

Annual reporting 2019-2020: Nordic Centre of Excellence (NCoE) in the Nordic Societal Security Programme

Original aims:

NORDRESS AIMS TO

- **Enhance societal resilience in a wide spectrum covering individual, community, infrastructure, and institutional resilience**, through defined interdisciplinary research projects, emphasizing cooperation between different NORDIC institutions.
- **Create a lasting interdisciplinary platform for sharing ideas and knowledge among many of the best scientists and experts on natural hazards in the Nordic countries**, most of whom have not worked together before.
- **Improve the opportunities of the NORDRESS partners to obtain funding** from other agencies and thus have an **impact on scientific progress**.
- **Improve networking, education and training** through **The Nordic Societal Security Academy (NSSA)**, which administers a quarter of the NordForsk grant.
- More specifically, **each of the 13 WP tasks has its aims, stated in the original project description**.

Design and methods: NORDRESS is arranged into 2 administrative and 4 research WPs, each of which is further subdivided into Tasks. Each of these has its own approach, design and methods. NORDRESS employs sound scientific methods in every field and emphasizes a cross-disciplinary approach. Emphasis is placed on cooperation between institutions in more than one Nordic country, both for transfer of knowledge and to create networks that will last beyond the timeframe of NORDRESS itself. NORDRESS also emphasizes cooperation beyond the consortium, with relevant agents and institutions, ranging from public participation in local communities to health- and social service providers, civil protection and emergency managers, municipal authorities, meteorological offices, the coast guard, aviation authorities, the media, and others.

Practical changes to original plan: No major changes have occurred in the project per se, although some proposed staff members in the WPs changed jobs and were replaced by others. As reported earlier, the development of exchange rates between the Icelandic and Norwegian currencies have seriously reduced the workhours and other expenses that the grant can cover.

Personnel of the NCoE: (Table 1) see below.

Detailed research progress:

NORDRESS is a multifaceted project aiming at increasing societal security and resilience from the viewpoints of individuals (WP3), communities (WP4), infrastructure (WP5), and institutions (WP6). The year 2019 was formally the last year of the project period, but a one-year extension was granted to complete some projects that were still ongoing. Most of the

project funding had been dealt out to the partners by 2019. We will describe briefly the progress made in 2019-20 in WPs 3-6, as well as the work on Administration (WP1) and the Nordic Societal Security Academy (WP2).

NORDRESS emphasizes cooperation across disciplines within and beyond the formal consortium. There has been collaboration between different WPs in the project as well as cooperation with agents and stakeholders outside of NORDRESS, such as civil protection agencies, municipal authorities, health- and social service providers, emergency response agents (the Red Cross, rescue teams), local police forces, societal safety policy makers, and media. This cooperation has taken place both within individual research projects, and through the activities of the NSSA, that funds study visits, workshops, courses and meetings.

WP1 ADMINISTRATION manages the CoE, distributes funds, follows the progress of all WPs and provides information and advice as needed. WP1 has introduced NORDRESS in various fora, pursued cooperation opportunities outside of NORDRESS and prepared grant applications.

WP1 prepares all official reports and documents, including the annual report.

WP1 hosted the NORDRESS Annual meeting on Thursday 22 November 2019 at 10-17 in Hotel Axel Guldsmeden Colbjørnsensgade 14 – Copenhagen. The focus of the meeting was on the preparation of a Documentary film, *Societal Resilience and Natural Disasters in the Nordic Countries*, that NORDRESS plans to produce, with the permission of NordForsk (see below: Impact strategies and plans).

WP2 The NORDIC SOCIETAL SECURITY ACADEMY (NSSA) continued to be a great success as a source of mobility and cooperation.

NSSA has acted as a great motivator for cooperation in the consortium, as the funded activities generally involve partners from more than one institution and country. The grants also provide opportunities for the WPs to organise workshops to discuss and plan their work, often with extraneous experts – in some cases several WPs join to host a workshop. Thus, the NSSA has fuelled cooperation between and beyond the NORDRESS partner institutions, and even recruited new consortium members. NSSA has been instrumental in building trust, strengthening the network and opening opportunities for transfer of knowledge and sharing of technical equipment.

NSSA also provided funding for a 4-day workshop on the role of Art in Coping with Disasters, held in south Iceland in November 2019, attended by 26 international graduate students, thereof 6 students from NORDRESS WPs.

Funding has also been granted for a course on Psychosocial responses to natural disasters/climate change, arranged by Prof. Atle Dyregrov at the University of Bergen in cooperation with other colleagues from WP3. The course was to be held in 2020, but has been postponed until 2021 due to Covid-19.

In addition, 20 researchers received mobility grants from NSSA in 2019. Four of these, intended to be used in 2020 were postponed due to Covid-19 and will be held in 2021 or 2022.

WP3 INDIVIDUAL RESILIENCE

Activities in WP3 have centred around

Long-term health following natural disasters (WP3.1)

Children in natural disasters – health and risk management (WP3.2)

Psychosocial support and intervention following natural disasters (WP3.3)

The WP3 team consists of experts in Iceland, Denmark, Norway and Sweden, who collaborate widely in their studies on the physical and psychological effects of being subjected to serious natural hazards, as well as the accessibility of support and treatment following such stress. The studies have involved adults, children and disabled people.

Progress in the main projects of WP3 in 2019-2020:

1. Tsunami study (registry data): Utilization of drugs for sleep disorders during a 10-year follow-up among Swedish adult and childhood survivors of the 2004 Tsunami in South East Asia.
 - a) Manuscript about to be submitted to the journal Sleep. Main findings: tsunami exposure was associated with elevated risk of long-term hypnotic medication use post-event among adults and decreased risk among children. Findings indicate that hypnotic medication use post-trauma is not contingent on a diagnosis of stress-related disorders.
 - b) The risk of stress-related psychiatric diagnoses 5-10 years post-disaster was also assessed among Swedish survivors of the SE-Asian Tsunami in 2004. During up to 9 years of follow-up, Swedish adult tsunami survivors were overall at elevated risk of stress-related disorders compared with the matched unexposed cohort. The relative rate for stress-related disorders was substantially elevated during the first year post-tsunami, decreasing over time and becoming non-significant from 5 years onwards. The manuscript will be submitted to Lancet Psychiatry.
2. Avalanche study (questionnaire data): Disaster-related risk factors associated with sleep disorders among Icelandic avalanche childhood and adult survivors, 16 years post-disaster.

A manuscript is being completed on disaster-related risk factors associated with sleep disorders among Icelandic avalanche childhood and adult survivors, 16 years post-disaster. Examining disaster-related risk factors for PTSD-related sleep disturbances in a multivariable regression analysis, young age when the avalanche fell, lack of social support during and in the aftermath of the avalanche, experiencing feelings of intense fear or shock and having witnessed caregiver's outbursts of anger independently predicted disruptive nocturnal behaviour common to PTSD among childhood survivors 16 years' post-disaster.

WP3 published papers on the following subjects in 2019-2020:

- Psychological measures to follow up and help individuals recover after serious traumatic events
- Caring for helpers following critical incidents
- Psychosocial consequences of extreme weather
- Experiences of physically disabled individuals in Denmark of the accessibility of medical and psychosocial services following natural disasters and other traumatic events

Other work – outside of WP3’s original aims:

- a) Prevalence of experiencing a natural hazards among Icelandic women – association with mental and physical health. The SAGA Cohort.

The SAGA cohort is a unique nationwide study on the impact of trauma on women’s health. The target population were all women, 18 years or older, residing in Iceland in February 2018. Participants answered an extensive web-based questionnaire on trauma history (including natural disasters) and health, and will be prospectively followed for diagnoses of major physical diseases and mental disorders.

Data was collected from March 2018 until July 1st 2019. 31 811 women registered to the study. 25% had experienced a natural hazard during their lifetime. Of those, 18% experienced current poor sleep quality, 24% trauma-related sleep disturbances and 5% PTSD symptoms. The next steps will be to investigate PTSD, depression, anxiety and sleep related disorders among women who have been exposed to natural hazards, stratified by background factors and the type of natural hazard they were exposed to.

- b) Preparation of a web-based application including treatment for PTSD.

This project is well underway in a wide international collaboration. The project title is *Development and delivery of a novel, globally scalable and science-based intervention for intrusive memories after psychological trauma* and will partly be based on participants in the SAGA Cohort. First part of the trial will include women that have experienced violence, but if successful, the aim is to apply the intervention to other trauma groups, such as victims of natural disasters with current PTSD. The trial will include testing of two parts: 1) Single symptom management intervention for unwanted intrusive memories many people experience after traumatic events and 2) Psychoeducation: Massive Open Online Course (MOOC) including educational material on intrusive memories.

