Sustainable Development Working Group

ARCTIC COUNCIL

SDWG PROJECT PROPOSAL

Version 02.03.2021

Project Title:	**Lead Country/Project leader(s):**
"Biosecurity of the Arctic" *(hereinafter referred to as the Project)*	Lead: Russian Federation Co-leads: Finland **Authorized co-lead state agencies**: Ministry for the Development of the Russian Far East and Arctic, Ministry of Agriculture and Forestry of Finland, Ministry of Social Affairs and Health of Finland **Academic institutions**: National Research University "Higher School of Economics" (HSE), Moscow, Russia; University of Oulu (UOULU), and Finnish Food Authority, Finland; University of Illinois, Chicago (UiC), USA; Akkon University for Human Sciences, Berlin, Germany; Northern (Arctic) Federal University (NARFU), and Arctic Cluster of Medical Universities, Russian Ministry of Health, , Non-profit partnership "Technological platform "Technologies of Ecological Development", the Russian Federation
Total Cost of Project: The Project management state / project manager(s) provide funding for the costs of supporting the Permanent Secretariat and field research activities. The Project Manager/Manager(s) and Project participants will seek opportunities to co-finance joint research programs from their own funds, resources of interested national organizations and international financial institutions in accordance with the agreed detailed plan of activities for the Project implementation. *(The total budget requirements for the project activities carried out by the Russian*	**Relationships to other AC Working Groups:** The project covers a number of interdisciplinary issues implicitly addressing the methodological challenges that requires a tight communication and collaboration with working groups of the Arctic Council viz. AMAP (Arctic Monitoring and Assessment Programme), CAFF (Conservation of Arctic Flora and Fauna). The collaboration will be focused on the jointly produced report to SAO (Biosecurity White paper), information exchange (cross-fertilization) on the arctic animal and human health issues that are helpful to fulfill the specific missions of collaborating WGs. The collaboration with the Permanent Participant organizations of the Arctic Council is also warranted. In addition, the interaction and synergy with the ongoing AC

agencies involved is estimated to be equivalent to $380,000 for 2-year period	projects "One Arctic, One Health", "The Arctic Migratory Birds Initiative" (AMBI) are important.

PLEASE NOTE: This project is intended to be a cross-cutting effort of SDWG, AMAP and CAFF. AMAP and CAFF are currently considering this project and may have addition feedback and advice about the scope, tasks, deliverables and timeframes articulated for this project. As a result, all 3 working groups must confirm their support for proceeding with the project and the first proposed task below is for relevant experts from all 3 working groups to come together to finalize specific tasks, deliverables and timeframes. This discussion will also be an opportunity to clearly outline how each working group will contribute and how they will work together to advance this project

Criteria for assessing project proposals submitted to SDWG

The 1996 Ottawa Declaration established the Arctic Council, emphasizes the commitment of the Arctic Council to the principles of sustainable development, including improved health conditions "The Sustainable Development Framework Document (SDFD) declares that the Arctic Council attaches particular importance to " health and well-being of people living in the Arctic ... prevention and control of diseases, as well as long-term monitoring of the impact of pollution and climate change on human health".

The Sustainable Development Action Plan (SDAP) includes "Protecting the health of people living and working in the Arctic" as one of the main priorities in the social dimension of sustainable development.

Objectives

The overall goal of the project is to support public health systems and public services in implementing a quick response to current and future biological threats related to the uncontrolled spread of highly virulent pathogens, parasites, biotoxins, and other biohazards across the Arctic.

Tasks:

- Bring together relevant experts from AMAP, CAFF, SDWG, and PPs to finalize specific tasks, deliverables, and timeframes for the project implementation.
- Prepare a case study based peer-reviewed report integrated with Indigenous knowledge related to specific biohazards in the Arctic that may pose risks to life and human health. (White Paper)
- Prepare recommendations on a community-based screening, monitoring, and information system for infectious disease control, prevention, and risk communication.

Background

The project is proposed to be implemented in 2021-2023, during the Chairmanship of Russian federation of the Arctic Council.

