CLINF Stakeholder Workshop Agenda & Minutes

Set-up:

The workshop comprised of three thematic sessions, each dedicated to a different aspect of CLINF research. Each session included a number of presentations to kick-start the ensuing discussions. Following the brief presentations participants were split into four carefully composed groups. Attention had been paid to gender balance and even distribution of the scientific and professional expertise represented by the participants. Each group was tasked to make notes of their discussions (see Appendix 2 for these original notes) and was chaired by a dedicated CLINF member. Results of the group discussions were reported back in an ensuing plenary session.

Theme "One Health" – chair: Birgitta Evengård

Welcome and brief CLINF overview (presentation 1)

Identification of relevant climate sensitive infections (CSIs)

- Presentation 2: *Emerging infectious diseases of the North* (Birgitta)
- Presentation 3: *Identification of relevant CSIs* (Ann Albihn)

Group discussions and plenary session:

1. *If and when you learn about CLINF at WWW.CLINF.ORG, which parts of its rather wide range of enterprises do you find most interesting and/or relevant?*
   One major challenge was seen in collecting and manipulating large amounts of data on infectious diseases, especially as data comes in different formats from different sources, and to forge this data into meaningful One Health forecasts for infectious diseases. One issue in this regard is scale, i.e. resolution in the data for modelling landscape epidemiology. New methodology might need to be developed in order to synthesize information from different fields of research. Despite of these difficulties, and also because of them, the attempted CLINF CSI database and disease models are expected to be an important contribution to climate change adaptation.

Communication about CLINF is important and should be carefully timed and targeted. An early involvement of stakeholders, especially of local communities, was advised in order to promote usage of CLINF results.
Water-related environmental factors appear to play a special role for disease transmission and thus for modelling future disease prevalence.
Socio-economic challenges arise from climate change, such as changing conditions for reindeer herding and other forms of animal husbandry.

2. *With a focus on the diseases of humans and animals, and in particular diseases that may transfer back and forth in-between the two (zoonotic diseases), which diseases do you find to be of most concern (for health, economy, society, etc.)?*
   Vectorborne (Borrelia, TBE, etc.) as well as food- and waterborne diseases (Cryptosporidium, PKD, EHEC, Campylobacter) were considered to be of most concern; in addition, Brucellosis, Anthrax, Q-fever, Blue tongue, CWD, tuberculosis, West Nile fever, bird influenza, nephropathia, and leptospirosis. CWD and Campylobacter infection should receive more attention. Anthrax is of high concern with regard to Russia. Not only because of increased risk of spreading from areas with thawing permafrost, but also from a socio-economic point of view. Participants assumed that there is no financial compensation system from the authorities to affected communities in case of an Anthrax outbreak among reindeer or other livestock.
3. *In the time-range of your personal experiences, do you sense any newly arrived diseases in your region of livelihood? If so, do you suspect that the change is related to changing weather patterns?*
   Blue tongue, foot rott (in sheep in Norway), Anthrax, TBE/Borrelia, Sindbis virus, tularaemia, Setaria tundra (mosquito-borne parasite infection of reindeer) are perceived as new or re-emerging diseases. However, these perceptions appear to differ between local communities and the rest of the population and/or national authorities. Rural communities and husbandry households might have a longer memory than the authorities.
   From Iceland increased numbers of ticks and biting midges were reported. It can be assumed that these observations are a sign of overwintering vectors and that with increasing numbers also the risk of transmitting diseases increases.
   For new or re-emerging diseases one has to be aware that physicians might not recognize disease symptoms because they lack the experience. Thus, awareness of rare infectious diseases might need to be improved.

National CSI reporting systems in an international perspective

- Presentation 4: *Reporting of zoonotic infections across Nordic countries* (Ann)

- Presentation 5: *Assessing the infrastructure of CLINF stakeholder organisations from Nuuk to Yakutsk* (Sepp Böhme)

Theme "Future CSI Scenarios" – chair: Tomas Thierfelder

Climate change effects on CSIs

- Presentation 6: *CLINF data and methods for inferring future CSI scenarios* (Tomas)
- Presentation 7: *Examples of weather effects on CSIs* (Ann)

Group discussions and plenary session:

