Red Book One

Drawing Macro-Regional Risk:
Six Scenarios for the Baltic Sea Region

Editors' Letter

This Notebook is one of nine in the Fourteen Point Three Notebooks collection brought together by the European Union Strategy for the Baltic Sea Region project 14.3 (read: fourteen point three).

Eight Notebooks will present you with findings from our project's four different working groups (named Task groups C, D, E and F), and one Notebook will introduce a general overview of the whole project.

We hope that the collection as a whole will give you a sense of the unfolding diversity and complexity of the project, whilst retaining homogeneity as a single vision and ideal.

The singular Notebooks present concrete results (studies, workshop reports, developed methodologies and scenarios). The structure of the entire collection intends to act as a mirror for the project as a whole, and to reflect on the process as much as the output. Each of the books can be read singularly as a study presenting concrete findings from the working groups, at the same time they can be read as a collection. Manifested together we view this as the symbolic added value brought to the macro-regional conversation by the project 14.3.

These values could be: the network, the will for cooperation in general terms, the challenges in finding a uniform language among different civil protection cultures and traditions, and the motivation to find commonality amongst the different departure points.

Red Book One and Two bring you the outcome of the Task C work. First, project partners formed a core working group and defined their initial stand points and interests. Second, using a tailor made questionnaire as a tool, they collected information and drew up a map of national risk perspectives in the Baltic Sea region. On the basis of this map, six scenarios were identified and developed as reflecting relevant national hazards. Both, review of the state of play and the scenarios are presented here in Red Book One. While scenarios can be read taking into account their hypothetical nature, a concrete and valuable outcome of the group work was the kick-off of a proper foundation for further in-depth cooperative work on macro-regional level.

It is our pleasure and honour to be sharing with you this vision of cooperation through our Red Books in particular, and the Fourteen Point Three Notebooks in general.

Editors of Fourteen Point Three Notebooks
Egle Obcarskaite – Anthony Jay Olsson

14.3 was a project implemented under the EU Strategy for the Baltic Sea Region (EUSBSR), Priority Area Secure (Priority Area 14 in 2009 version of the EUSBSR Action Plan). The whole priority area calls for an insurance that contributions in the field of civil protection encompass the overall Strategy objectives (save the sea, connect the region, increase prosperity). The project 14.3 responds specifically to the objectives through addressing the necessities of bringing together and coordinating civil protection stakeholders and bolstering the capacity of individual countries, in order to ensure our region's uniform resilience to macro-regional risks.

14.3 was developed from a belief that considering the nature of the world that we live in today, only by ensuring a proper level of resilience on a macro-regional level can we ensure a higher level of resilience and preparedness on the national level as well.

Project 14.3 was a pioneering effort. →

Not only for addressing the topic of macro-regional risk in the Baltic Sea region (before this project there wasn't even a common concept discussed among the countries in the region), or for bringing up a complex all-hazards approach, but also for bringing together a partnership consisting of all countries in the region, to not only discuss and share but develop together a strategic approach to civil protection. As such, it thus constitutes a shift in the whole paradigm of the way civil protection may be conceived on a macro-regional level.

Why it is only now that 14.3 could have happened? →

Some say because there was previously never this level of openness in sharing information on civil protection tools and methods among different countries in the region; this could not have been imagined twenty or even five years ago. Others say it was because countries in our region finally openly recognized their individual vulnerability, as well as the fact that there may be situations to which even the most resourced country would face the need to ask for assistance from a neighbour. 14.3 partners came together admitting it straight: it is not enough to ask – you have to be ready to receive assistance.

Pioneering efforts also meant that 14.3 was a daring effort. →

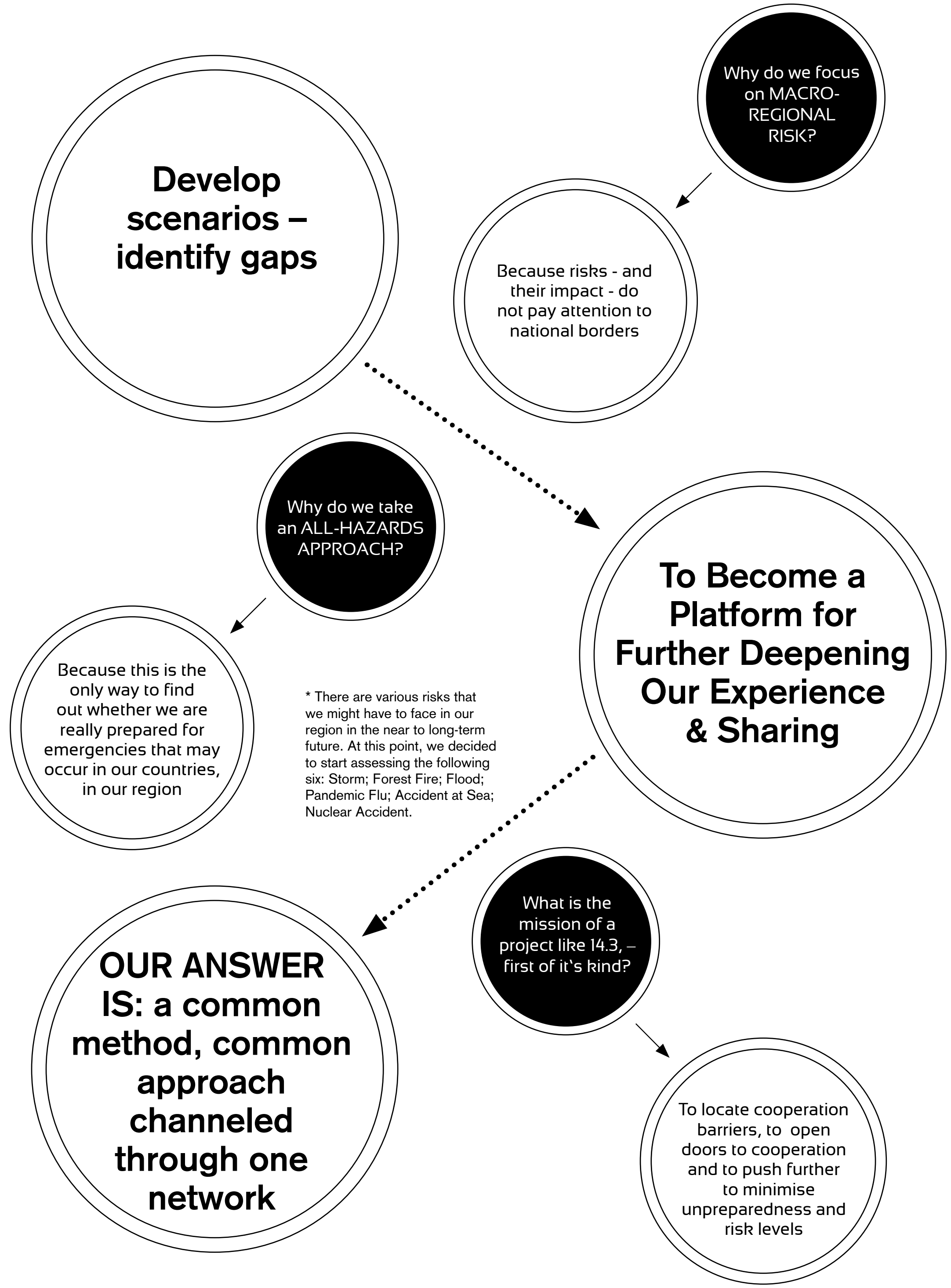
This was especially visible in how the all-hazards approach had to be adopted for the project. All-hazards approach is a challenging claim even on national level, as it requires crossing administrative and institutional boundaries. Which is the best way to achieve this? The answer is yet to be formulated.

