Integrating Activities for Advanced Communities

D6.2 - Refined action plan including experience from a field trial

Project No.730938– INTERACT

H2020-INFRAIA-2016-2017/H2020-INFRAIA-2016-1

Start date of project: 2016/10/01 Duration: 48 months
Due date of deliverable: 2019/03/31 Actual Submission date: 2019/03/29

Lead partner for deliverable: USB
Author: Alexandra Bernardová

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the Consortium (including the Commission Services)	
CO	Confidential, only for members of the Consortium (including the Commission Services)	

Table of Contents

Publishable Executive Summary

The overall objective of Work Package 6 “Rapid response to environmental emergency alerts“ is to help protect the Arctic and global residents from the hazards of potential future environmental emergencies. Within the work package, we have identified more than 40 potential hazards and categorised those under seven categories. Several organisations and institutions were contacted, and cooperation was established. A trial run to test the developed system was conducted in summer 2018 (see deliverable D6.1). This brought to light several issues that will need to be addressed and considered for future potential runs. There is continuous work on the web site, which will serve as a platform with available information about possible risks, protocols on how to collect data for their monitoring, contact information for reporting events or developments and links to ongoing trial run(s) and sampling campaigns.

1. Identification of potential hazards

Based on the literature survey of various available sources of relevant information (scientific papers, annual reports of monitoring organizations or initiatives and final reports of projects) we have identified more than 40 potential hazards which were grouped into six categories:

- Climate-sensitive infections (e.g. air-borne diseases, echinococcosis, toxoplasmosis)
- Non-native and range-expanding species (alien species/invasive species, expanding species, algal blooms)
- Environmental contaminants (e.g. air pollution, chemical contaminants, POPs, radionuclides, plastics)
- Environmental indicators of climate change events (extreme weather events)
- Hazards (e.g. snow avalanches, methane eruptions, tundra wildfires, volcanic ash)
- Miscellaneous (meteorite strikes, noise and traffic)

To asses which issues were most important to focus on, a questionnaire was sent to INTERACT station managers. Based on the survey results (fig. 1), the most important reported risks are (a) diseases (rabies, air-borne diseases, e.g. anthrax, tuberculosis), (b) pollutants (POPs, black carbon, plastics), (c) catastrophic events such as earthquakes, windfalls or volcanic eruptions, and (d) weather related events such as instances of extreme weather (rain on snow, winter warming, extreme rain/snowfall...), floods or avalanches.

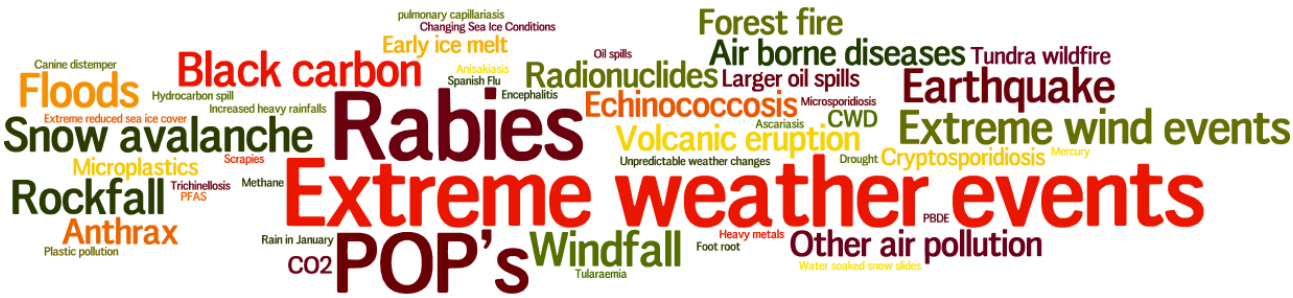

Figure 1: Word cloud diagram representing the severity or imminence of hazards in the vicinity of Arctic stations as reported by station managers

2. Collaboration with relevant organisations

We have established collaboration with organizations and projects focused on the Arctic to consult possible hazards and to develop joint monitoring strategies and/or to extend the scope of present strategies. Examples are provided below.

