the ancient long-dormant Siberian Plague (Anthrax) with 90% fatality rate was considered as the main cause of 2016 outbreak among the Yamal people. The virus was considered to be activated as a result of melting permafrost due to high temperatures around 35°C and bring about indefinite lasting environmental damages. This incident also resulted in an emergency declaration, mass evacuation or quarantine of nomadic herders most at risk, and army dispatch to cope with the possible risk of biological weapons. An anthrax leakage accident in Yekaterinburg during the cold war was later revealed as a human-error accident from the military facilities. There is also great concern about the Smallpox, especially in many livestock burial places in Yakutsk, a hub of the fur trade, which was created when the last pandemic occurred more than 100 years ago (Revich and Podolnaya, 2011; The Siberian Times, 2016; Washington Post, 2016). Therefore, identification, monitoring, or Environmental Impact

Assessments (EIA) of areas with high risks, such as old burial places and virus research institutes may contribute to better handling of future pandemics (Murase, 2021: 7-17).

In 2021, Russia also reported to the WHO the first H5N8 Bird Flu Case, which was transmitted from birds to humans in southern Astrahan outside the Arctic Region. Arctic temperature increase has already surpassed the tipping point of distribution change of some disease vectors, and almost reaches the level of increasing burden on infectious diseases above 4°C, as the 2007 IPCC Fourth Assessment Report indicated (IPCC, 2007). It is therefore no surprise if the possible vector habitat areas have already or might soon move up to the Arctic Region. In case of migratory birds, infectious diseases might transmit across oceans and continents, therefore the possible delay and lack of communication with the WHO due to the Ukraine War is of deep concern.

The 2020 Norilsk Nickel oil spill in Russia was partly due to melting of the permafrost, which could also trigger infectious diseases due to unknown viruses, in addition to ecological damages from unstable resource extraction (Durfee and Johnstone, 2019: 229), higher investment risks, costs to strengthen the facility, and large penalty charges of of 2.1 billion dollars (Arctic Environmental Research Center, 2020; Financial Times, 2021).

### **Role of international environmental law**

Unlike the Antarctic Treaty System (ATS), which is based on legally binding hard law, protection of the Arctic environment is based on soft laws and a multi-layered, complex legal system, including international environmental laws, regional treaties and arrangements, and domestic laws in 8 sovereign states (Koivurova et al., 2020: 64).

### **Paris Agreement**

Climate change, in general, is a major factor for disease transmission, outbreak frequency, and emergence or deterioration of existing infectious diseases by influencing the environmental conditions that can enable or disable the survival, reproduction, abundance, and distribution of pathogens, vectors, and hosts. Vectors are especially vulnerable to climate change, and transmission cannot occur without suitable temperature conditions (Reisen, 2015: 129-130; Wu, et al, 2016: 14-23; Camilo et al., 2022: 869-875). At the time of the IPCC Third Assessment Report, no studies were available on the impact of climate change on human health in the Arctic Region, but later the Arctic Climate Impact Assessment was prepared by the Arctic Council and the International Arctic Science Committee (WHO, 2003: 56). While a WHO investigation was carried out on the original source of COVID-19, some studies indicate that climate change may have played a key role. The expansion of agricultural land and a subsequent reduction in forests may have resulted in an explosion of bat species. The creation of open land for cattle grazing may have also facilitated closer contact between humans and animals who lost their habitats to the livestock industry (Beyer, et al., 2021: 767; Berardelli, 2021; WHO, 2021). In this sense, the restoration of nature with the involvement of Arctic Indigenous Peoples provides a wider recognition and application of Nature-

based Solutions (Nbs), not only to strengthen climate-biodiversity nexus, but to cope with future climate-induced pandemics in the Arctic region.

Over 200 health journals urged world leaders attending the 2021 UN General Assembly and COP26 in Glasgow to tackle catastrophic, devastating and detrimental harm to health due to the 1.5°C temperature increase, which disproportionately affects the most vulnerable people in society including ethnic minorities (Atwoli et al., 2021: 1-3). Indigenous Peoples are not defined under the UNFCCC, but have actively participated to the Conference of the Parties (COP) as observers, in particular on the Clean Development Mechanism (CDM) afforestation under the Kyoto Protocol or Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) (IUCN, 2008; Osakada, 2017: 240). This is because their livelihoods such as hunting and gathering is closely tied to the land and forest and is directly affected by the quality of environment and climate conditions (Matinez and Sheats, 2015: 449). In this context, to implement the Paris Agreement, COP26 agreed on the Glasgow Leaders' Declaration on Forests and Land Use, Global Forests Finance Pledge to invest 19.2 billion dollars to stop deforestation and land degradation by 2030, and at least 1.7 billion dollars assistance to Indigenous Peoples and local communities (IPLC) to strengthen their rights to land and resources. COP26 also doubled the Adaptation Fund to protect forest habitats, considering that adaptation action should be based on traditional knowledge, knowledge of Indigenous Peoples and local knowledge systems.