4. *Have you sensed an increasing trend in the variability of weather in the region of your livelihood, and hence a notion that weather is not as reliable and/or predictable as it used to be (for example in comparison from one generation to another)?*
   Although it is difficult to sense such changes during a single lifetime, participants agreed that the likelihood of extreme and of static weather appears to have increased; the same applies to the pace of these changes. Seasonal shifts appear to be affected, with a lengthening of seasons. Signs of changing climate can be seen everywhere. Glaciers and permafrost are thawing. Landslides due to long lasting and heavy summer rain are a new phenomenon on Iceland. Finland has not experienced any exceptionally cold winter for an entire generation.
5. *If you feel that weather is changing, are you aware of any related effects on enterprises such as agriculture, animal husbandry, hunting/fishing, tourism, or any other branch of entrepreneurship?*
   As the landscape is changing, so is the land use, e.g. in regions of thawing permafrost buildings are damaged and where rivers and lakes no longer freeze reindeer migration routes need to be changed. Changes in vegetation cover are synonymous with changes in biological niches regarding a wide range of animals, and hence impact on possibilities for animal husbandry, fishing and hunting.
   As warm seasons are getting longer, farmers in the North might be able to harvest two crops from their fields, but more humid or wetter weather increases the challenges of animal husbandry, for example with regard to diseases. For fisheries, warmer ocean temperatures require new management as the fish are moving to new regions. Unpredictable ice conditions affect reindeer migration and winter transportation routes. Winter tourism is affected by shorter seasons with less snow. Wildfires and the lack of wild berries due to drought affect forestry and foraging businesses (wild berries and mushrooms). At warmer temperatures reindeer move to higher altitudes and residual snow patches in

order to avoid insects. This behaviour reduces their grazing time and results in smaller calves. Warmer temperatures also have an impact on the autumnal moose hunting and slaughtering. Hanging the meat might require artificial cooling.

6. *If you feel that the possibilities of conducting enterprises are changing as a result of changing weather, are you aware of any cases that may be related to a changing exposure towards infectious diseases?*
   The supplementary feeding of reindeer, transporting and fencing them, possibly even together with other animals such as sheep, increases the risk of infectious diseases. In Russia reindeer migration routes may change in order to avoid areas with putative sources of Anthrax. Where animal feed has to be imported, there is a concern regarding its potential contamination with new infectious diseases.
   In 2014, Finland experienced several epidemics due to warm weather. With higher temperatures, people will spend more time outdoors, which increases their exposure to ticks and mosquitoes and their use of insecticides. This in turn might cause resistance.

In-field CSI sampling and survey

- Presentation 8: *Inclusion of CSIs into ongoing programmes of environmental survey* (Tomas)
- Presentation 9: *In field CSI sampling of husbandry reindeer* (Ann)

CLINF Geographic Information System (GIS)

- Presentation 10: *Introduction to CLINF GIS, an international infrastructure for communicating CSI* (Tomas)
- Presentation: *Hands-on demonstration of CLINF GIS* (Sepp)

Individual work with CLINF GIS

All participants were assigned a @clinf.org e-mail address, provided with login credentials and then invited to have a sneak preview of the CLINF GIS SharePoint (https://umeauniversity.sharepoint.com/sites/CLINF).

Additional notes:

Dmitry informed participants about the Russian webpage www.arctichealth.ru, which follows a similar approach to geographic mapping of health data as CLINF. The site is still under construction, but intends to provide maps with Russian health data combined with meteorological and landscape data. The user will be able to choose the disease and time period of interest.
We further learned from Yulia about the International Arctic Science Committee, which has a working group focusing on Russia. Yulia is the secretary of this working

group. She offered CLINF researchers to use their newsletter to spread the word about CLINF and to interest Russian researchers in collaborations with CLINF scientists. Yulia also provided a very informative presentation by Vladimir Pavlenko describing the organization of Arctic research in Russia (Appendix 4).

Theme "Societal Effects of CSIs" – chair: Grete Hovelsrud

Introduction to the societal effects of CSIs (presentation 12)

- *Cumulative effects of multiple environmental and societal changes* (Grete)
- *Adaptations to cumulative effects* (Camilla Risvoll)
- *Traditional knowledge and adaptation* (Jan Åge Riseth)
- *Coproduction of knowledge as a critical way to address the effects of CSIs on society and nature* (Grete)

Group discussions and plenary session:

7. *Do you think the society is prepared to meet the complex challenges from changing climatic and societal conditions? What are your experiences with such changes?*

Participants feel that the society *en large* is aware of the challenges, but not yet prepared; some might even be in denial. In contrast to many indigenous peoples, most of the population is no longer close to or dependent on nature. Thus, the majority might not feel the urgency in adaptation needs, as they do not experience the changes on a daily basis.