- c) The Swedish Tsunami Cohort (registry and questionnaire data)

Although most people are exposed to a traumatic event at some time, only a minority develops posttraumatic stress disorder (PTSD). A handful of genome wide association studies (GWAS) on PTSD have been conducted, mostly limited to US war veterans, yielding important yet inconsistent results. The Swedish Tsunami Cohort comprises 16,068 Swedes who survived the tsunami in SA-Asia in 2004, among whom 16% have persistently reported high PTSD symptoms. An extended follow-up of this homogenous population with respect to socioeconomic status, ethnicity and trauma exposure provides a unique opportunity to significantly advance knowledge in this area. New questionnaire data including a short self-report of PTSD symptoms and a saliva sample for DNA extraction have now been collected for this group. GWAS will be performed to identify sequence variants associated with variation in long-term trajectories of PTSD symptoms, and polygenic risk scores will be used to test the predictive power of a suggested list of alleles on PTSD symptomology. This will be the first comprehensive GWAS on PTSD in North-European populations and one of the largest initiatives worldwide. The knowledge gained may facilitate early identification and refined interventions for the most vulnerable individuals of the large populations worldwide that inevitably will continue to be exposed to trauma.

- d) Studies on the effects of Covid-19

In the early summer of 2020 WP3 members in Iceland and Norway initiated studies on the effects of COVID-19 on individuals. In Iceland the study is called COVID-19 National Resilience Cohort, and is conducted by the University of Iceland, the Directorate of Health and the Chief Epidemiologist, with the aim of increasing knowledge about the epidemic's effects on the well-being and lifestyle of Icelanders.

In Norway WP3 members conducted a study on young people's risk perception and experience in connection with COVID-19, as well as reaching out to the general public with advice (see list of publications).

Course funded by NSSA

WP3 has been granted funding from NSSA to offer a course on - *Psychosocial responses to natural disasters/climate change* – which will be held in Bergen in November 2021, in collaboration between University of Bergen and University of Iceland. 20 Nordic graduate students will be invited to attend with the aim of preparing them for psychosocial assistance in future disasters. The course will start with an open conference on psychosocial issues involved in natural disasters/climate change, followed by two days of course work.

WP4 COMMUNITY RESILIENCE

All the Nordic countries participate in WP4, which explores the role of communities in societal resilience to natural hazards.

Substantial progress has been made with respect to generating understanding of factors that affect people's decision-making during a crisis, particularly with respect to efficient and timely communication of natural hazard risk.

In addition to internal cooperation between the three Tasks of WP 4, the teams collaborate directly with WP 5 on Infrastructure and WP 6 on Institutions.

WP4 has created a wide circle of collaboration, including national and international colleagues and stakeholders such as civil protection agencies, including meteorological offices, emergency and rescue managers, health professionals, social service providers, authorities at local, regional and national levels, media, and last but not least residents and visitors in hazard prone areas.

The three main tasks of WP4 are:

- 4.1 Unpacking and measuring community resilience.
- 4.2 Risk perception
- 4.3 Participatory early warning and monitoring systems for natural hazard

WP4.1 and 4.2 team published 9 papers in 2019-2020

- Conceptualizing community in disaster risk management
- The many faces of local community: Exploring lay conceptualizations of the Norwegian lokalsamfunn
- Seeking commonalities of community resilience to natural hazards: A cluster analysis approach
- Configurations of community in flood risk management
- Climate change and natural hazards – the geography of community resilience.
- The role of personal experiences in Norwegian perceptions of climate change.
- Utilizing existing knowledge in disaster management
- Cross-scale interactions in flood risk management

- Enhancing tourists' safety in volcanic areas

Studies on risk communication to tourists in high risk areas include a recent study undertaken at Sólheimaglacier in south Iceland. The aim was to investigate risk-taking in a hazardous area where warning signs are located. Visitor behaviour was observed, whether they stop, read the sign and proceed or not, or whether people don't seem to pay attention to the warning signs. 559 visitors were observed and subsequently 34 were interviewed, as well as 9 ice hiking guides and day-trip guides. Through GPS we mapped key decision-making and hazard locations which will provide a novel way of presenting our quantitative and qualitative data. Results are being analysed.

A major milestone is the interest of the Civil Protection Agency in Iceland to cooperate with NORDRESS in developing mitigation plans and evacuation strategies related to natural hazards. Members of WP4.2 have been instrumental in conducting workshops with all the municipalities in South Iceland, including a wide range of stakeholders, from local inhabitants to municipal officials. The aim of the workshops was to introduce first response and long term coping strategies for the communities. The strategies have now been adapted to each municipality.

In cooperation with the CPA and the Red cross, WP2 also took a leading role in setting up and running community information and help centres after two major natural hazard incidents in Iceland in 2020: a snow avalanche in the Westfjords in January and a severe landslide in Seyðisfjordur in East Iceland in December.

Finally, NORDRESS and the Civil Protection Agency co-funded the position of the editor of the official one-stop information website COVID.is, which was launched shortly after the pandemic hit in March 2020. The website contains a wide array of information on the pandemic, all official announcements, quarantine and containment zones, statistical information for Covid-19, vaccine information, and much more. The website is presented in 11 languages and is updated daily.

Thus WP4.2 has worked directly with vulnerable communities in hazard mitigation and preparation as well as supporting hazard stricken communities.

The WP4 team included 2 doctoral students during this period.

Ingibjörg Lilja Ómarsdóttir focusses on community resilience and communication. She plays a major role in the cooperation with the Civil Protection Agency and the Red cross in Iceland. Silje Aurora Andresen obtained her PhD degree in December 2019 at the Norwegian University of Science and Technology, Department of Geography. The title of her thesis is "Disaster mentality: Discourses and Practices of Disaster Management in Norway"

WP4.3 Progress and outcome of the in 2019-2020

GEUS: The goals of WP 4.3 were pursued alongside the EU H2020 funded project NAIAD and the Danish Environmental Agency funded HIP project. Results from WP 4.3 were presented in a GEUS co-convened session at the ECCA 2019 conference, funded by an NSSA grant. The session was titled *Towards citizen-aided early warning and monitoring for natural hazards illustrated for the Nordic countries*, and several NORDRESS WP 4.3 presentations were given. The session focussed on the public's role in the early warning and monitoring process. The

approach was illustrated using NORDRESS case studies from Denmark (drought in 2018 and cloudburst in 2011), Finland (forest fires in 2018 and the Kiira storm in 2018), Iceland (severe weather and floods), Norway (flash flooding and landslides), and Sweden (forest fires and flooding).

IMO: Progress in incorporating public observations into IMO's monitoring, warning and assessment procedures was furthered. IMO has demonstrated how public observations, in the form of dialogue and photographs, can be incorporated into an early warning system for two-way exchange of warnings and local feedback. Such a system has the potential to improve the content and timeliness of flood warnings, thereby helping to maintain public trust; it could also help to focus emergency responses during a hazardous flood.

FMI: Success factors and shortcomings of the crowdsourcing feature of the Finnish Meteorological Institute's (FMI) mobile Weather app have been further investigated. The feature has been piloted since summer 2017, and it gives citizens the possibility to send observations of weather conditions and impacts. The aim of the crowdsourced data is to improve the severe weather warning system of FMI, and potentially provide data for impact and risk assessments related to weather and climate change.

WP 5 INFRASTRUCTURE RESILIENCE

Initially WP5 planned to focus on the resilience of transportation infrastructure on land, sea and in the air, but with time it has broadened the focus to include the built environment and important tourist destinations. It works with transportation authorities, insurance companies, city planners, tourism operators, coast guards and aviation authorities.

In cooperation with WP4, WP5 organized two sessions for the ECCA conference in Lisbon in 2019, a) Ethical dimensions of sea level rise and b) Towards citizens aided early warning and monitoring for natural hazards.

WP 5.1 and 5.2 The focus of WP5.1 and 5.2 was on mitigation of risk posed by slope failures and avalanches. Although the funding for research projects was limited, NORDRESS has resulted in a valuable network between experts in the Nordic countries. The NSSA has funded several extended visits where staff members from geophysical and meteorological institutes have shared experience and conducted field work to gain first-hand experience of best practices to predict and mitigate hazards. In 2019 the NGI in Trondheim hosted a mobility program on the mapping and monitoring of unstable slopes for an expert from the Icelandic Meteorological Office. The program included both formal presentations by different parties, and a lot of informal discussions during field trips to amazing sites of unstable slopes and rock avalanches. This resulted in greater knowledge transfer than would be possible with conferences or formal workshops.