Project 14.3 proposed to take one step at a time and responded to the all-hazards challenge through structuring the project in four thematic tasks. There were three tasks dealing with the following hazards: floods, forest fire and nuclear accident. Whereas one task – Task C – engaged in an overall strategic discussion on how can risk be assessed and analysed on a macro-regional level, and how a common risk-discourse can decrease societal vulnerability of each singular country in the Baltic Sea region, as well as that of the macro-region as a whole.

Working Together on Macro-Regional Risk.

Project 14.3

Was the First Time that the Countries Around the Baltic Sea Worked Together on Macro-Regional Risk*



Here are the types of questions we asked ourselves in workshops and expert groupings

Fourteen Point Three Notebooks

Collection of Fourteen Point Three Notebooks is Set to Launch a CIRCULAR LOOP in which ONE PART Manifests The Whole and THE WHOLE Manifests One Part ⟶

Task C

Macro-Regional Risk

What will it take for us to have a common approach to risk and a common method to assess it? Do we need it? Why?

RED BOOK ONE / TWO

Task D

Floods

How can we best share our experience in coping with floods? Could this help us to reduce the national costs associated with flood prevention , preparedness and response?

GREEN BOOK ONE / TWO

Task E

Forest Fire

What fire risk models are used already in the Baltic Sea region? How can these be bolstered? What kind of common system would we need and why?

BLUE BOOK ONE / TWO

Task F

Nuclear Accident

Would we be able to cope with a nuclear emergency which would impact several countries in the region? How can we create a common response and alertness mechanism?

ORANGE BOOK ONE / TWO

... Red Books represent the contribution

from our Task C experts whose main concern centred on beginning a discussion on the risk-assessment challenges in the Baltic Sea Region; a discussion that, for the first time, would include all countries from the area. In their two Notebooks they bring to us an insight on how our countries meet the challenge of assessing overall risk. They also question and explain what methodology can be used together, and they bring us their first attempt to develop a common language by drawing six different risk scenarios.

... Blue Books represent the outcome

from the Task D Grouping who have discussed flood prevention practice in the Baltic Sea region. Floods are an annual occurrence for most of the countries in our region, and each one of them has developed a strong national know-how of coping with this type of emergency. However, the discussions focused on how can we increase the effectiveness of our actions in dealing with this emergency by sharing experiences of individual singular-country specific cases? The Blue Books give us a picture of various flood prevention experiences in the Baltic Sea region, as well as their conclusions and recommendations for further know-how sharing.

... The Green Books focus on our regions foliage,

vegetation and forest cover and what happens when fire occurs. As our Task E experts discovered, all countries that participated in the work of Task E have their own national fire risk systems. These systems are both, similar and different at the same time. The question asked of experts was whether the region needs to have one fire risk system for the whole region? What would that system entail and how would that system borrow elements from other systems already developed elsewhere? This is to be decided in the future. For now, we have made a first step in this process providing you with an overview of existing fire risk systems in the Baltic Sea region.

... Our Orange books investigate nuclear accidents

The nuclear question is probably one of those regional questions which we cannot afford to overlook in a macro-regional context judging by its potential impact. To show you why this is so, Task F experts developed a scenario for an hypothetical accident in Finland that may have severe consequences on other countries in the region. The second part of their task work was to assess this developed scenario and provide recommendations for further activities that would increase our preparedness towards accidents of this complex kind. The scenario and workshop report are both delivered to you in our Orange Books completing the circle.

The EUSBSR flagship project 14.3 was a novelty on various levels

Two of the most important 'firsts'

...partnership of diverse civil protection actors from every country of the Baltic Sea region was built

...the focus of the project was concentrated on an all-hazards approach through a macro-regional lens

The questions we asked ourselves were

How can we acknowledge and communicate the project's complexity, and capture it without reducing or subordinating it at the same time?

How can we talk about the methods and the substance of inquiry at once, whilst keeping both on an equal footing?