The proposal for assessing, predicting and managing the risks of uncontrolled transfers of virulent pathogens was made by the representative of the Russian Federation to the Arctic Human Health Expert Group of SDWG and supported by all participants of the meeting held in September 2019 (Protocol of 13 September 2019, Reykjavik, Iceland).

Rationale

In a broader context, biological hazards refer to organisms or biological substances that can affect human health and wildlife. These include viruses, bacteria, fungi, protozoa, helminths, venomous marine species, plants, and their biotoxins, as well as predatory and herbivorous, domesticated, and farmed animals capable of causing infectious and non-infectious diseases, injuries, allergies, or poisoning. Generally, any human contact, direct or indirect, with the self-replicating living beings involved in the natural selection process is potentially hazardous.

Currently, the arctic national monitoring systems for the environment and human habitats are based primarily on quantitative measurements of toxic chemicals and the occurrence of some pathogens in a limited list of objects (water, soil, market food, and human media). This approach does not fully reflect their potential sources, transmission routes and adverse biological and social effects on humans.

The environmental and health risks of a biohazard vary greatly by its origin, exposure pathway, or type of contact. The transmission of virulent pathogens to humans is carried out predominantly by biological pathways such as the migration of people, wild birds, fish, insects and marine mammals representing the main reservoirs and carriers of hard-burden infectious diseases.

The Arctic regions are the most impacted due to the phenomenon of massive seasonal transboundary and interregional migration of wildlife that includes millions of migratory birds, fishes, and mammals, many of which are still commonly used for the traditional diet of the arctic Indigenous population. These species travel up to 5,000 km annually for safe breeding in the Arctic regions, mainly in the form of vertical migration from South to North and backward, but there is also a latitudinal form of migration, in particular, of wild swans and commercial marine fish [1].

The most important factors contributing to the severity of the problem under consideration are the ongoing and expected climate changes along with increased shipping that can affect the geography of migration routes, seasonality, and spawning areas of wild birds, fish, insects, and animals [2, 3, 4]. The Arctic regions are at higher risk of climate change impact on transmission pattern of zoonotic and vector-borne infectious diseases [5]. Russia, as being the largest country by both the total arctic area and arctic population, is of special concern [6].

The other arctic-specific phenomenon is the fast thawing permafrost that may have preserved for centuries in the frozen ground a range of zombie pathogens such as viable bacterial spores and viruses. There are several well-documented outbreaks of anthrax (*Bacillus anthracis*) coming out due to the climate-mediated thermal degradation of permafrost. The threat of genome reconstruction of viruses remobilizing from the burial sites is considered to pose the greater epidemic risk of smallpox and other pathogenic viruses [7].

As a result of natural disasters (tsunamis, typhoons, flooding, hurricanes and so), a few million tons of contaminated wastes are washed into the oceans every year from the southern coastal regions, including persistent bacteria and viruses, parasites, and other biohazards capable of being transferred thousands of kilometers away. As estimated, the earthquake-induced tsunami on March 11, 2011, washed-out 5 million tons of debris in a single event. The increase in debris influx to surveyed North American and Hawaiian shorelines was substantial and significant, representing a 10-time increase over the baseline [8].

Microscopic algae and aquatic bacteria can be also great threats to public health due to their ability to produce marine toxins (MTs). MTs have been reported in several marine organisms causing human poisoning incidents since these organisms constitute the food basis of coastal human populations [9, 10].

Annually up to 125 000 deaths are reported worldwide, with an additional 400 000 amputations and other severe health consequences including infectious diseases related to animal attacks [11]. According to the Russian Federal Service for Surveillance on Consumer Rights Protection and Human Wellbeing, annually more than 380,000 people are injured due to direct human-animal interactions, 38% of those resulted from attacks of wild animals [12] . There is a need to pay more attention to the prevention of human injuries, morbidities, and fatalities resulting from wildlife in the arctic biosecurity policy.