WP5.3 Risk assessment and prevention for flooding and coastal erosion in extreme weather has focused on coastal flooding in Denmark, Iceland and Sweden. A coastal vulnerability index (CVI) for erosion of the southern shores of Sweden has been developed (https://gis.swedgeo.se/ksi_erosion/) based on two sub-indices, Coastal characteristics and Societal values. In 2020 members of WP3 gave conference presentations on

- *Mapping the soft and ethical dimensions of Sea Level Rise*
- *Regional Coastal Cooperation in Southern Sweden*
- *Coastal erosion and sea level rise in Sweden*

The leader of WP5.3 organized the annual Swedish Coastal Conference 2020 which included multiple coastal resilience issues

NORDRESS results have also contributed to other climate adaptation projects carried out at the Swedish Geophysical Institute, including a literature review on managed realignment (or managed retreat) as an alternative or complement to hard infrastructure protection of the shoreline. A manuscript has been submitted on

- *Territorial governance of managed retreat in Sweden - Addressing challenges*

In Denmark, WP5.3 has focused on cooperation with key stakeholders to develop dynamic flood risk mapping on a national scale. In February 2021 a paper was published based on GEUS work, partly carried out with NORDRESS:

- Hydrogeological studies integrating the climate, freshwater cycle, and catchment geography for the benefit of urban resilience and sustainability

The hydrogeological study investigated subsurface processes related to water security, flood risks, and drought hazards in urban areas. Data collection, collation, and modelling was considered for typical urban situations. Additionally, the influence of strategic planning, the management of future infrastructure, and the impact of construction projects was considered. Case studies were presented from different hydrogeological studies performed in Odense, Denmark. Potential biophysical and hydro-meteorological hazards were identified and subdivided according to geological, hydrogeological, man-made, and climatic origin, and by their characteristic temporal scales and site-specific characteristics. The introduction of adaptive design and resilience in urban and suburban planning and management requires a shift towards more organic, adaptive, and flexible design and management strategies. The anthropogenic modification of subsurface structures, alongside the effects of climate change, increases the possibility of hydrogeological risks.

In cooperation with NORDRESS partners, the Icelandic Meteorological Office (IMO) wrote a report on

[Methods for Coastal Flooding Risk Assessments. An Overview of Methods used in Scandinavia and the UK and a discussion of their suitability for Iceland](https://www.vedur.is/media/vedurstofan-utgafa-2020/VI_2020_005.pdf)
https://www.vedur.is/media/vedurstofan-utgafa-2020/VI_2020_005.pdf

Thus, NORDRESS related activities have contributed to increase the resilience of land-based infrastructures to flood hazards, by improving predictions, vulnerability mapping and mitigation measures.

WP 5.4 Arctic offshore challenges

Progress in WP5.4 was as follows:

- *Investigating existing modes of imagining, discovering and reacting to emerging offshore hazards and vulnerabilities in the Arctic.* In 2019 we turned our attention towards the Arctic Search and Rescue Game, which we conceptualized in 2018. The research results from this work package foremost serve as input to task on tabletop exercises (see below).

A paper was completed: *Offshore is Onshore: Scalability, Speed and Synchronization in Arctic SAR*, published in the Scandinavian Journal of Military Studies in November 2020.

- *Investigation and evaluation of existing modes organizational learning and knowledge capturing from Search and Rescue Exercises (SAREX) in the Arctic*. In 2019 a research assistant was hired to perform parts of the literature study. Thereafter, the study progressed much faster, and a paper titled: *Learning from Organizational Real-Life Experimentation* was submitted to the 2021 Review Issue of Journal of Management. It was not accepted for publication, and alternative outlets are being sought.
- *Development of a concept for computer-assisted cross-boundary tabletop SAR exercises in the Arctic*. In late 2018 we completed the conceptualization of the Arctic Search and Rescue Game concept, which was presented at the Arctic Coast Guard Seminar 2019 that took place in April 2019 in Turku, Finland. Much effort has been dedicated to securing the necessary funding to complete the development of the game.

WP 5.5 Vulnerability of air traffic to volcanic eruptions

initially focussed on the response of European aviation authorities to the Eyjafjallajökull eruption in 2010. This was the subject of Dr Uta Reichardt's PhD thesis, which she defended in 2018. Two papers from that work were published in 2019:

- Reichardt, U., Ulfarsson, G.F. & Petursdottir, G., 2019. Developing Scenarios to explore Impacts and Weaknesses in Aviation Response Exercises for Volcanic Ash Eruptions in Europe. *Journal of Air Transport Management*, Vol. 79, 101684.
- Reichardt, U., Ulfarsson, G.F. & Petursdottir, G., 2019. Increasing Resilience through Interaction: Stakeholder Workshop on Aviation and Volcanic Ash. *Journal of Integrated Disaster Risk Management*, Vol. 9, No. 1, 19 pp.

Dr. Reichardt was invited to Japan in February 2019 to present her work at the *International workshop on air traffic management under large-scale eruptions*, held in Kagoshima, Southern Japan. The workshop was organized by researchers from the Disaster Risk Prevention Institute at Kyoto University, and created a framework for a new applied research project on volcanic ash and aviation risk management in Japan and South East Asia.

With valuable connections established with disaster specialists in Japan, Dr Reichardt and Ingibjörg Lilja Ómarsdóttir from WP 4.2, obtained an NSSA grant to undertake fieldwork on disaster prevention, communication, and management in Japan in the spring of 2019, in order to compare practices in Japan and the Nordic countries.

This fieldtrip and Dr. Reichardt's interest in visual presentations and the role of art in coping with disasters in Japan influenced WP5.5 research and activities in 2019 and 2020. Dr. Reichardt organized a new graduate course that takes a holistic view on the means of coping with disasters, not least in the Nordic countries. The course builds on all the work packages of NORDRESS, several members of the consortium have taken part as invited speakers in addition to other experts on communication, religious studies and the arts. The course was open to NORDRESS – related students, who attended 10 weeks of lectures online, and then flew to Iceland with the support of NSSA to take part in a 4-day workshop. The workshop centered around the topic of how individuals and communities can cope with hardship and loss, and the role of psychological help, spirituality and art in strengthening resilience. The workshop

presentations were filmed and are available online. <https://nordress.hi.is/nssa-worskhop-coping-with-disasters-presentations-online/>

The course has now been expanded and is offered as an annual 6 ECTS course at the University of Iceland and a 4 ECTS course at the University of the Westfjords, Iceland. It has also been adapted to the Icelandic University of the Arts, where it is offered as a 6 ECTS course in the BA Product Design as well as 2 ECTS interdepartmental block seminar. Dr. Reichardt together with the Royal Danish Academy of the Arts and the Swedish Umeå Institute of Design have filed an application to export the course on disasters and art to other Nordic Art institutions.

Novel approaches to increase resilience: Out of Sync

In 2020, Dr. Reichardt initiated a research project on the impact of Covid-19 on the space-related arts sector in Iceland. The installation/ event “Out of Sync” was based on this work. It combined a creative research outreach with applied solutions, working together with artists in Iceland and Taiwan as well as the augmented reality tech company Volta, UK. The event connected an Icelandic musician in Covid isolation with the crowd in a Taiwanese music venue, where strong border controls allowed local cultural life to flourish with no restrictions at the time. The performance in Iceland was transmitted through live stream and augmented reality to Taiwan, a video and audio feedback loop installation enabled visitors in Iceland to partake in the crowded event from afar and communicate with the guests in Taiwan. The project highlights how innovative approaches can help combat isolation by enabling people in lockdown to attend artistic events (albeit from afar). This, in itself, may strengthen people’s resilience. Such solutions can also help secure artists some income under difficult circumstances and may in the long run lead to more sustainable practices by reducing event based travelling. www.outof-sync.com

The project is being expanded to a series of demonstrative events and related research on the potential ecological impact of streaming live events. Together with the Casus Institute for Advanced Systems Understanding in Germany, a set of virtual and physical workshops will be arranged to discuss collaboration on future research and applications of the project.

WP 6 INSTITUTIONAL RESILIENCE

WP 6.1 Review and enhancement of the institutional framework for natural hazard management has in collaboration with the other NORDRESS WPs analysed the institutional arrangements in the governance of natural hazard risks in Denmark, Finland, Iceland, Norway and Sweden.