Collaboration with Climate change effects on the epidemiology of infectious diseases and the impacts on Northern societies (CLINF)

Concerning diseases, we set up a cooperation with the CLINF project (https://clinf.org/) focused on the effects of climate change on the distribution of climate-sensitive infections and their impact on northern animal husbandry households. CLINF covers several cooperating partners and other affiliated organisations (mostly in Scandinavia and Russia) concerning infections which could be contacted or reported about the occurrence of a disease. Discussions with CLINF were made at CLINF annual meeting in Abisko, Sweden, December 2018.

Collaboration with Laboratory of Arbovirology, the Biology Centre, Czech Academy of Sciences

The Laboratory of Arbovirology at the Biology Centre of the Czech Academy of Sciences cooperates with this work package to run the trial on the determination of the prevalence of selected tick- and mosquito-borne diseases in the Arctic (such as influenza (see section 2).

Collaboration with National Ecological Observatory Network -NEON

Collaboration has been initiated and an on-line meeting to introduce INTERACT to people from National Ecological Observatory Network - NEON to deepen the cooperation and finding the opportunities for cooperation on receiving and analysing samples of selected diseases is planned to be held shortly.

Collaboration with the Radioactivity Laboratory at Aarhus University

The Radioactivity Laboratory at Aarhus University contacted us about possible cooperation to sample anthropogenic radionuclides occurring in the environment of Greenland.

Collaboration with Aarhus University, Protection of the Arctic Marine Environment (PAME) and Alfred Wegener Institute (AWI)

Concerning plastic pollution, we have started the communication with the experts from Aarhus University about effective cooperation. Marine plastic pollution in the Arctic is one of the priorities of upcoming Icelandic chairmanship of the Arctic Council and within the work package we plan to connect with Arctic council workgroup (Protection of the Arctic Marine Environment - PAME) as well as with AWI regarding the nanoplastics.

Future collaborations with Group on Earth Observations (GEO) and Local Environment Observer Network (LEO)

Organisations dealing with environmental hazards (e.g. GEO) as well as initiative concerning alien and invasive species (ARIAS) where the communication either did not start yet or was started at very general level are about to be contacted.

There is an emerging cooperation with the LEO network (www.leonetwork.org), which uses observation and knowledge of people (mostly in Alaska and west coast of the United States where the network is currently active) about an unusual animal, environment, and weather events. Cooperation with the LEO network will help us to connect (get responses) also to local communities. INTERACT could bring to LEO the increase of observers and could help to increase the pool of experts that could react to submitted observations. Cooperation with local communities will be also discussed with WP9.

3. Trial run experiences

The trial run, focused on collecting ticks, mosquitoes and bird or seal droppings for the determination of the prevalence of selected tick- and mosquito-borne diseases (e.g. arboviruses, influenza) in the Arctic, is presented in Deliverable D6.1.

The most important findings from this trial run are:

a) The necessity for simple, easy to understand protocols
b) The lack of equipment for sampling
c) The possible necessity to obtain permissions in advance for collecting samples
d) The shipping of parcels

During the preparation of the protocols we have realised, that we cannot simply use the standard protocols for collecting any type of samples/data. The staff at the station or prospective locals do not necessarily have experiences with sampled material. The protocols need to be prepared so everybody can follow the instructions (see example in Figure 2.).

Some of the necessary sampling equipment is also not always readily available, thus we tried to add suggestions for alternatives. In our trial run, there was the necessity to freeze the samples to preserve the DNA (RNA) for analyses. Since not all stations are equipped with freezer, we offer to use RNAlater instead. The cooperating Laboratory of Arbovirology who cooperated with us on the trial run offered to send appropriate amount upon request, as well as other laboratory material (gloves, vials etc).

Permits for sample collection often need to be obtained well in advance (as is necessary e.g. for Greenland) which will represent an issue in need of a rapid response.

Shipping of parcels should not be a problem within the European Union. However, shipping out of EU or across the continent could be problematic. The samples collected as part of our trial run did not pose any health risk; however, we have asked the Czech customs office and several shipping companies how to send samples of this type and whether there are any limitations, but we did not get any satisfactory answer. The experiences of station managers also differed considerably (problems are expected especially when sending samples from Russia), so precautions have to be made to ensure the safe delivery of the parcels.