Red Book One brings you our reflections on what it means to work on macro-regional risk. We would say that in no small sense and from a multi-national perspective this is pioneering →

Task C Fact Sheet

18 Months of...

MEETING in the Baltic Sea region →

Stockholm → Hamburg → Riga → Warsaw → St Petersburg

The task was led from Tønsberg, Norway

WORKING together →

Norwegian Directorate for Civil Protection and Emergency Planning (DSB) - Fredrikssund-Halsnæs Fire & Rescue Service (Denmark) – Estonian Rescue Board – Main School for Fire and Rescue Service in Warsaw (Poland) – Swedish Civil Contingencies Agency (MSB) – State Fire and Rescue Service of the Republic of Latvia – State Fire and Rescue Service of the Republic of Lithuania – Hamburg Fire and Rescue Service (Germany)

SHARING experiences →

(Core Group of Experts)
Tone D. Bergan, Janniche Cramer, Thomas A. Hansen (NO) – Kim Lintrup (DK) Kaido Tee, Jaan Eiken (Jaan Tross, Kady Danilas) – Martins Baltmanis, Ivars Nakurts, Rudolfs Azens (LV) – Taito Vainio (FI) – Svetlana Krasilnikova, Giedrius Viganauskas, Neringa Brogaite-Karveliene (LT) – Jerzy Wolanin, Pavel Kepka, Marcin Smolarkiewicz – Jürgen Krempin, Marko Florek, Simon Reif (DE) Carl-Gustaf Erixon, Ole Florin (Tiina Saksman Harb, Magnus Winehav) – Michael Galishev, Dmitry Umanets (Consultants: Mats Ruge Holte (NO) and Pekka Visuri (FI))

TONE BERGAN Task C Leader:

"It is challenging to build up a macro-regional risk approach. Most countries in our region are still developing their own national risk assessments and we found out that we speak very different languages. We use different terms, there are many authorities involved and even within each country exist challenges of having different authorities communicating and cooperating one with another. Then we move across the border and another dimension is added. 14.3 project, I think, is one step ahead in establishing a way towards how to deal with these challenges."

TASK C Gave Us

→ Six scenarios for hazards that may have cross-border and/or macro-regional impact.

→ Scenarios help us to make sure that we have planned for which troubling effects we have to be prepared for.

→ Macro-Regional Risk Assessment and Mapping Guidelines for Disaster Management Guidelines can be a vocabulary for civil protection experts, to make sure one 'common language' among different countries is used.

→ An open door to build a common understanding on what assessing macro-regional risk in the Baltic Sea region can bring.It helps to make sure that you can receive help from other countries should you need it, as well as for you to be prepared to help the others.

Drawing Macro-Regional Risk: Six Scenarios for the Baltic Sea Region

Introduction or Where did we start?

Understanding of national risk is important for linking prevention, preparedness, response capacity and follow-up elements (mitigation). In this Baltic Sea region macro-regional analysis participants were asked to bring these national risk perspectives together. **The aim is to map common risks that could affect the region as a whole, and to identify gaps by working systematically using a common theoretical platform.**

The EU Baltic Sea region has 85 million inhabitants, i.e. 17 percent of EU's population. They share common features and challenges, but there are also differences. In order to identify similarities and differences in the field of civil protection, Task C of the EUSBSR flagship project 14.3 sent a questionnaire to participants asking for their response on the following topics:

- Cross-border cooperation
- International assistance
- National risk assessments
- Scenarios

In this study we go through the questions and answers, outlining both similarities and differences between countries in the Baltic Sea region in the field of civil protection.

Cross-border cooperation

All countries in the Baltic Sea region have experience in cross-border cooperation in the field of civil protection. The majority of respondents replied that they participate in such activities several times a year. The activities range from participating in emergencies, to developing plans and developing risk preventive measures. Some of these activities take place under a civil protection umbrella, while other activities are on sub-fields such as marine pollution or search and rescue, but still within the framework of civil protection.

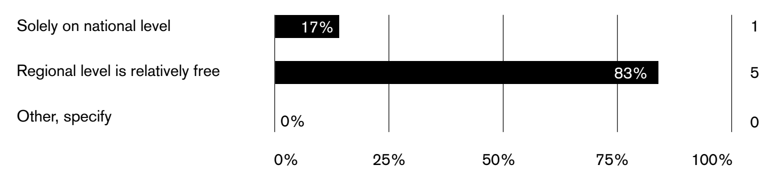


Figure 1

Respondents' answer to the question "[ ] the regional level is relatively free to make their own arrangements on cross-border cooperation?"

In the field of civil protection respondents state that cooperation is, as would be expected, closest between neighbouring countries and regions. The co-operative measures are partly based on bilateral and partly on multilateral agreements between the parties. When it comes to multilateral agreements, several of the respondents highlighted the EU, particularly the European Civil Protection Mechanism, as important in the field of civil protection.

The respondents' answers to the questionnaire indicate strong cross-border cooperation in the Baltic Sea region. Early warning and information sharing are important for civil protection. These are subjects where cooperation is of importance. Responses to the questionnaire however indicate that there are significant regional differences. In some countries accidents such as forest fires, nuclear emissions and maritime emergencies are primarily reported to separate sectoral focal points, while in others these should be reported to centralized civil protection centers. Some countries have dual structures where both national contact points and sectoral stakeholders should be informed.

There is extensive cross-border cooperation in the field of civil protection in the Baltic Sea region. Figure 1 indicates that in several countries there are regional agreements with counterparts in neighboring countries. In most countries regional levels are relatively free to set up such cross-border arrangements. These cross-border arrangements differ in terms of whether they are related to a specific hazard or more generic in form.

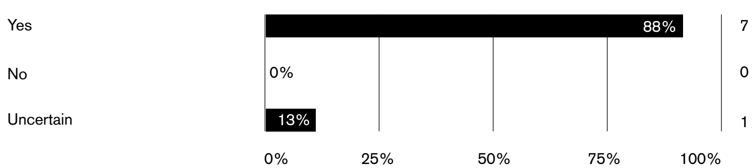


Figure 2 Respondents' answer to the question "do relevant actors in your country conduct joint exercises where cross-border issues related to civil protection are addressed?"

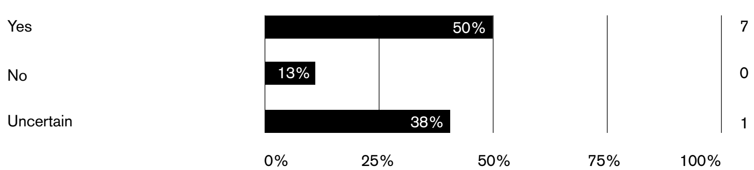


Figure 3 Respondents' answer to the question "have you identified a need to further develop a particular kind of cross-border cooperation related to civil protection?"

The Baltic Sea region lacks a unitary system for early warning and information sharing. The responses from the participants indicate that the systems differ between countries, regions and sectors. Efficient cross-border cooperation therefore requires an in depth knowledge of each other's civil protection systems.