2019 was largely a year of consolidation of earlier efforts and achievements. Nevertheless, several activities were planned and mostly carried out, including conference sessions, a peer reviewed article, guidance of expert visitors, and proposals for a Nordforsk call. NORDRESS partners GEUS (Peter van der Keur, coordinator), FMO (Adriaan Perrels) and SGI (Lisa van Well) and other partners in the consortium have submitted a proposal for Nordforsk funding under the call ‘Nordic societal security in light of the emerging global and regional trends’. The proposal is entitled: Resilience assessment models of nature-based solutions to global environmental change demonstrated for four Nordic cities. The proposal relates to both WP4.3 and WP6.1. In addition, a second consortium of NORDRESS partners (NGI (coordinator); FMI, and Chalmers University) prepared another Nordforsk proposal on critical infrastructure

for the same call, named NordicLink, , inter alia based on experiences in NORDRESS. This call relates to both WP5.1-5.3 and WP6.1.

On behalf of WP6.1 Adriaan Perrels took part in the Annual meeting in November 2019 and in the discourse regarding the preparations for a TV documentary about themes in NORDRESS.

Two PhD students were members of WP6.1:

Karoliina Pilli-Sihvola (in FMI until 31.8.2019) completed her PhD in Environmental economics from Hesinki University in May 2020.

Atte Harjanne (on leave of absence since 1.5.2019, due to being elected in the Finnish Parliament).

6.2 The Nordic Welfare system

WP6.2 has studied how the Nordic countries can learn from each other regarding the implementation of local social services after natural hazards, and how they could support each other with resources in times of need. WP6.2 received very little research funding but has emphasized network building across borders.

One Master's student worked with WP6.2:

In June 2019 Ragnheiður Hergeirsdóttir finished her MA thesis at the Faculty of Social Work at the University of Iceland. She investigated how local social services in the municipality Árborg reacted to a major earthquake and the economic crisis in 2008.

GOVERNANCE: The Institute for Sustainability Studies, University of Iceland is the NORDRESS **Project Manager**. Daily management lies with a 4-person **Executive board**, while the **NORDRESS Council**, consisting of one representative from each Party, has the ultimate decision-making power in the Consortium.

All partners are devoted to specific tasks within the project which is structured into 13 **workpackage tasks** (WP Task). Each WPTask has been assigned a **WP leader** who co-ordinates activities and is responsible for the work-plan of the WP task and its progress, as well as financial and scientific reports. WP leaders come from the partner institutions in all the Nordic countries, which ensures a joint Nordic representation in the management of the CoE. This governance structure has proven to be effective and problem free.

Highlights of the research: (Up to two paragraphs on key developments, during the period of the report)

- As a part of the NORDRESS cooperation GEUS has developed a countrywide high-resolution model for Denmark of groundwater and surface water, now readily available online. The model includes future scenarios e.g. of predicted groundwater levels, which offers opportunities for improved planning and climate adaptation. The new model describes the water circulation and the depth of local groundwater levels with a 100m resolution, based on historical data and future predictions until the year 2100. This provides indications as to where high groundwater levels may pose threats in the future, not least in periods of heavy precipitation. These maps should facilitate decisions regarding climate adaptation, city planning, hazard management and hazard preparedness.

- Another key development is the new cooperation with Japanese colleagues and the Iceland University of the Arts to explore ways to develop visual means of disaster risk communication. Two young researchers obtained a NSSA grant to visit the Disaster Prevention Research Institute, Kyoto University, where they e.g. met with experts in various forms of disaster communication. This spurred further collaboration with the Iceland University of the Arts, with courses and workshops on Art and Disaster.

Key findings:

Examples of key findings in 2019-2020 are:

- 1) The risk of stress-related psychiatric diagnoses 5-10 years post-disaster was assessed among Swedish survivors of the SE-Asian Tsunami in 2004. During up to 9 years of follow-up, Swedish adult tsunami survivors were overall at elevated risk of stress-related disorders compared with the matched unexposed cohort. The relative rate for stress-related disorders was substantially elevated during the first year post-tsunami, decreasing over time and becoming non-significant from 5 years onwards.
- 2) Providing accurate and timely hazard warnings to residents is a difficult task despite authorities being familiar with the at-risk population. A more challenging task is communicating that same information to visitors from a variety of cultural backgrounds. This is of particular concern in Iceland that is hazard prone, not least in volcanic areas. Through focus groups and interviews with a wide range of tourists and tourism-related professionals, we investigated people's perceptions and beliefs with respect to risk communication initiatives and behaviour in volcanic environments. The results suggest that while risk communication initiatives reach some, the majority is not aware of them. In their current form they seem ineffective at enhancing tourists' safety. The results also show that tourists are generally not risk averse, highlighting the considerable challenges communicators face. It is imperative that authorities and the tourism sector as a whole are actively involved in risk reduction strategies, including regularly distributing consistent hazard, risk and response information through all available channels, so that when a warning is issued it does not come as a surprise. Furthermore the risk communication must be tailored to the intended audience. The importance of these recommendations extends beyond Iceland's volcanic environment, given the occurrence of death and injury associated with nature-based tourism worldwide.
- 3) Offshore is Onshore: Scalability, Synchronization, and Speed of Decision in SAR. With its massive size, small population, and extreme climate, the Arctic is a highly relevant case for studying Search and Rescue (SAR) in remote and challenging environments. The three major challenges to Arctic SAR are: (i) limited SAR capabilities, (ii) a multi-jurisdictional context with civilian/military authorities involved, and (iii) need for coordination of a diverse set of organizational units operating both onshore and offshore.
A large-scale SAR exercise, LIVEX 2016, held off the west coast of Greenland, was analyzed to explore these challenges from a three-tier analytical approach: *Scalability*, which investigates surge capacity in crisis management, *Synchronization*, which focuses on challenges related to the creation and maintenance of a situational picture during a SAR operation, and *Speed of decision*, which looks at how complex matters

are managed in a multi-jurisdictional context under time pressure. Our findings show: (i) that surge capacity requires more focus on integration than activation, (ii), that actors must question information and challenge their own interpretations to maintain a synchronized situational awareness, and (iii) that urgency may result in a decrease of speed in decision-making.

Warrant:

As long as NORDRESS bases its research on sound and accepted scientific methods and publishes its findings in peer reviewed academic journals, a particular argumentation to support confidence in its findings should not be needed.

Researcher mobility: (Table 2) see below.

Researcher training and education:(Table 3) see below.

Output and dissemination: (Table 4) see below.

Meetings and networking:

The NORDRESS Annual meeting 2019 was held in Copenhagen on November 22 and attended by 23 members of all NORDRESS WPS.

The NSSA is the main vehicle for networking and meetings and provided 20 researchers with mobility grants in 2019-2020, in addition to funding courses.

WP5.5. also organized workshops in cooperation with the Iceland University of Arts.

Infrastructure and data policy:

NORDRESS requires solid research infrastructure, equipment and other physical facilities, as well as access to databases and opportunities to collect further data. These needs are well met, as the partners are well equipped universities and research institutions ready to provide these facilities. NORDRESS emphasizes open access to methods and results and data as appropriate. The NORDRESS website provides continuous information on project activities and NORDRESS partners are urged to produce open reports and submit academic papers to open access journals. NORDRESS helps cover the cost of open access publications.

**Progress and contributions
towards Programme aims:**

- 1. to address common Nordic Societal security issues by providing excellent, cross-disciplinary research in this field.***

NORDRESS addresses Nordic Societal Security against natural hazards experienced by all the Nordic countries, albeit to varying degrees. Although natural threats vary from one region to another for geological, geographical, and social reasons, similar measures may be adopted to increase societal security and resilience across borders.

NORDRESS is highly cross-disciplinary, and all its activities aim to increase societal security in the Nordic countries and beyond.

a) NORDRESS approaches societal security from four directions: of individuals, communities, infrastructure and institutions. All these are equally important to all the Nordic countries.

b) NORDRESS studies a variety of natural hazards, ranging from local to transboundary: avalanches and landslides floods from rivers, the ocean and extreme weather forest fires threats in Arctic waters volcanic eruptions

c) NORDRESS strives to improve a variety of security measures:

- Mapping, monitoring, and predicting different hazards, including public participation in monitoring weather and floodings.
- Understanding public acceptance of and compliance with security measures, such as warnings and evacuations, and scrutinizing the assistance provided to the affected populations by social services of various kinds, rescue teams and safety agents.
- Evaluating mitigation measures, such as protective structures versus temporary closure of transport lines.
- Understanding risk and security measures in Arctic offshore and marine environments.
- Improving stakeholder collaboration in volcanic hazard responses of the European air industry.
- Understanding the legal and institutional framework of natural hazards in the Nordic countries.
- Understanding the role of the welfare system and social services in natural hazard relief.

d) NORDRESS involves a wide variety of experts ranging from academics through civil protection agents of all kinds to local inhabitants affected by hazardous natural events. The consortium is very interdisciplinary.