Since the samples could potentially contain infected biological material, we instructed the station managers to mark each parcel as ‘UN 3373 – Biological substance, Category B’ (Fig. 3) in order to comply with the IATA Dangerous Goods Regulations Specimens, assigned to UN 3373, are human or animal materials that are being transported only for the purpose of diagnosis or investigation. Such materials include excreta, blood and its components, as well as other tissues and fluids.

Another solution, to - at least partly - avoid sending samples across long distances or continents is to identify laboratories capable of doing the same analysis in other countries.

2. Droppings collection protocol for the detection of the influenza virus

Author: Jiri Cerny, Institute of Parasitology, Biology Centre of the Czech Academy of Sciences
July 2018

Despite being thought of as a normal seasonal disease, influenza is one of most deadly diseases, causing the deaths of many patients worldwide. Different influenza strains can easily recombine, creating new potentially highly pathogenic strains. It is therefore important to monitor not only pathogenic strains, but the whole virus population. In the Arctic, the influenza A virus frequently infects seabirds, geese, ducks and seals whereas the influenza B virus has been found only in seals. In infected birds, the influenza virus is secreted with excrements, which can be easily collected.
Any number of samples is greatly appreciated, but tens of samples from each bird or seal colony are necessary for a statistically significant analysis.

Droppings collection

MATERIAL LIST: 1.5/15 or 50-ml tubes, laboratory gloves or plastic bags, toothpicks (or safety matches), RNAlater, pipette

Please write down the general information about the colony under study (animal species, numbers of individuals, locality, etc.) on the sheet.

1) Droppings must be collected as fresh as possible (still viscous, not dry).
2) Collect droppings into an empty 1.5-ml tube or into a tube containing RNAlater (can be provided upon request) using a new wooden toothpick or some similar object (e.g. a pipette tip). Never reuse the tool.
3) Wear laboratory gloves (or plastic bags) when handling the droppings and wash your hands afterwards.

Figure 2: Example of a sampling protocol.

Figure 3: Biological substance category B label

4. Information flow and sustainability

The flow diagram suggesting delivering relevant data to environmental agencies was presented already in D6.1 (Fig. 4) and has proved to be valid also after the trial run. The establishment of that procedure and securing the long-term sustainability is planned for the next project period.

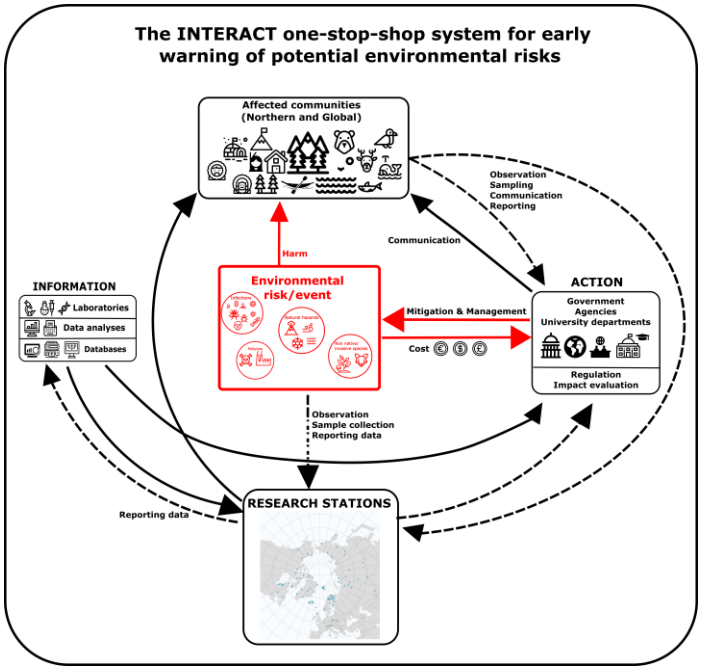

Figure 4: The flow diagram outlining the delivering of relevant data to environmental agencies is still valid after the initial trial run.

5. Outreach

A web platform that will be accessible at: https://eu-interact.org/managing-risks/ will serve as a hub for finding all necessary information about risks and hazards grouped into categories, links to ongoing trial runs or calls, as well as a 'red button' allowing to easily contact someone from the Rapid Response Work Package, who will forward the message to the proper recipient.