The lack of threat prevention and security policy means not only that there are risks associated with the uncontrolled spread of pathogens by natural pathways (for example, because of natural disasters), but also with possible deliberate actions (known as bioterrorism).

The socio-economic effects of human co-exposure to persistent contaminants, pathogens, and biotoxins that can accumulate in food webs and spread through biological pathways have not yet been properly assessed.

The following well-known phenomena, proven facts and systemic problems are the basis for the study of these risks:

1. Seasonal migration is one of the unique phenomena in nature. Many bird species migrate along stable routes, known as flyways.

Birds are the main reservoir and carrier of some parasites, as well as respiratory viruses and blood-sucking insects. Huge populations of coastal birds, half of which breeding in the Arctic, are asymptomatic carriers of all types and combinations of hemagglutinin and neuraminidase of influenza “A” virus. Strains of avian flu and coronaviruses can undergo genetic recombination with strains that affect humans.

As estimated, there are between 75,000 and 300,000 helminth species parasitizing the vertebrates [13]. Wild birds can absorb pathogens such as *Salmonella, Campylobacter, Mycobacterium avium*, and spread these pathogens to humans directly or through infecting poultry, including drug-resistant forms of these pathogens resulting from the widespread use of antibiotics in poultry farming. More than forty species of parasites live on birds, their nests, or in places where they camp. They are associated with the spread of several hundred

viral, bacterial and parasitic agents. Such diseases include plague, encephalitis, smallpox, meningitis, and many other diseases [14].

Paradoxical is the fact that some parasites do not die when birds leave a certain area; ticks and other insect vectors are looking for a new "host", often human beings or pets.

As for wild migratory fishes, they can transmit to humans a range of parasites such as roundworms (nematodes), flatworms or flukes (trematodes), and tapeworms (cestodes) as well as some bacteria (*Listeria, Aeromonas hydrophila*, etc.)[15]. Shellfish, such as oysters, mussels, and clams can bio-accumulate viral pathogens from polluted waters. The consumption of contaminated shellfish can cause gastroenteritis, respiratory illness, fever, and hepatitis.

Another point of biosecurity interest is that the arctic-breeding migratory birds and fishes, constituting a very important part of the arctic traditional diet, may well have been a vector and source of human exposure to bioaccumulative environmental pollutants and pathogens simultaneously. As known, many of those pollutants such as lead, mercury, arsenic, PFASs, and dioxin-like PCBs capable of affecting the immune system that leads to the suppressed human resistance against virulent pathogens and may devalue vaccination efficacy [16].

Thus, migratory birds, fishes, and animals may have significantly contributed to the global spread and pandemics of infectious diseases. Improving understanding of wild bird and fish migration patterns and transmissible infectious diseases can help predict future outbreaks and epidemics.

2. Climate warming can cause the remobilization of virulent (paleo) pathogens and biological toxins into the environment from the legacy waste sites and burred cattle carcasses sites in the permafrost. It has been documented that thawing the Arctic permafrost initiated by the Global warming process is capable of releasing a number of paleo pathogens such as the spore-forming bacterium *Bacillus anthracis, Variola virus (smallpox), Mycobacterium tuberculosis,* etc. with an extremely long viability up to 30 000 years.

3. The project urgency is justified by the enormous humanitarian stress and extent of the challenge posed by the ongoing pandemic COVID-19, which highlights the urgent need for health and economic policy actions, including international cooperation, to cushion its consequences, protect vulnerable populations, and strengthen healthcare capacities to prevent and deal with similar events in the future [17]. Currently, the various arctic agencies and organizations authorized to monitor zoonotic diseases and other biohazards are not sufficiently integrated to address emergency issues. For example, the experience gained through the COVID-19 pandemic shows that the information on regional and global transmission risks of highly virulent infections to humans appeared to be incomplete or is not readily available. A methodology for assessing and predicting the risks of spreading virulent pathogens in the Arctic are not sufficiently developed so far. Existing measures to control infections are mostly focused on human-to-human transmission.