II. to facilitate and develop international Societal security research cooperation

Conferences, Courses and Workshops organized by NORDRESS through the NSSA are generally open to international participation and have attracted academics and other researchers, students, and various stakeholders from all over the world.

NORDESS members involve international partners in their work. WP3 works closely with international colleagues at the Karolinska Institute in Stockholm and Uppsala University; WP4 has collaborated with Australian experts on community resilience and natural disasters, and has in the current reporting period established cooperation with Japanese colleagues, WPs 4 and 5 have repeatedly arranged sessions at the international conference ECCA, and WP5 has also instigated widespread cooperation between European air traffic controllers and other air industry stakeholders.

III. to mobilize and qualify researchers for participation in EU Societal security research funded by the Horizon 2020 program

NORDRESS has certainly qualified researchers to take part in large international research programs. The partners scrutinize opportunities offered by H2020 and have taken part in exploratory meetings to prepare applications. The NORDRESS members in the SAGA Cohort study have received an H-2020 grant. Applications to other EU-programs have also been successful, e.g. to the Northern Periphery and Arctic Program (www.northernperiphery.eu) for a multinational project on safety at sea, App4Sea, which operated 2017-2020.

IV. *to involve users of research results (industry, policy makers, local communities etc.) in the work*

NORDRESS emphasizes cooperation with end users in all its WPs. In the health sector our researchers cooperate with clinicians, both in the fields of mental and physical health. They also provide advice to local authorities, schools, media, and others on how to react to very stressful events, such as natural disasters, with the welfare of vulnerable groups, not least children and disabled people, in mind. Regarding community resilience NORDRESS collaborates with local authorities, civil protection authorities and agents, the Red cross, tour operators and guides, NGOs, media, and local populations. Infrastructure resilience is studied from the viewpoint of transportation including in the research relevant authorities and specialists, such as meteorological offices and road authorities; Maritime security involves search and rescue experts, local authorities and managers of safety exercises. When it comes to aviation security NORDRESS collaborates with the European air traffic control system, air companies, engine designers and other stakeholders. Finally, studies on institutional security involve legal experts and social workers and others who have direct experience on how these systems work and need to be developed.

Thus, NORDRESS involves users of the research results to a high degree in its work.

V. *to disseminate the results to a wide array of stakeholders in the Nordic region and internationally;*

NORDRESS is a collaborate effort by Nordic researchers and experts who work on different aspects important for society's resilience to natural hazards. The consortium spans the chain from academics to end-users, and includes experts on geophysics, meteorology, geography, engineering, societal infrastructure, the welfare systems, disaster law and (catastrophe) insurance, public health, psychological trauma, civil protection and emergency management. Thus, NORDRESS is in itself a network of scientists, experts, end-users and other stakeholders in the field of natural hazards and societal security.

As the NORDRESS network is wide and varied, NORDRESS reaches a broad array of stakeholders through its own internal work and meetings.

NORDRESS has published its findings in academic journals, books and reports, in English, the Nordic languages and German, and financial support is offered to cover the publication cost in open access journals. NORDRESS reaches out to other stakeholders through meetings, conferences and other media. The NSSA enables members to bring together administrators, rescue workers, (local) politicians, inhabitants in risk areas, health professionals, media people and others. Thus NORDRESS has built in mechanisms that allow for a wide outreach to various stakeholders, on a local, national and international levels.

Impact strategies and plans: In addition to conventional scientific means of disseminating results in high impact journals, books and conferences, NORDRESS emphasizes collaboration with stakeholders in all its WPs, as its impact will depend on the attention it gains among the public and decision makers. We try to involve, or at least consult, authorities from relevant sectors in each project. Similarly, we reach out to those affected by the natural hazards, the local populations, rescue and relief teams, media etc. Thus, we hope to ensure that our studies are perceived as relevant by those who work in the field, as well as those directly affected by the natural hazards.

The NSSA is a unique feature of NORDRESS. It provides wide opportunities for arranging workshops, courses or other events for a wide variety of stakeholders: scientists, administrators, civil protection agencies, rescue workers, and media people. It has proven invaluable for integrating the various elements of the CoE.

Documentary film: In the autumn of 2018 the NORDRESS consortium discussed whether it could be feasible to produce a documentary film on natural hazards and resilience in the Nordic countries, built on the NORDRESS network and its approach. This novel way of dissemination is more likely to reach a wide audience than a written report is. The idea had been introduced to the Director of NordForsk, with positive results. Preparations were initiated and the documentary was the focus of the annual meeting of NORDRESS in November 2019.

Ms Þóra Arnórsdóttir, news and programme editor at the Icelandic State Broadcasting Service has been hired to direct the film and conduct the interviews, the producer will be Task4Media. Þóra attended the annual meeting in Copenhagen and got an overview of the fields NORDRESS has worked in as well as the specific contributions of each WP to these. Þóra then presented her view of the content and form of the film. Mia Smeds, Director of communications at NordForsk attended the annual meeting and went over the plans with Þóra.

The intention was that Þóra would start filming on location in March 2020, interviewing NORDRESS WP leaders and others, including people who were personally affected by hazardous events in the Nordic countries. The NORDRESS partners are prepared to assist in establishing the relevant contacts.

Almost to the day that Þóra was to begin the interviews, in mid-March 2020, COVID-19 hit the Nordic countries with travel restrictions which put all plans on ice, where they still remain when this is written in March 2021. A travel and interviewing agenda has been prepared and waits to be implemented when circumstances allow.

Potential media stories:

As a part of the NORDRESS cooperation GEUS has developed a countrywide high-resolution model for Denmark of groundwater and surface water, now readily available online. The model includes future scenarios e.g. of predicted groundwater levels, which offers opportunities for improved planning and climate adaptation. The new model describes the water circulation and the depth of local groundwater levels with a resolution of 100m, based on historical data and future predictions until the year 2100. This provides indications as to where high groundwater levels may pose threats in the future, not least in periods of heavy precipitation. These maps should facilitate decisions regarding climate adaptation, city planning, management and preparedness.

Supplementary funding:

NORDRESS cooperates widely with other projects in and beyond the Nordic countries. These have their separate funding, from national and international sources. This is a win-win situation, as researchers consider it an asset to be a part of NORDRESS when they apply, and NORDRESS benefits indirectly from a successful application. We do not have an overview of all grants received by NORDRESS partners in related projects, but recent examples include an H2020 grant to the SAGA Cohort, a Northern Arctic and Periphery Programme grant to Guðrún Pétursdóttir on risk reduction of oil pollution at sea, and grants from the Icelandic Research

Fund to Prof Arna Hauksdóttir WP3 leader to study the effects of natural hazards on health; to Edda B Þórðardóttir WP3 to study long term morbidities and comorbidities after exposure to trauma and bereavement; to Halldór Björnsson WP4 and WP5 to improve the monitoring of active seismic fissures and map seismic risk in inhabited areas.

Recent grant proposal submitted include:

H2020 proposal CROCCODILE- Climate Resilience of Coastal Cities: Ongoing, Dynamic and Inductive Machine Learning in Europe: Interweaving Big Data and Small Date, submitted by SGI in second round 3 September 2020 with NORDRESS partner GEUS and other key persons met at ECCA 2019 attended with help of a NSSA mobility fund.

H2020 proposal CAYMAN - Citizen Engagement for systemic adaptation to climate change (prepared during 2020 and submitted 26 January 2021) with SGI and NODRESS partner GEUS and other key persons met at ECCA 2019 attended with help of a NSSA mobility fund.

Programme evaluation:

We have no special comments on the work and procedures of NordForsk, the Program Committee or the Scientific Advisory Board, which have provided us with very useful advice and encouragement.

Requests for Programme support:

NORDRESS is a large CoE with 13 WPs and more than 60 partners, who are prepared to assist each other. The Scientific Advisory Board has provided very useful advice. We have not needed to seek advice directly to the NordForsk Program Committee.

Again, we thank NordForsk for offering support.

Table 1: Personnel of the NCoE

List the names of the research team leaders involved in the NCoE. Please give the number of other researchers and students who have worked within the project. Also, please indicate the number persons in each category as listed (number of, number of man months in total and the number of man months paid by the NCoE).