Although such assistance is considered compensation to Indigenous Peoples as victims for lost land and resources due to climate change (Osakada, 2022: 16-38), their traditional ecological lifestyle and knowledge to live in harmony with nature, expertise and resiliency efforts contribute to developing adaptation policies and strategies for human beings to survive in the changing climate and chart a path to recover and build back better from the COVID-19 pandemic. Therefore, more systematic involvement and participation of Indigenous Peoples in formal decision-making processes is crucial, not only under the United Nations Framework Convention on Climate Change (UNFCCC) or the Arctic Council, but in each country to develop their National Adaptation Plans (NAP) under the Paris Agreement.

These adaptation measures can also indirectly contribute to reducing future possible risk of outbreaks among the Arctic Indigenous Peoples, but the Kyoto Protocol and the Paris Agreement have long focused on the carbon sinks of forest and has just started to link the issue to the health aspects of climate change after COVID-19. Public preparedness for bioterrorism and pandemic influenza in the early twenty-first century has limited relevance to climate adaptation, but the public health response to environmentally sensitive infectious diseases such as Dengue fever, Hantavirus, West Nile virus and Zika virus increased the international attention to the linkages between environment, in particular climate change, and health (Wiley, 2018: 241-265; UNEP, 2016). Therefore, further collaboration with health-related organizations is essential to promote community-based health research, monitoring and surveillance, such as the study by University of

Alaska, Centers for Disease Control's Building Resilience against Climate Effects (BRACE), National Center for Environmental Health (NCEH), Centers for Disease Control and Prevention (CDC), and Alaska Community Services (ACS) (Driscoll, 2016: 417-418). In the Arctic region, the Arctic Council's Arctic Monitoring and Assessment Programme (AMAP) and Emergency Prevention, Preparedness and Response (EPPR) working groups are expected to align with the International Union for Circumpolar Health (IUCH) and the International Circumpolar Surveillance (ICS) System among the Arctic countries.

Finally, while there is still discussion as to whether government or the private sector have obligations to individuals or communities affected by climate change based on the right to health or right to a clean environment under international human rights law, the current Human Rights-Based Approach to climate change is beneficial to protect Indigenous Peoples in the Arctic Region from climate-sensitive infectious diseases (Burger, 2018: 16-33; Williams, 2015: 601-615). The United Nations General Assembly (UNGA) adopted a historical resolution in 2022 (UNGA, 2022), by declaring access to a clean, healthy, and sustainable environment, a universal human right, based on a similar resolution adopted by the Human Right Council in 2021 (Human Right Council, 2021), recognizing access to a healthy and sustainable environment as a universal right. This monumental development of affirming the "right to health and right to a clean environment" as a human right, which gained wide support during the COVID-19 pandemic, could do a lot to improve the health situation of the Arctic Indigenous Peoples.

### **Convention on Biological Diversity (CBD)**

Factors behind the recent emergence of zoonoses include ecological changes resulting from agricultural practices such as deforestation, conversion of grasslands, irrigation, factory farming, bushmeat consumption, live animal markets and its long-distance transport (Unuigbo, 2021: 6), and drug-resistant bacteria due to antibiotics to grow livestock (Kahan, 2016: 1-9). Human behaviors such as migration, urbanization, international travel (Friis, 2019: 112-113; WHO, 2019) and lack of biodiversity, in general (Ostfeld, 2009: 40-43) are factors. Zoonotic diseases that can spread from animals to people are highly sensitive to environmental changes that alter the habits of animal populations and bring them into closer contact with human populations, and sometimes the animal to human transmission becomes person to person transmission (Wiley, 2018: 248). In this context, the biodiversity or ecosystem strengthens resilience of health and immunity systems through monitoring species in the human microbiome (Preston et al., 2013: 83-100; Abiha et al., 2021: 323-347).