Poor management of dramatic flooding or forest fires showcase insufficient disaster preparedness and contingency capability. National authorities have not understood the need for adaptation. Outsourcing of preparedness and management activities have fragmented the responsibility for a holistic view on climate change adaptation and civil protection.

Supplementary feeding of reindeer, which has to be regarded as an adaptation strategy, does not only represent a change in reindeer management, but also a tremendous cultural change since reindeer herding practices are synonymous with Sami culture. One advantage with the new practice of supplementary feeding is the opportunity so observe (and treat) individual animals, and to better protect the herd from predators. But, apart from extra efforts and extra costs, another drawback is the perception that meat from fenced reindeer is of inferior quality. Finland currently discusses the idea of a healthcare regime for reindeer, under which animal welfare should govern all handling of the animals.

Successful adaptation activities will most likely depend on financial resources. Private fire fighters hired by wealthy Californians during the recent wildfires exemplify the possibility for those with means to adapt and to protect their property. In general, we can expect economic value to be the driving force behind decisions for or against specific adaptation strategies. In this sense, we can also expect an increase in migration due to changing climate ("climate refugees").

In the North, changes in land use and competition for the land have already led to conflicts between landowners, reindeer herders and industry (mining, energy).

8. *What kind of knowledge do we need to address the challenges from CSIs? Do you know of arenas for including other knowledge than science and management (traditional, local, experimental)? In your opinion do you think different kinds of knowledge are included in decision-making and management?*

Concerns were expressed with regard to the knowledge of decision makers and politicians. They often retrieve their information from consultancies, who are expected to be well-informed. But, participants warned, that there are no guarantees that such consultants build their advice on scientific facts. Furthermore, politicians tend to "cherry pick" only those facts that seem to agree with their political agenda.

Participants felt that thus far there is no overarching preparedness or strategy in place to cope with the complex challenges for animal husbandry due to an increased pressure from infectious diseases.

Participants noted an increased interest in citizen science, i.e. collection of scientific data via public participation. This method could be useful to collect facts about what is going on in nature, and to improve local and regional weather monitoring. Thus, the diffuse notion of variations in weather or in natural phenomena could be substantiated by actual data. It is easy and important to involve citizens in scientific endeavours. In addition, traditional knowledge, which developed in close relation with local and regional conditions, should receive more attention.

Introducing the role of societal infrastructure in affecting CSIs

9. *Because of changes in climate and socio-economic conditions the reindeer herders more often have to adapt through increased transportation, feeding and handling of animals in fenced areas (skillegjerder). Do you see any challenges or opportunities related to these practises?*
10. *Do you know whether there is any regular contact between reindeer herders and veterinarians? Do you (veterinarians) see any increase in sick animals during wet and warm weather?*

There is not enough contact between the stakeholders of animal husbandry, e.g. authorities, businesses, or veterinarians, and those individuals or communities that possess traditional knowledge. This lack in communication is an obstacle for monitoring infectious diseases in the animals. In addition, reindeer herders generally do not contact veterinarians, when they become aware of sick animals. Only at the slaughtering of wild or husbandry animals, there is a chance to record cases of infectious diseases. But slaughtering events are not considered as reliable indicators of population health.

One positive example however, is the regular collaboration between the Icelandic Food and Veterinary Authority and sheep farmers of Iceland. In contrast, reindeer herders are often objects to scientific investigation, which might provide only unidirectional knowledge transfer and might be ethically questionable.

Evaluation:

At the end of the workshop, participants were asked to answer three questions using the mentimeter online evaluation tool. Results are presented in Appendix 3.
Additional feedback received by e-mail:

- Thank you for good and smooth logistics in Abisko!
- I heard that you had an excellent workshop in Abisko.
- Phantastic effort with the arrangements last week!
- Thank you very much for the excellent organization of the workshop! That was great!
- Thank you very much for this very good stakeholder meeting. The event was super and Abisko wonderful. The dinner was excellent although I had preferred more local food like fish or reindeer meat. The High Coast beer almost fit that category!
- The Abisko meeting was simply excellent. I enjoyed the inspiring discussion, and it also showed how much a multidisciplinary consortium has to work to get work done. I really appreciate your effort.

Participants

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