Name of the research team leader	Host Institution
Guðrún Pétursdóttir, WP1- WP2	UI
Arna Hauksdóttir, WP3.1	UI
Atle Dyregrov WP 3.1	SFK
Ask Elklit WP3.3	SDU
Haakon Lein WP4.1	NTNU
Guðrún Gísladóttir WP4.2	UI
Hans Jørgen Henriksen WP4.3	GEUS
Per Danielsson WP 5.3	SGI
Farrokh Nadim WP5.1 & 5.2	NGI
Morten Thanning Vendelø WP5.4	CBS
Guðmundur Freyr Úlfarsson WP 5.5	UI

Adriaan Perrels WP 6.1	FMI
Guðný Björk Eydal WP 6.2	UI

2019, 2020 and 4 months in 2021	Number of Persons	Man-months in Total	Man-months paid by the NCoE
Professors and senior researchers	30	20,2	4,1
Post docs	5	41,5	19,4
PhD students	7	30,5	12
Other academic personnel			
Coordination and administration of the NCoE	2	28	28
Auxiliary personnel (office, technical, other personnel)			

Table 2: Researcher mobility

Please specify research stay abroad as well as visits by foreign researchers.

Name, job title, organisation	Site of work	Purpose of visit	Duration of visit	Comments, output of the visit
Ingibjörg Lilja, Ómarsdóttir, PhD student and Uta Reichardt Post-doctoral researcher University of Iceland	Japan (Kyoto, Yokohama, Tokyo)	To visit and learn from actors that engage in preparedness, response and recovery in connection with natural hazards in Japan	April 2019- June 2019 =80 days for two persons = 160 days	A part of the study visit was fieldwork where we conducted 24 interviews with survivors, volunteers, entrepreneurs and academics, related to the Great East Japan Earthquake and Tsunami in 2011.
Deanne Bird, Research specialist,	South Iceland	Enhancing tourists' safety in Iceland. Tourists	1-11 June, 2019 10 days	Tourist behaviour was observed

University of Iceland.		were interviewed on location in Hvolsvöllur and Sólheimajökull in South Iceland This work was undertaken in partnership with Almannavarnir the Civil Protection		(n=559), followed by interviews with visitors and tour guides to explore how they regard to warning signs that are in the hazardous area.
Lisa Van Well Deanna Bird Guðrún Jóhannesdóttir Per Danielson	Lisbon, Portugal	The Ethical Dimensions of Dealing with Sea Level Rise at ECCA 2019.	27-31 May 2019 5 days for four persons = 20 days	Members of WP4.2; 4.3 and 5.4 organized a special session at the ECCA 2019 meeting in Lisbon, Portugal. The session spurred interesting discussions on new approaches regarding mitigation of sea level rise.
Harpa Grímsdóttir, Coordinator, IMO	West-Norway, Trondheim	The purpose of the trip was to learn about mapping and monitoring of unstable rock slopes in Norway. Norwegian institutes and specialists have extensive experience in this field. In Iceland the problem exists but unstable slopes have not been mapped or monitored in a systematic way.	10. - 16. June, 2019 = 6 days	The objectives of the mobility grant were fully achieved, and the trip was an important step towards a systematic mapping and monitoring of unstable slopes in Iceland. The Norwegian specialists at NGU and NVE showed great hospitality and put effort and work into creating a perfect programme. The trip included both formal presentations on the subject by

				different parties, and a lot of informal discussions during field trips to amazing sites of unstable slopes and rock avalanches. This resulted in greater knowledge transfer than would be possible with conferences or formal workshops alone
Halldór Björnsson, Head of research group, IMO	Netherlands, Delft, Deltares	Storm surge risk assessment methods	25-29 March 2019 = 5 days	The visit to Deltares helped us deciding the numerical model that will be used at the Icelandic Meteorological Office to estimate and study storm surges in Iceland. Deltares develops several tools but specifically for our interests on storm surges we focused on Delft3D-FM, which is a flow model and the result displaying platform and forecasted suite Delft3D FEWS.
Rasmus Dahlberg, Assistant Professor, CBS	Sweden, Uppsala	4th Conference on North European Emergency and Disaster Studies (NEEDS4).	10-12 June, 2019 = 2 days	Rasmus was unable to attend the Conference and Karoliina Sihvola went instead.

		To present findings from NORDRESS studies		
Hans Jörgen Henriksen, Senior advisor, GEUS. Peter van der Keur, Karoliina Sihvola, Davíð Egilsson	Lisbon, Portugal	ECCA 2019, Science Practice Session: Participatory approaches to develop warning systems for natural hazards.	27-31 May 2019 5 days for four persons= 20 days	In the session, two approaches to increase climate related awareness were discussed: the first associated with a participatory approach to empower decision-makers in southern Portugal through a design of a climate change adaptation plan; and the second related with the importance of citizen aided monitoring approaches to improve natural hazard monitoring in the Nordic countries.
Ingibjörg Lilja Ómarsdóttir, PhD. student. University of Iceland.	Southern Iceland, in Heimaland	The Icelandic Red cross has a defined role in the preparedness and emergency management system in Iceland. When a state of emergency is declared, the Red cross opens emergency shelters for those affected. These provide first aid and food, clothes and temporary shelter until people can	4-5 October 2019= 2 days	Seminar called Local Disaster Services – the role of the Red Cross in the preparedness and emergency management system in Iceland. Participation in natural hazard exercises operating on different levels in the emergency management system.

		return home or move into more permanent accommodation.		
Angel Ruiz-Angulo, Research scientist, IMO	Netherlands, Delft, Deltares	Storm surge risk assessment methods. DELFT3D FM, software	November 4-5 and 11-14 2019 = 8 days	Attended the DELFT 3D express course and the Software days at Deltares in Delft, Holland. Particularly, I attended the Delft3D FM course, which is a package used for studies on storm surges and flooding propagation at the coastline.
Deanne Bird, Research Specialist, University of Iceland	Heraklion, Crete	Oral presentation at the Cities on Volcanoes Conference – COV11, to be held in Crete	Postponed due to COVID-19 Will be held in June 2022	
Rasmus Dahlberg, Assistant Professor, CBS	Mississippi, Gulf Park Campus	The applicant has been invited to participate in the “Offshore Situation Room” workshop organized by the National Academies of Sciences’ Gulf Research Program.	Postponed due to COVID-19 Will be held in autumn of 2021	
Ingibjörg Lilja Ómarsdóttir, Phd. student, University of Iceland	Heraklion, Crete	Oral presentation at the Cities on Volcanoes Conference – COV11, to be held in Crete	Postponed due to COVID-19 Will be held in June 2022	
Uta Reichardt	Heraklion, Crete	2 oral presentations at the Cities on Volcanoes Conference –	Postponed due to COVID-19	

		COV11, to be held in Crete	Will be held in June 2022	
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Number of:	
Visiting days	232
Visiting researchers	20

Table 3: Researcher training and education

Please list courses organized. Specify the number of students participating (own students, and other students) and number of ECTS points gained in the courses. In addition, the number of PhD and Post Docs, both national and international is asked for.

Course (name of course, institution, person responsible)	Own Students	Other students	Number of ECTS points
Coping with Disasters, University of Iceland, Dr. Uta Reichardt	25	5	4ECTS
Psychosocial responses to natural disasters/climate change, University of Bergen, Atle Dyregrov	12	8	
Out of Sync, University of Iceland, Dr. Uta Reichardt.	30	Open access	0
The role of Art in Coping with Disasters NSSA funded workshop, November 2019, Hotel Ranga, Iceland. Organized by Dr.Uta Reichardt	25	5	1 ECTS

How many PhDs and Post Docs are recruited in Nordic countries (specify the country) and how many are recruited internationally?

Number of PhD students recruited in Nordic countries (specify the country)	2 PhD students from Iceland 2 PhD students from Finland (one of them working in Norway) 1 PhD student from Denmark 1 PhD student from Sweden
Number of PhD students recruited outside Nordic countries	1 from Germany

Number of Post Docs recruited in Nordic countries (specify the country)	1 in Iceland 1 in Denmark 1 in Finland
Number of Post Docs recruited outside Nordic countries	1 from Germany 1 from Australia

Specify the number of PhD degrees achieved at the NCoE in reporting period.

Silje Aurora Andersen	1 Norway
Karoliina Pilli Sihvola	1 Finland

Table 4: Output and dissemination

Report the output of the research, e.g. publications.

Two tables are provided. The first table is for publications, reports and outreach activities with the main activities/collaboration funded by the NCoE. The second table is for publications, reports and outreach activities where the NCoE research has contributed. Also, report the number of Open Access publications.

Please attach a complete publication list – To the extent possible, please indicate direct publication linked to the work of the NCoE.

NORDRESS was active in publishing its research in 2019-2020.