Exercises are an important tool for learning more about these systems. According to the respondents most countries conduct civil protection exercises on an annual or bi-annual basis. As figure 2 indicates, cross-border issues are an important part of such exercises.

The respondents highlight different types of exercises as relevant for cross-border cooperation. Some highlight national civil protection exercises as important, while others focus on multilateral exercises arranged by the EU or other organizations. The questionnaire does not give a full picture of the range of bi- and multilateral exercises the different countries participate in.

In the Baltic Sea region cross-border cooperation in the field of civil protection is good. As figure 3 shows respondents have nevertheless identified needs for improvement. Respondents have among other things pointed out working with countries and people with different cultures and languages, and where the understanding of risk is not similar, as points which need to be focused more on in the future.

To improve cross-border cooperation in the Baltic Sea region there is a need for better understanding of each other and of relevant civil protection arrangements and agreements. Increased interaction is a way to improve this understanding across borders, e.g. through joint training/exercises and developing common understandings of risk.

Respondents put forward several suggestions that could improve cooperation in the Baltic Sea region. Among these suggestions are:

- More funding for multilateral civil protection initiatives
- Lowered barriers for movement of equipment and personnel, e.g. visa regulations
- Improved language skills
- Standardized training of personnel
- Establish a forum for discussing cross-border cooperation

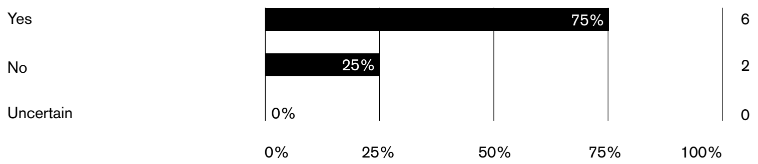


Figure 4 Respondents' answer to the question "have you identified hazards on your territory with consequences that would require help from abroad?"

International assistance

In the section of the questionnaire focusing on international assistance, respondents were asked questions on their national response plans, experience with international assistance and on national support functions.

According to the respondents most of the countries have identified accidents where they would ask for international assistance. Some have identified specific hazards where assistance would be needed. Others have focused less on specific hazards, but have established generic systems for receiving assistance independently of the types of hazards.

Most of the participating countries have at one point received international assistance, e.g. due to flooding, storms, forest fires or oil spills. When international assistance is needed most respondents have identified bilateral channels as important for communicating with other countries. Respondents also highlight EU Civil Protection Mechanism as an important channel, and some mention NATO's Euro-Atlantic Disaster Response Coordina-

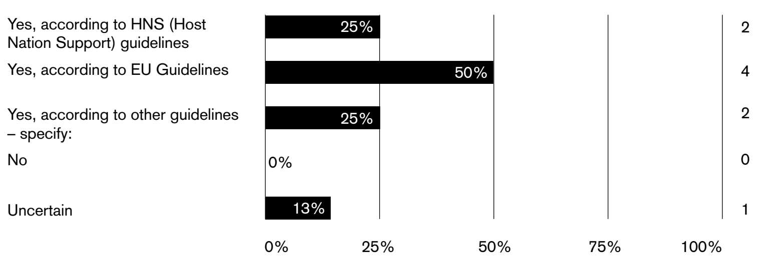


Figure 5 Respondents' answer to the question "there are several ways to solve border crossings when such international assistance is called upon. Do you have national guidelines in place?"

tion Centre (EADRCC). Most, but not all, respondents have identified a single national contact point responsible for coordinating incoming assistance.

When asked if they know of particular obstacles, administrative, legal, operational or of another type, that would complicate acceptance of offers of international assistance, three countries respond that they have. They highlight a number of obstacles connected to the Host Nation Support (HNS) guidelines, ranging from work permits to integration of foreign teams and interoperability.

The response outlined in figure 4 indicates that HNS is an issue most countries in the region have been working on, and that procedures are established. This is an important issue, and something which could contribute to decreasing the consequences of accidents in the Baltic Sea region.

National risk assessments

A national risk assessment is a cross-sectoral overview of major natural and man-made risks that countries face and should be take into account. Such assessments should include all risks which are of sufficient severity to entail involvement by national governments in the given response, in particular via civil protection services.

EUSBSR flagship project 14.3 (Task C) uses the methodology described in the EU Commission Staff Working Paper "Risk Assessment and Mapping Guidelines for Disaster Management". What separates this project from traditional risk assessments using this methodology, is that this project is a macro-regional assessment. Hence, the focus is not on separate countries, but on **bringing national perspectives together to map common risks that could affect the Baltic Sea region as a whole.**

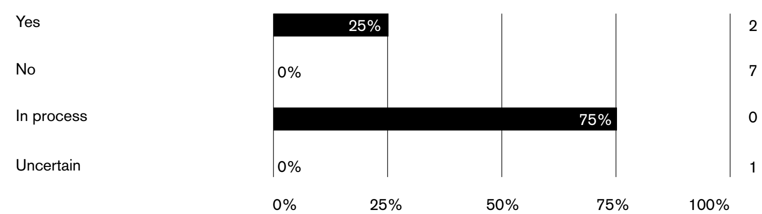


Figure 6 Respondents' answer to the question "Has a national risk assessment been performed?"

In the questionnaire sent out by Task C, participants were asked whether the individual countries had performed a national risk assessment, and also what methodology they had used. The answers revealed that only two countries had finished a national cross-sectoral risk assessment. Several of the participants however revealed that they were in the process of developing such an assessment, see figure 6.

Few of the respondents were specific on what methodology they were using in their national risk assessments. None highlighted the EU Commission Staff Working Paper "Risk Assessment and Mapping Guidelines for Disaster Management" as their point of departure. The respondents did not specify whether scenarios were an integral part of their national risk assessments.

Cross-sectoral risk assessments can be an important tool for authorities dealing with civil emergencies. When asked what authorities were responsible for developing national risk assessments, typically authorities responsible for interior, civil security and national emergency management were mentioned. The responsibility was partly on a ministerial level and partly on a department or directorate level.

Overall the answers reveal that participants are at very different stages in developing national risk assessments. The countries vary in terms of experience with national risk assessments and their familiarity with the methodology and process.