In response to increasing zoonotic diseases, the Convention on Biological Diversity (CBD) adopted a decision at COP13 (CBD, 2016) to introduce the WHO's "One Health" approach combining human, animal, and ecosystems to avoid and prepare for the next pandemic. The One Health approach was originally promoted by the WHO, the Food and Agriculture Organization (FAO) and the International Epizootic Office (OIE) based on the 2004 Manhattan Principles in response



to the SARS pandemic in 2002 (OIE, 2021; Goldberg, et al., 1893: 190-207), and joined by the United Nations Environment Programme (UNEP) after COVID-19, a wake-up call for planetary health (Pachauri et al., 2021: 3-15). The importance of the One Health approach has been repeated by Global Biodiversity Outlook 5 (GBO5), which assesses the achievement of the Aichi Target under the CBD, Leaders' Pledge for Nature (United Nations Biodiversity Summit, 2020), and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The IPBES pointed out the existence of 827 thousand human-infectious viruses in nature, and warned that animal trade and diversion to agricultural land may be possible threats for frequent pandemics (IPBES, 2020; Brown, 2021). Despite this progress, the One Health approach is not widely recognized or applied as soft law and legal principle in courts including in the Arctic Region.

The Nagoya Protocol defines access to traditional knowledge associated with genetic resources; Prior Informed Consent (PIC) (Article 7) includes consideration of indigenous and local communities' customary laws, community protocols and procedures (Article 12), and awareness-raising (Article 21), but their implementation depends on each sovereign country. Greenland adopted Greenland Home Rule Parliament Act no. 20 of November 20th 2006 on Commercial and Research-Related Use of Biological Resources as domestic PIC, but Russia has not yet ratified the Nagoya Protocol as of 2023. If the Nagoya Protocol is expanded to pathogens such as SARS-CoV-2 and its Digital Sequence Information (DSI) as genetic resources subject to the Access and Benefit-Sharing (ABS) to protect the rights of developing countries which hold samples, there is also a serious concern against possible delays of developing and sharing vaccination under the WHO's Pandemic Influenza Preparedness Framework (PIPF).

To secure better participation of the Sámi people and utilize their valuable knowledge in the protected areas under the CBD (Article 8), the Sámi Parliament and administrative authority developed the voluntary Akwé: Kon Guidelines. These guidelines contribute to improving the CBD's impact assessments (Unuigbe, 2021: 44-45). Expansion of protected areas under the CBD has been strengthened by the 2021 G7 2030 Nature Compact to halt and reverse biodiversity loss by 2030, the Kunming Declaration at COP15 (Part I) to reverse biodiversity loss by 2030, and the Post-2020 Global Biodiversity Framework (Part II) to include 30% protection targets of both land and oceans territory by 2030. Such international regimes can help strengthen the resilience of the Arctic region, as President Biden vowed in 2021 to reconsider land leases for oil and gas development under Trump's administration in the Arctic National Wildlife Refuge, where the Gwich'in Indigenous Peoples live with caribous. Protected areas can also preserve the habitat of polar bears protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), promote the wise use of wetlands, and protect migratory birds in the Northeast Greenland National Park, which is registered as a Ramsar Convention site under development of minerals and hydrocarbon.

### **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)**

Over 30 pathogens have been detected in the last three decades, 75% of which originated in animals, and 60% of all known infectious diseases are zoonotic. In this context, the UN identifies illegal animal trade, wet markets, and ecosystems encroachment as key factors to increase the risk of infection diseases and future zoonotic pandemics (León et al., 2021: 610). COVID-19 was initially considered a zoonotic disease transmitted from bats as hosts and Pangolins, or later Raccoon Dogs as possible vectors, which have been overfished and traded as food or traditional medicine in China. In response to international pressure to close the wet markets permanently and ban wild animal trading, the Chinese wild animal protection law upgraded the protection level of Pangolins soon after COVID-19. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington Convention) has been regulating Pangolins due to poaching since 2016, but zoonotic diseases are out of its scope, and the Parties are responsible for its protection (Kimura, 2020: 1122-1125). However, some countries depend on the trading of bush meat at wet markets for their life and survival (Reperant, et al. 2013: 72). Trading of exotic animals as pets is another concern, due to lack of legal tools to apprehend poachers and the voluntary nature of disclosures to support traceability.

CITES may play a vital role in regulating international trade of endangered species, but it also has limitations especially in controlling zoonotic diseases. Canada only allows catches of Narwhals in the Arctic Ocean to Indigenous Peoples, but international trading is allowed under the Appendix II of the CITES, and Canada objected to a U.S proposal to upgrade the status of the Polar Bear under the Appendix II category to a total ban under the Appendix I.