In total 22 peer reviewed papers were published, and 21 conference presentations given, out of which 4 were invited lectures. These and various other activities are listed below:

University degrees completed in 2019-20:

PhD theses:

Silje Aurora Andersen Norway

Karoliina Pilli Sihvola Finland

MSc thesis:

Ragnheiður Hergeirsdóttir Iceland

Table A Outreach and dissemination of activities/collaboration mainly funded by NORDRESS

Peer reviewed scientific publications / of which Open Access	7
Non-peer reviewed publications / of which Open Access	0
Reports	1
Publications for the public	0
Invited conference presentations	1
Conference presentations, oral / poster	4
Number of appearances in media	3
Outreach and dissemination to the public	0
Web disseminations	0
Courses arranged	6
Summer courses	0

Peer reviewed scientific publications / of which Open Access

- Räsänen, A., Lein, H., Bird, D., & Setten, G. (2020). Conceptualizing community in disaster risk management. *International Journal of Disaster Risk Reduction*, 45. <https://doi.org/10.1016/j.ijdr.2020.101485>.
- Räsänen, A., (2021). Cross-scale interactions in flood risk management: A case study from Rovaniemi, Finland. *International Journal of Disaster Risk Reduction*, 57. <https://doi.org/10.1016/j.ijdr.2021.102185>
- Räsänen, A., Kauppinen, V., Juhola, S., Setten, G., & Lein, H. (2020). Configurations of community in flood risk management. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 1-16. <https://doi.org/10.1080/00291951.2020.1754285>
- Bird, D., Gísladóttir, G. (2020). Enhancing tourists' safety in volcanic areas: An investigation of risk communication initiatives in Iceland. *International Journal of Disaster Risk Reduction*, 50, 101896. <https://doi.org/10.1016/j.ijdr.2020.101896>
- Gísladóttir, G., Bird, D., and Pagneux, E., What can we learn from previous generations? Álftaver's experience of the 1918 Katla eruption. Submitted to *Jökull*. Accepted in March 2021.
- Reichardt, U., Ulfarsson, G.F. & Petursdottir, G., 2019. Developing Scenarios to explore Impacts and Weaknesses in Aviation Response Exercises for Volcanic Ash Eruptions in Europe. *Journal of Air Transport Management*, Vol. 79, 101684.
- Reichardt, U., Ulfarsson, G.F. & Petursdottir, G., 2019. Increasing Resilience through Interaction: Stakeholder Workshop on Aviation and Volcanic Ash. *Journal of Integrated Disaster Risk Management*, Vol. 9, No. 1, 19 pp.

Reports

- Peter van der Keur, Hans-Jørgen Henriksen, Matthew J Roberts; Karoliina Pilli-Sihvola, David Egilson, Atte Harjanne: NORDRESS-ECCA 2019. Session report. Participatory approaches to develop warning systems for natural hazards and a scientific based regional adaptation plan (PIAACAMAL). Cases of the Nordic countries and Southern Portal region

Invited conference presentations

- Guðrún Jóhannesdóttir Community resilience and Voluntary work within the emergency management system in Iceland. Guest lecture in the course Coping with disasters, held at the University of Iceland.

Conference presentations oral / poster

- Räsänen, T. A., Lein, H., & Setten, G. (2019). Conceptualising community in disaster risk management. Åre Risk Event, 26-28 March 2019 Åre, Sweden.
- Räsänen, T. A., Lein, H., Bird, D., Setten, G. (2019). Conceptualizing community in climate change adaptation. Nordic Geographers Meeting 16 -19 June 2019 NTNU-Trondheim.
- Peter van der Keur, Hans-Jørgen Henriksen, Matthew J Roberts, Karoliina Pilli-Sihvola, David Egilson, & Atte Harjanne
- ECCA2019. NORDRESS WP4.3/6.1 shared session with Portuguese partners (11:15 THURSDAY 30 MAY, SP048, Room S13) Participatory approaches to develop warning systems for natural

hazards and a scientific based regional adaptation plan (PIAACAMAL). Cases of the Nordic countries and Southern Portugal region.

Media appearances Non-academic publications

Ásthildur Elva Bernharðsdóttir, Ingibjörg Lilja Ómarsdóttir og Guðrún Pétursdóttir. Nýtum þekkinguna sem er til staðar. *Sveitastjórnarmál*, 1tbl:24-30 2020

Ingibjörg Lilja Ómarsdóttir appearance on the Iceland. State Broadcast in relation with Covid-19 risk communication.

Deanne Bird Interview in the Icelandic National Broadcasting Service about her PhD research project.

Courses/Seminars arranged

Coping with disasters. NORDRESS funded course held at the University of Iceland, organized by Dr.Uta Reichardt

The role of Art in Coping with Disasters NSSA funded workshop, November 2019, Hotel Ranga, Iceland. Organized by Dr.Uta Reichardt

Out of Sync, Exercise on Resilience – Mengi Art Gallery, University of Iceland, artists in Iceland and Taiwan as well as the augmented reality tech company Volta, UK., Organised by Dr. Uta Reichardt.

WP3 has been granted funding from NSSA to offer a course on - *Psychosocial responses to natural disasters/climate change*. Initially the course was to be held in Bergen in November 2020, but due to Covid-19 it was postponed until November 2021. It is organized in collaboration between University of Bergen and University of Iceland. 20 Nordic graduate students will be invited to attend with the aim of preparing them for psychosocial assistance in future disasters

Table B Outreach and dissemination of activities/collaboration where NORDRESS has contributed.

Peer reviewed Publications / of which Open Access	15
Non-peer reviewed Publications / of which Open Access	0
Reports	2
Publications for the public	1
Invited conference presentations	3
Conference presentations	13
Number of appearances in media	2
Outreach and dissemination to the public	11
Web disseminations	0
Conferences/Courses arranged	4
Summer courses	0

Peer reviewed scientific publications / of which Open Access

- Petursdottir, G., Reichardt, U., Bird, D., Donovan, A., Gísladóttir, G. Hauksdottir A., Johannesdottir, G., Sigmundsson, F., Thordardottir, E.B., Ulfarsson, G.F., 2020, Eyjafjallajökull eruption in 2010, in: Casajus Valles, A. Marin Ferrer, M., Poljansek, K. and Clark, I., Science for Disaster Risk Management 2020: acting today, protecting tomorrow, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-18181-1, JRC114026.
https://drmkc.jrc.ec.europa.eu/portals/0/Knowledge/ScienceforDRM2020/Files/supercasestudy_03.pdf
- Susie Mielby , Hans Jørgen Henriksen, Urban Hydrogeological Studies Integrating the Climate, Freshwater Cycle, and Catchment Geography for the Benefit of Resilience and Sustainability. *Water* 2020, 12(12), 3324; <https://doi.org/10.3390/w12123324>
- Nurmi, V., Pilli-Sihvola, K., Gregow, H., Perrels, A. (2019), Over-adaptation to Climate Change? The case of the 2013 Finnish Electricity Market Act, *Economics of Disasters and Climate Change*, Vol.3, Issue 2, pp 161–190 <https://doi.org/10.1007/s41885-018-0038-1>
- Dyregrov, A., & Dyregrov, K. (n.d.). Positive growth following trauma – clinical perspectives. *Bereavement Care*. <https://doi.org/10.1080/02682621.2019.1679462>
- Dyregrov, A., Dyregrov, K., & Kristensen, P. (2019). Tiltak for etterlatte. I G. Dyb & T. Jensen (Red.), *Å leve videre etter katastrofen* (s. 176–189). Oslo: Gyldendal.
- Elklit, A., Simonsen, L. D. & Todorovac, A. (2019). Medizinische und Psychosociale Versorgung von körperbehinderten Menschen in Notfallsituationen. *Trauma – Zeitschrift für Psychotraumatologie und ihre Anwendungen*, 17(2), 70-77.
- Tamrakar, T., Elklit, A., Murphy, J. & Kok, R. (2019). Was Psychological Debriefing dismissed too quickly? An assessment of the 2002 Cochrane Review. *Crisis, Stress, and Human Resilience: An International Journal*, 2 (1).
- Dyregrov, A. & Kristensen, P. (2020). Information to bereaved families following catastrophic losses. Why is it important? *Journal of Loss and Trauma*, 25, 472-487.
<https://doi.org/10.1080/15325024.2019.1710954>
- Dyregrov, A., Fjærestad, A., Gjestad, R., Thimm, J. (2020) Young People's Risk Perception and Experience in Connection with COVID-19, *Journal of Loss and Trauma*.
<https://doi.org/10.1080/15325024.2020.1853974>
- Dahlberg, R, et al. (2020). Offshore is Onshore: Scalability, Synchronization, and Speed of Decision in Arctic SAR. *Scandinavian Journal of Military Studies*, 3(1), pp. 157–168. DOI:
<https://doi.org/10.31374/sjms.52>
- Setten, G., & Lujala, P. (2020). Climate change and natural hazards – the geography of community resilience. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 74(3), 133-134. doi:10.1080/00291951.2020.1778782
- Lujala, P., & Lein, H. (2020). The role of personal experiences in Norwegian perceptions of climate change. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 74(3), 138-151. doi:10.1080/00291951.2020.1731850
- Scherzer, S., Berg, N. G., Lein, H., & Setten, G. (2020). The many faces of local community: Exploring lay conceptualizations of the Norwegian lokalsamfunn. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 74(3), 152-164. doi:10.1080/00291951.2020.1791245
- Opach, T., Scherzer, S., Lujala, P., & Ketil Rød, J. (2020). Seeking commonalities of community resilience to natural hazards: A cluster analysis approach. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 74(3), 181-199. doi:10.1080/00291951.2020.1753236