Scenarios

The use of scenarios is an integral part of any risk analysis based on the EU's "Risk Assessment and Mapping Guidelines for Disaster Management". In the questionnaire six scenarios were identified as reflecting relevant regional hazards, and hence relevant for the Baltic Sea macro-regional risk assessment. The six scenarios were:

- Extreme weather/storm
- Flooding
- Forest fire
- Diseases (pandemic flu)
- Accident at sea
- Nuclear accident

Scenario 1: Extreme weather/storm

According to the questionnaire the Baltic Sea region is highly exposed to rough weather, especially during the period ranging from October to April. Over the past five to ten years we have experienced storms, extreme weather (longer periods of very cold temperature), thick ice blocking traffic at sea and massive snow falls. Such weather conditions could prove a test in itself on many preparedness and response items, but it is possibly their inherent consequences on life and health and vital societal functions and infrastructure that could pose the most challenging threats to society.

Respondents were asked to give feedback on the extreme weather/storm: who are the corresponding responsible authorities, where would such an accident have the biggest impact, what would the overall consequences be, and what are the potential needs for assistance.

Extreme weather was by all respondents highlighted as a relevant scenario with potentially large consequences for national infrastructure. Damages to power grids/power failures and interruptions in electronic communication were also underscored by the respondents.

Extreme weather will be trans-boundary and have cross-sectoral effects. Several of the respondents replied that they probably would need cross-border assistance, but that it was difficult in advance to specify what kinds of help that would be required.

Scenario 2: Flooding

The Baltic Sea region is exposed to floods and storm surges. Russia, the Baltic States, Poland, Germany and Denmark are relatively often threatened or actually hit by storm tides from the Baltic Sea/North Sea or submerged levels in their inland rivers. In the Nordic countries a combination of rain and snowmelt causes major floods. Floods, though somewhat different in type/potential impact, pose a recurrent threat to the region as a whole.

All the respondents highlighted flooding as a relevant scenario that could affect their country. Flooding could also have cross-border effects. Flooding due to increased water levels in inland rivers was by most respondents put forward as a major risk, but some also mentioned surges in the water levels in the Baltic Sea as a challenge.

According to replies to the questionnaire most countries in the region have done work on flooding. A wide range of consequences have been identified, ranging from major halts in transportation and power failures, to an increasing number of people becoming ill. Some, but not all, replied that severe flooding would need for external/cross-border assistance.

Scenario 3: Forest fire

Forest fires are a continuous threat in parts of the Baltic Sea region. The most common causes are human activities such as felling, camp fires and people being irresponsible with fire. In addition, natural phenomena such as lightning strikes cause forest fires. Forest fires are mainly a problem if they affect vital societal functions. The number of days with a high risk of forest fires is expected to increase in the Baltic Sea region in the years to come.

Most of the countries have identified areas or regions where forest fires constitute a threat. In some areas such fires would also pose a threat to neighbouring countries. Several respondents underscore the potential cross-border consequences of forest fires. Cross-border support could be required, e.g. aerial support and other types of technical support.

Scenario 4: Diseases (Pandemic flu)

Pandemics are a challenge and something all countries in the Baltic Sea region will have to prepare for. A pandemic is an infectious disease that spreads across large parts of the world and affects large amounts of the population in each country. Historically, outbreaks of influenza pandemics have taken place approximately 3-4 times each century. The last great worldwide epidemic (pandemic) was H1N1 that spread during 2009/2010.

All respondents highlight pandemic flu as a relevant scenario with consequences particularly in the densely populated areas of their countries. Transport and travel hubs, airports, ferries etc, will be places were a pandemic first occurs, and then is spread to other regions and countries.

A pandemic flu will have severe consequences in the region as a whole. It will have impact on the functionally of society. The cross-boundary consequences could be major, and countries would have to cooperate to ensure the maximum effect of implemented mitigating measures. None of the respondents specified particular needs for international assistance during or in the aftermath of a pandemic flu.

Scenario 5: Accident at sea

The Baltic Sea and neighbouring basins are among the busiest waters in Europe. Cities such as Copenhagen, Gdansk, Hamburg, Helsinki, Klaipeda, Oslo, Riga, St Petersburg, Stockholm and Tallinn, are ports of call for a substantial number of large cruise ships in addition to the normal daily schedule of large ferries that sail these waters north - south, or east - west. There are also several oil refineries, industrial facilities and STD (supply, transport and distribution) installations along our coastlines, not to mention the global importance of harbours such as Hamburg. Should an accident occur in these waters, it could quickly escalate into a major disaster.

Several of the respondents put forward accident/s at sea as a major risk. Both Skagerrak, Denmark and the Baltic Sea were mentioned as potential accident sites. In their responses, oil spills were highlighted as a main risk in conjuncture with accidents at sea. Some respondents also underscore that collisions could lead to a number of people being injured, and thus in need of evacuation and medical assistance.

In general the answers from the participants on this subject were limited and did not go into any detail. They were not specific in terms of where accidents where most likely to occur, nor on whether they would have cross-border or cross-sectoral effects.

Scenario 6: Nuclear accident

There are a number of nuclear power plants and nuclear facilities in and around the Baltic Sea region. As the accident in Fukushima showed there is a constant risk connected to these types of activities. Nuclear accidents could happen in nuclear power plants, nuclear recovery plants, storage facilities for nuclear waste or in military nuclear facilities. Accidents in facilities outside the Baltic Sea region could also impact countries in the region, creating major regional disasters.

In response to the questionnaire several nuclear power plants in the region were presented as potential accident sites, although the respondents underscored that the likelihood was small. Nuclear accidents could lead to radiation and have major cross-border consequences. Respondents underscored environmental degradation and long term health consequences as major effects.

Depending on the weather all countries in the region could be affected, and cross-border cooperation would be required. Respondents named experts on nuclear contamination, monitoring and notification as potential fields of cooperation.

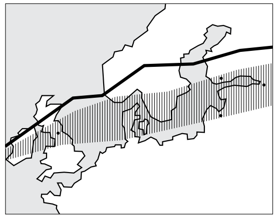
Task C: Macro-regional risk assessment

Scenarios

Scenario 1:
EXTREME WEATHER/STORM

Geographical location
The storm will affect the majority of countries in the Baltic Sea region, see fig. 1. Denmark, Norway, Sweden, Lithuania, Latvia, Estonia, Finland and Russia will all be affected

Time
The time of accident is in the winter. The storm lasts from December 8 (Denmark) to December 10 (Russia).