The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) (Article 5) also considers the prevalence of specific diseases in assessing the risk of animal trading in the Arctic region, but the GATT food safety exception (Article XX(b)) does not fully consider the seasonal tundra, permafrost, other Arctic specific conditions, or animal welfare under the free-trade-oriented regime. In the Arctic region, it might be beneficial to strengthen the monitoring of animal consumed by Indigenous Peoples, who ingest raw meat from fish, seal, caribou, or reindeer (Wettlaufer et al., 2021: 135-144; Carleton, 2021: 1-11, 24). The WTO-OIE framework and international standards also serve as the basis for information exchange between the exporting and importing countries (Wolff and Hamilton, 2020: 15-25).

Arctic fox populations have decreased especially in Scandinavia, due to fur trade, climate change, and competition with the Red Fox in Greenland but are not protected under the CITES. Trading of Arctic foxes as pets directly or through exotic pet shops with necessary vaccination not being illegal, but exotic animals or wildlife trading may increase the risk of carrying viruses in the Arctic as well. Therefore, the above mentioned Chinese wild animal protection law prohibited the online trading of Arctic foxes after COVID-19 except the trade of its fur.

## **Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat**

The pathogen of the 1918 Flu pandemic has been detected in the lungs of the bodies of infected people under the permafrost in Alaska. This pathogen was most likely carried by migratory birds and transmitted to the surrounding birds or pigs, then reached humans and expanded among soldiers during the First World War (Hayami, 2006). Since congestion stress due to loss of wetlands may increase the risk of infectious diseases among migratory birds, protection of habitats by registering wetlands through the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat contributes to the prevention of possible influenza pandemics. The Ramsar Convention adopted COP8 decision VIII/32 (2006) on potential impact of avian influenza on biodiversity, COP9 Resolution IX.23 (2008) on Highly pathogenic avian influenza and its consequences for wetland and waterbird conservation and wise use, and COP12 decision XII/21 (2014) on biodiversity and human health.

Flyways overlap between Alaska and Far East Russia, but the mixing of viruses are very rare (Koçer, et al., 2014:119-120). However, effective management of wetlands and ecosystems with rich biodiversity through the participation of Indigenous Peoples based on Nature-based Solutions (NbS), is effective not only for protecting reindeer (Ramsar Convention, 1999), but also for migratory birds, which sometimes bring infectious diseases across borders and oceans in the Arctic region, particularly in Siberia.

## **Conclusion**

COVID-19 has revealed the strengths and weaknesses of the Arctic response to pandemics and provided useful lessons to prepare for future possible climate-sensitive zoonotic diseases. The Arctic region faces higher risks of infectious viruses contained under the melting permafrost or deep ocean sediments due to faster temperature rise. These infectious viruses might be transmitted by the surrounding animals, such as reindeer and seals, as hosts or vectors to Indigenous Peoples, who's livelihoods are dependent on ecosystems, such as hunting, fishing and livestock farming, and live in remote areas with limited access to the health system.

For better handling of future pandemics or increasing climate-sensitive zoonotic diseases, the key determining factors are strengthened support by the Arctic Council and close collaboration with health-related organizations. Identification and monitoring of sites with high risks, such as old burial places, virus research institutes or animal trading is also crucial. Other actions include effective management of the Arctic tundra and wetlands with more systematic participation and involvement of Indigenous Peoples in the more formal decision-making process to develop adaptation plans.

Wider recognition and application of Nature-based Solutions (NbS) to strengthen the climate-biodiversity nexus, and the recent Human Rights-Based Approach to climate change such as the

UNGA's resolution affirming the "right to health or right to a clean environment" as a human right, can contribute to a robust environment for the Arctic Indigenous Peoples. In particular, more holistic and multifaceted approaches based on WHO's One Health approach is necessary for protecting them from climate-sensitive infectious diseases, by combining all the indirect, but relevant aspects of international environmental laws, such as the Paris Agreement (ex. mitigation and adaptation to reduce future risk of outbreaks among them), CBD (ex. effective management of the Arctic Tundra and wetlands through their participation based on NbS), CITES (ex. strengthening the monitoring of animal trading around them) and Ramsar Convention (ex. effective management of wetlands and ecosystems through their participation based on NbS), as well as relevant domestic laws in the Arctic region.

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