Gunnel Göransson, Lisa Van Well, David Bendz, Per Danielsson, Jim Hedfors (2021) *Territorial governance of managed retreat in Sweden - Addressing challenges*. Submitted to Journal of Environmental Studies and Science, special issue, 1 February 2021.

Reports

Guðrún Elín Jóhannsdóttir [Methods for Coastal Flooding Risk Assessments. An Overview of Methods used in Scandinavia and the UK and a discussion of their suitability for Iceland](https://www.vedur.is/media/vedurstofan-utgafa-2020/VI_2020_005.pdf)
https://www.vedur.is/media/vedurstofan-utgafa-2020/VI_2020_005.pdf

Per Danielsson et al: SGI's Coastal Vulnerability Index developed for Skåne region and most of Halland region.

Invited conference presentations

Guðrún Jóhannsdóttir. Invited speaker at the Nordic Health Preparedness Conference 2019 in Iceland, held by the Svalbard Group. Participated as well in "Plenary discussion of experts" at the conference.

Ingibjörg Lilja Ómarsdóttir. Invited speaker at the NordForsk Webinar From Haga to COVID-19.

Reichardt, U., Ulfarsson, G.F., & Petursdóttir, G., 2019. Ash and Aviation in Europe: A Stakeholder Analysis of Preparedness for Volcanic Ash from Iceland. International Workshop on Air Traffic Management under Large-Scale Eruptions. Kagoshima, Japan.

Conference presentations oral / poster

Per Danielsen: Public and decisionmakers's perceptions of cultural ecosystem services" Presentation at LIFECoastAdapt meeting, Sweden, 2019

Adriaan Perrels: Impact based forecasting Session coordination (incl. paper review) at EMS2019 (DTU Lynby DK) 13.9. 2019

Thordardóttir, E.B., Song, H., Fang, F., Arnberg, F., Hultman, C., Valdimarsdóttir, U.A., Hauksdóttir, A. Long-term hypnotic medication use among Swedish survivors of the 2004 southeast Asia tsunami. Oral presentation at the XIX Conference on Studies on Bio- and Health Sciences at the University of Iceland, 2019

Atle Dyregrov. Presentation on a seminar 'Psychosocial consequences of extreme weather' for the Nordic Directorates for Civil Protection, Horten, September 17 2019. Title of presentation: Extreme weather – how to follow up affected people.

Atle Dyregrov. Keynote at the European Congress of psychology, Moscow, July 5 2019. Title: Emergency preparedness and crisis intervention.

Atle Dyregrov. Two-day seminar in Glasgow Scotland. Title: 'Caring for helpers following critical incidents'. March 18-19 2019.

Atle Dyregrov. Presentation on follow-up after critical events for the Social committee in the Estonian Parliament. Tallin, September 10 2019.

Rasanen, T.A., Setten, G. (2019). Conceptualising community in disaster risk management. Are Risk Event, 26-28 March, 2019. Are, Sweden.

Rasanen, T.A. Lein, H., Bird, D., Setten, G., (2019). Conceptualizing community in climate change adaptation. Nordic Geographers Meeting 16-19 June 2019. NTNU-Trondheim.

Van Well, L et al *Mapping the soft and ethical dimensions of Sea Level Rise* European Geosciences Union (EGU) 2020.

Danielsson, P et al *Regional Coastal Cooperation in Southern Sweden*. European Geosciences Union (EGU) 2020.

Danielsson, P Organizer of Kustmöte (Annual Coastal Conference) 2020 including several issues dealing with coastal resilience.

Van Well, L. "Coastal erosion and sea level rise in Sweden" BSR Climate Change Dialogue Platform 10th Round-table meeting with focus on integrated coastal protection. 10 December 2020 <https://cbss.org/event/climate-change-dialogue-integrated-coastal-protection/>

Media appearances

Atle Dyregrov. 37 interviews with national and international press related to crisis, trauma and disasters.

Hans Jörgen Hendriksen: [Forbered dig: Det her er kun en forsmag på, hvad fremtiden bringer - politiken.dk](https://www.politiken.dk) . [Geus: Vi ser klimaændringer, som vi først havde forventet om 20-30 år | Ingeniøren](https://www.geus.dk)

Outreach and dissemination to the public

Dahlberg, R., & Vendelø, M.T: The Arctic Search and Rescue Game. Presentation at Arctic Coast Guard Seminar 2019, Turku, Finland

Henriksen HJ, GEUS. Kulturnat presentation. Climate ministry. Overformynderiet. Popular presentation on groundwater flooding. 11 October 2019.

Dahlberg, R., & Vendelø, M.T: The Arctic Search and Rescue Game. Presentation at Arctic Coast Guard Seminar 2019, Turku, Finland

Henriksen HJ, GEUS. Kulturnat presentation. Climate ministry. Overformynderiet. Popular presentation on groundwater flooding. 11 October 2019.

H.J Hendriksen (GEUS) worked a Hydrological information and Prognosis HIP system. <https://www.geus.dk/om-geus/nyheder/nyhedsarkiv/2021/feb/model>

Dyregrov, A. (2020). Ta vare på hjælperne. Kronikk i Dagens Medisin i papir den 26. mars, på nett 27. mars. <https://www.dagensmedisin.no/artikler/2020/03/27/ta-vare-pa-hjelperne/>

Dyregrov, A. (2020). Nødvendig å skremme – men til hvilken kostnad. Dagens Medisin. <https://www.dagensmedisin.no/artikler/2020/05/17/covid-19-ryster-troen-om-at-verden-er-et-sikkert-sted/>

Dyregrov, A. & Gilbert, M. (2020). Sorg og avskjed i pandemiens tid. VG, 25 november. <https://www.vg.no/nyheter/meninger/i/vAlPbV/sorg-og-avskjed-i-pandemiens-tid>

Gilbert, M. & Dyregrov, A. (2020). Rett til avskjed, tid til sorg – også i pandemiens tid. VG. 11. november. <https://www.vg.no/nyheter/meninger/i/mBBX14/rett-til-avskjed-tid-til-sorg-ogsaa-i-pandemiens-tid>

Dyregrov, A., & Raundalen, M. (2020). [Hva kan vi si til barn om Coronavirus?](https://krisepsykologi.no/hva-kan-vi-se-til-barn-om-coronavirus/)

Dyregrov, A., & Raundalen, M. (2020). [What can we say to children about the Coronavirus?](https://krisepsykologi.no/what-can-we-say-to-children-about-coronavirus/)

Courses/Seminars arranged

WMO Working Group on Societal and Economic Research Applications – 3 day meeting in FMI, including a morning seminar on DRR, climate services, and polar prediction. Focus topic is socioeconomic valuation of weather and warning services.

SGL in Sweden organized on 17 December 2020 a **Sustainable and Ethical Adaptation to Rising Mean Sea Levels (SEA-RIMS)** workshop with local, regional and national authorities to develop a storymap presenting the ethical dimensions of sea level rise to coastal communities.

Workshop at Iceland University of the Arts: Hugarflug 2021: Disaster Studios: **Designing Resilience Online conference** February 9-12, 2021. Organized by Dr.Uta Reichardt <https://hugarflug.lhi.is/Tatttakendur-Participants>

Workshop at Iceland University of the Arts: Hugarflug 2021: Out of Sync: **Online panel discussions on Arts&Science collaboration** Online conference, February 9-12, 2021. Organized by Dr.Uta Reichardt <https://hugarflug.lhi.is/Tatttakendur-Participants>