Low Pressure Track

Affected Regions

Affected Cities:
St Petersburg
Helsinki
Riga
Ljungby
Halmstad
Copenhagen
Logstor
Carlisle

In northern Europe the weather has been clear and cold in late November and early December, with temperatures around -10°C at night and 5°C on average during the day. Electricity consumption has been high for the season. Weather forecasts indicate that there might be heavy squalls, snowfall or rain over large parts of the region, covering several bordering counties including both larger cities and the countryside.

6 December a low pressure system starts developing south of Newfoundland. It strengthens rapidly and moves into the central North Atlantic. 8 December it hits Scotland and Northern Ireland. 9 December, at 03:00 local time, the storm hits Denmark. It then moves into the southern parts of Sweden and the Baltic Sea, and dissipates over Russia December 10.

When the storm hits Denmark it has wind speeds of 130 km/h, and wind gusts of 170 km/h, making it a category 1 hurricane. The storm retains most of its strength as it moves across the Baltic Sea, with St. Petersburg experiencing gusts of 130 km/h.

Because of strong winds and glaciations, power lines break down and distribution plants eventually short-circuit. This results in extensive power failure. The storm also causes extensive disruptions in electronic communications. Roads become more or less inaccessible due to the icy conditions combined with snowdrifts as well as fallen trees and power lines. There are reports of several road accidents. The public is advised to stay home. The storm has effects on several sectors of society, such as disruptions in the payment system, the provision of food and drinking water, the municipal healthcare service, etc.

The storm subsides after three days. Many people, houses and villages are cut off by snowdrifts up to two meters deep. The electricity grid's reduced capability and overloading results in power shortages in the affected areas, particularly in Denmark, Sweden, Estonia and Russia.

Clearance work and repairs can be initiated, but damaged power infrastructure will only be back in full operation within one or two weeks at the earliest. Telecommunications are also expected to have problems during this time.

Administrative consequences

Warning / time for preparation

Preparation time for national authorities is limited. The storm starts building up only three days before it hits Denmark. National authorities are surprised by its strength when it hits Ireland and later Denmark, and also by the fact that it retains its strength as it passes the Baltic Sea.

Duration

It takes approximately 15 hours for the storm to pass any given area. It will take weeks and months to repair the damages caused by the storm.

Affected areas

Most countries in the region will be affected, but to a different degree. In Denmark, Sweden, Estonia, Latvia, Finland and Russia heavily populated areas will be directly affected. A storm of this magnitude will create need for coordination across different administrative units:

- Municipalities
- Regions
- Countries

Affected sectors

A major storm will be a challenge for multiple sectors in society. Examples:

- **Health:** Power shortage could create problems for hospitals and create problems with heating in particular areas, etc.
- **Critical infrastructure:** Electricity lines are cut off, gas lines potentially destroyed, telecommunication towers and lines will be down. There could be a lack of heating, electricity and telecommunication.
- **Goods and services:** As a result of power fallout and fallen trees and other debris blocking roads, people cannot attend work. Public services will not be available in some areas. There could be halts in production and distribution of food and other goods.
- **Transportation:** Roads and railroads will be blocked.
- **Emergency management:** Need for coordination of crises management, including evacuation of elderly people, securing objects, cleaning up areas in the aftermath, managing help from abroad, etc.
- **Law and order:** Areas will be temporarily inaccessible for the police and other types of governmental authorities due to fallen trees, destroyed bridges etc.
- **Information:** Strong need for coordinating information to the affected population, neighbouring countries, the media, etc.

Need for cooperation and coordination

Most countries in the region will be affected, and their relevant resources will probably be exhausted. Help will have to come from outside the affected area, i.e. Germany and Poland, making Host Nation Support (HNS) important.

Examples of relevant assistance are: Equipment for pumping water, assistance to evacuees, power supply units etc.

This point will have to be addressed in the risk assessment.

Consequences/cascading effects

Human impacts

Deaths can be expected as a direct result of the storm, but these numbers will probably be limited. Countries will probably experience deaths during the clear up phase, and as a result of accidents due to damaged infrastructure.

A storm will lead to a number of injured people, both directly and indirectly as a result of damaged infrastructure. The aftermath could be challenging for people in need of medical assistance.

There will be a lack of heating due to destroyed electricity grids.

Economic and environmental impacts

A storm will have major economic impacts. Economic consequences that need to be accounted for are: People will not be able to attend work during and in the aftermath of the storm. There will be major disruptions of infrastructure that will need to be rebuilt. There will be major halts in production and distribution of goods. The insurance pay-outs will be massive.

A storm will destroy large forest areas and could also cause damages to other types of nature. It could have other types of environmental impacts as a result of ships colliding and leaking oil, damages to oil pipelines, destruction of industrial facilities etc. This would create environmental restoration costs.

Political / social impacts

In large areas there will be a lack of public services as a result of a storm, including lack of public transportation, limited presence of police and emergency services, no water and sanitation etc. There will be disruptions in the distribution of food and water. Electricity and telecommunication will be out, in regions probably for weeks.

There will be big variations in how strongly areas are affected, and also how long it takes to clear up and rebuild the damaged infrastructure.

Lack of police and limited access to different necessities can have consequences for order and stability. Some areas could experience hoarding.

Lack of heating due to damages to the electricity infrastructure could cause problems, particularly for the elderly, creating a need for evacuation.

Scenario 2: **FLOODING**

Geographical location
Poland (The River Oder)

Time
The time of accident is in the summer. The first flood wave hits Poland July 5-6, and over the next few days downstream areas in large parts of Poland are flooded. The flood hits the German border on July 13. Large areas, particularly in the southern parts of Poland, are flooded for weeks.

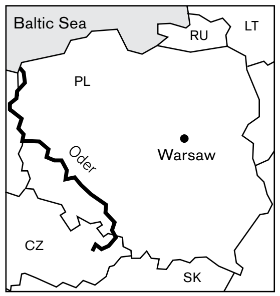


Figure 1: The River Oder runs from the Czech Republic through Poland and ends in the Baltic Sea. In the north the river constitutes the border between Poland and Germany.