Main deliverables:

1. White Paper: A case study based peer-reviewed report integrated with Indigenous knowledge related to specific biohazards in the Arctic that may pose risks to life and human health. Based on available data, source material, expert and indigenous knowledge-, suggested topics for this White Paper include:

- Priority biohazards, related levels of societal concern, and feasible measures of controlling the long-range transfer and locally originated emerging and re-emerging pathogens, parasites, biotoxins, and other biological threats in the Arctic;
- Status of endemic zoonotic diseases of potential concern to humans and wildlife in the Arctic;
- Human co-exposure to persistent contaminants, pathogens, and biotoxins that can accumulate in food webs and spread through biological pathways;
- Migratory species of wildlife capable of transferring pathogens into the Arctic with special focus on those consumed by Indigenous peoples in their traditional diet or used in other cultural practices.
- Spread of risks related to the remobilization of viable paleo-pathogens from the thawing permafrost soils due to global warming.
- Arctic Biohazard Risk Classification by levels of evidence, level of spread rate, and level of public health importance.

2. Recommendations on a community-based screening, monitoring, and information system of infectious diseases control, prevention, and risk communication.

Expected overall effect

Reduction of morbidity and mortality rates of the arctic population and related economic and demographic consequences associated with human exposure to environmental biohazards.

Anticipated partnership

The exchange of information, assessments, and innovations that can support public health systems and health service delivery is required a tight partnership with other Arctic Council Expert Groups and Permanent Participants, ongoing Arctic projects, academic institutions, and stakeholders to achieve the project aims. The overall execution of the project, including coordinating the activities of all participants and submitting interim and final reports and recommendations to the SDWG, will be provided by a task force consisting of the most authoritative experts in the field of Biosecurity. A project office will be established at the HSE (Russia) to organize current practical activities.

Integration of Traditional and Local Knowledge

Integration of traditional and local knowledge will help to achieve better results in the implementation of the Project outcomes by using them in the Project activities.

The approaches, tools and procedures for the integration of traditional knowledge into planned activities in the framework of the Arctic Biosecurity project, will be widely based on the positive experience gained in the productive collaboration of the human health expert groups with PPs on the other SDWG and AMAP projects such as

- "Persistent Toxic Substances, Food Security, and Indigenous Peoples of the Russian North",

- “One Arctic, One health”,

- “COVID-19 in the Arctic: A briefing document for Senior Arctic Officials” etc.

In order for the multi-stakeholder collaborations to fulfill their potential, the annual online meeting on Arctic biosecurity is planned to ensure that the needs of indigenous peoples and other susceptible groups are sufficiently addressed. The practical channel of the integrated project management and implementation of its outcomes in a proper way will be provided by engaging an authorized expert/knowledge holder of PPs in the project office in Moscow.

Timetable and Project Completion

The Project starts in February 2021 and the completion date is December 2022

1. White Paper: “Biosecurity of the Arctic: Emerging, re-emerging infectious diseases and other biohazards (First draft – Sept. 2021; Second draft – Nov. 2021; Final draft – Jan., 2022).

2. Recommendations on a community-based screening, monitoring and information system for infectious diseases control, prevention, and risk communication (first draft – Apr. 2022; final draft – October 2022).

Funding

The Russian Federation is committed to cover the expenses related to the field research activities within its respective jurisdiction as well as the project office costs. Finland will provide in-kind contributions to the project in the form of the time, effort and knowledge of relevant Finnish experts that will participate in tasks and preparation of deliverables outlined in this project proposal.

Funding to support AMAP and CAFF work related to this project will be confirmed through their respective project review and endorsement processes.

Communications

The Arctic biosecurity requires communicating with state and local authorities, Indigenous Peoples’ organizations as well as the public on the risk levels and prevention strategy. An appropriate communication system is to be developed that will make it possible to convey information about the goals, objectives, and outcomes of the project, its implementation and, most importantly, practical recommendations to the public of the member-states of the Arctic Council.

The development of recommendations on an international strategy for biosecurity in the Arctic requires adequate and timely sharing and processing of the relevant information.

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