There has been a low pressure system moving from northern Italy to Poland, resulting in extensive rainfall in southwestern Poland and northern Czech Republic. The overall rainfall in a couple of days equals an average cumulative rainfall for a two month period. This has led to a critical increase in river bank levels in Poland and the Czech Republic, and eventually to the flooding of large areas.

The flooding first begins in the Czech Republic July 5, and on July 6 spreads to Poland. There are several rapid flash floods. The water also rises by up to 4 meters in half a day. Tributaries cut new channels relative to the original river courses, and threaten to result in large flood damage if the channels of water reach densely populated areas. It continues to rain heavily.

Due to the heavy rain a second flood wave is created, running down the river Oder and overwhelming successive towns. The first Polish town to be flooded is Głuchołazy. The flood then spreads from Chałupki to Racibórz, and on 8 July reaches Krapkowice. On July 10 Opole town (the left-bank side of river Oder) is flooded, and on July 12 Wrocław and Rybnik. In Poland the most affected provinces are Dolnoslaskie, Opolskie and Lubuskie.

The river Oder is the natural border between Poland and Germany. The flood reaches the German border July 13. By the time it reaches the border it has slowed down, but the damage it creates in Germany is still substantial.

The flooding is on the same level as in 1997. In Poland max water level varies between 1 000 cm above normal levels in the south and 650 cm in the north. In Germany the level varies between 850 cm in the south and 550 cm in the north. The probability of such water levels is estimated at one every 1 000 years (0,1 %).

Such a flood will have devastating effects. Immediate consequences include a relative high number of casualties, serious damage to infrastructure and property, including dam breaches, necessary large-scale evacuation of people, increased risk of contamination of drinking water, and mass disruptions and in some areas an abrupt halt for a period of time in vital transportations of food, water and electricity as well as medical and livelihood items.

In response to such a flooding all national rescue forces and other national responders (army, border guard, police and volunteers) will need to be deployed. All available resources, helicopters, boats and floating equipment, pumping capacity, vehicles, will be in use.

After July 10 the weather in the area normalizes in tune with the the time of year, and the flooding eventually subsides.

Administrative consequences

Warning / time for preparation →

Preparation time for national authorities is limited. Heavy rainfall starts in late June, but the severity of the weather is unexpected and preparations do not start immediately. Downstream, authorities have more time to prepare.

Duration →

Including the heavy rainfall, the flooding lasts for approximately a month. Evacuations will last for months, and rebuilding and rehabilitation of large areas will take years. In Germany the situation will be less severe, but will also last for weeks/months.

Affected areas →

In Poland an area of 665 000 hectares of land was directly affected by the flooding in 1997.

Both in Poland and Germany a flood of this magnitude will create a need for coordination across different administrative units:

- Municipalities
- Regions
- Countries

Affected sectors →

A large flood can affect all sectors. Examples:

- **Health:** Hospitals will be inaccessible/unusable, lack of treatment for people who are ill/injured, limited access to clean water and sanitation etc.
- **Critical infrastructure:** Electricity lines will be cut off, gas lines destroyed, telecommunication towers and lines will not function. There will be lack of heating, electricity and telecommunication.
- **Goods and services:** No public services will be available in affected areas. Halt in production and distribution of food and goods.
- **Transportation:** Roads, railroads and airport access will be destroyed/ temporarily unavailable.
- **Emergency management:** Need for coordination of evacuation, building and strengthening flood barriers, building and manning camps for evacuees, rescuing livestock, managing help from abroad.
- **Law and order:** Areas temporary inaccessible for the police and other governmental authorities.
- **Information:** Strong need for coordinating flood and rescue information, coordinating information to the affected population, neighbouring countries, the media.

Need for cooperation and coordination →

Polish capacity will probably be exhausted, and there will be need for foreign assistance, making Host Nation Support (HNS) an important element. Examples of relevant assistance: Equipment for stopping the flooding (sand bags, water pumps etc.), assistance to evacuees (tents, water purification and sanitation equipment, blankets etc) and dehydration systems.

This will have to be addressed in the risk assessment.

Consequences/cascading effects

Human impacts

Deaths can be expected as a direct result of the flooding. There will also probably be deaths during the clearing up phase as a result of accidents caused by damaged infrastructure such as roads, telecommunication, electricity, health facilities etc.

A flood will lead to a number of injured people, both directly and indirectly due to damaged infrastructure. The aftermath will be challenging for people in need of medical assistance.

Economic and environmental impacts

A flood will have major economic impacts. Buildings and infrastructures, probably whole villages, will be damaged/destroyed and have to be rebuilt especially if the buildings themselves were in a state of disrepair before the flood. People cannot attend work for extended periods. There will be halts in production and in the distribution of goods. Insurance pay-outs will be massive. There will be costs for running evacuee camps.

A substantial amount of the destructed areas will be farmland. There will be cost as a result of loss of cattle, agricultural fields etc. Rebuilding the farmland will take years.

A flooding will have environmental impacts in large areas. Embankments will be destroyed. Pipelines will be damaged, industrial facilities and sewage treatment plants destroyed, leading to spills. There will be major environmental restoration costs.

Political / social impacts

There will be a lack of public services in areas. Large areas will be inaccessible for an extended period of time. There will be no public transportation due to destroyed roads and railroads, lack of water and sanitation in areas, camps for evacuees with limited services etc. There will be disruptions in the distribution of food and water. Electricity and telecommunication will be out, in regions probably for months. Health services will be limited, particularly in the initial period.

Large inaccessible areas and limited access to necessities can have consequences for order and stability. Some areas will experience hoarding. The degree of discontent in the population will correlate with the degree to which authorities are seen as being in control, and handling the situation in a good manner.

Scenario 3: FOREST FIRE

Geographical location
Lithuania (Veisiejai forest enterprise)

Time
The main forest fire in this scenario takes place in the summer, lasting from July 20 to 27.

Figure 1: The forest fire starts in Veisiejai area, and due to strong winds from the east/south east moves towards Poland and also threatens Kaliningrad in July

In the northern parts of Europe, concerns about the risk of wildfires and forest fires are increasing.

In our scenario over the past week, people have been enjoying an early taste of summer, but meteorologists are becoming increasingly anxious. March and April saw significantly less rain than usual, and they foresee that potentially parts of Europe over the summer could experience the worst drought for more than a century.

From late May and onwards, hot and dry weather persists in the northern parts of Europe, with temperatures of 35 °C (95 °F) in early June. This weather continues throughout June and July, adding concern among meteorologists and increasing the risk of forest fires. From mid July, the number of forest fires in and around the Baltic area increases, but fire fighters are able to control them.

There have been several minor fires in the Veisiejai forest enterprise, but they have been kept under control. However, on July 20 the wind suddenly increases dramatically to 15 m/s east-southeast (approximately 55 km/h), creating difficulties for fire fighters. They lose control over a large forest fire in Veisiejai.

At the time when fire fighters lose control over the fire in Veisiejai, there are several smaller fires ongoing in other places in Lithuania. Hence all national resources are occupied and are not easily redirected. Help from abroad is required to avoid the fires in Veisiejai spreading.

The fire spreads quickly north-northwest. Already by July 21 several villages in the Veisiejai area are threatened by the fire and are engulfed in smog. Around 15 000 hectares are in flames.

July 22 authorities announce that the area has increased to 20 000. A few people die, and hundreds are injured. Around 1,000 people are battling the fires - most of them fire fighters and soldiers, but also a few volunteers. They are using heavy equipment to cut huge troughs into the ground in an attempt to stop the fire. A combination of the smoke from the fires, which produces heavy smog capable of blanketing large urban regions and the record-breaking heat wave, puts additional stress on the healthcare system.

The weather forecast for the next five days predicts continued dry weather and strong winds, creating a situation where the fire potentially could spread to Poland. There is also a need for preventive measures to ensure that the fire does not spread to Belarus if the wind turns. Help from abroad is required, including aerial support.

July 27 the wind subsides, and fire fighters are able to get control over the fire. It has not spread to neighboring countries, but has destroyed 35 000 hectares. Houses are destroyed and villages partly burnt down. People in large areas have been evacuated.

Critical infrastructure in Lithuania is destroyed, also affecting neighbouring countries. Roads are unusable and large areas inaccessible. There is pressure on the health care system.

Administrative consequences

Warning / time for preparation

It has been hot and dry weather in the region for months, and authorities have been warned by meteorologists of the increasing danger of forest fires.

Duration

The main forest fire lasts for a week, from July 20 to 27. There are several smaller forest fires in the weeks leading up to the fire. It will take weeks to secure the area to avoid further fires, and even longer to make areas accessible. Rebuilding damaged infrastructure and buildings could take more than a year.

Affected areas

35 000 hectares will burn down as a direct consequence of the fire, but people in a larger area have been affected. Damages to infrastructures will possibly have consequences in larger areas, also outside Lithuania.

In Lithuania there will be a need for coordination across different administrative units:

- Municipalities
- Regions

Affected sectors

A forest fire will potentially influence all sectors. Examples:

- **Health:** Some hospitals will be inaccessible or unusable. Lack of treatment for people who are either ill or injured. An increasing number of patients due to smog.
- **Critical infrastructure:** Electricity lines are cut off, gas lines destroyed, telecommunication towers and lines burnt down. Serious shortages in supply of electricity and no telecommunication are direct consequences.
- **Goods and services:** No public services available in affected areas, halts in production and distribution of food and goods etc.
- **Transportation:** Roads, railroads and airport access will be destroyed/ temporarily unavailable.
- **Emergency management:** Coordination of evacuation, fire fighting, rescuing livestock, managing help from abroad etc.
- **Law and order:** Areas temporarily inaccessible for the police and other types of governmental authorities.
- **Information:** Strong need for coordinating information to the affected population, neighbouring countries, the media etc.

Need for cooperation and coordination

Lithuanian authorities would most probably need foreign assistance, and would have to coordinate incoming assistance. There could be a need for aerial support and firefighting equipment, thus making Host Nation Support (HNS) important. This will have to be addressed in the risk analysis.

Consequences/cascading effects

Human impacts

Deaths can occur as a direct consequence of the fire, but numbers will probably be limited. Deaths can be expected during the clearing up phase, and as a result of accidents due to damage to infrastructure such as roads, telecommunication, electricity, health facilities etc.

A forest fire will lead to a number of people becoming injured and ill, both directly as a result of heat and smog, and indirectly as a result of damaged infrastructure etc. Illness as a result of inhalation of smog could become chronic.

Economic and environmental impacts

A forest fire will have economic impacts. There will be numerous consequences that need to be accounted for. People will not be able to attend work. There will be major disruptions of infrastructure that will have to be rebuilt. There will be major halts in production and distribution of goods. Insurance pay-outs will be big as a result of burnt down houses and buildings, and as a result of damaged forest areas. The fire fighting operation would be expensive.

A fire would have environmental impacts, potentially altering the ecological system in the affected area. There could be environmental restoration costs as well.

Political / social impacts

In large areas there will be a lack of public services, limited water and sanitation etc. Disruptions in the distribution of food and water are challenging for responsible authorities. Electricity supplies and telecommunications will be cut. It will take time to clear up and rebuild damaged infrastructure, buildings etc.

Scenario 4:
DISEASES (PANDEMIC FLU)

Geographical location
The first incident in the region is reported in Copenhagen, but the whole region is affected.

Time
The first incident is reported in early January. The flu lasts until the end of May.

An unknown disease is reported in Thailand in late November. The World Health Organization (WHO) within weeks identifies it as influenza. The information is immediately transmitted back to Thai authorities, and is reported through the WHO Global Influenza Surveillance Network to other member countries.

Within weeks, countries in the region experience significant human-to-human transmission. In early January the first incident is reported in Europe – in Copenhagen. Over the next days there are reports of infected people in several countries surrounding the Baltic Sea. The pandemic flu spreads quickly, and by mid January incidents are reported in all countries in the Baltic Sea region.

All countries experience a surge in people seeking care for influenza-like illness. All age groups are affected, but young people of employment age are particularly affected. There are no vaccines available and antiviral drugs seem to have no effect. The flu is primarily spread by droplet transmission.

Rates of absenteeism in schools and businesses begin to rise. Phones at health departments ring constantly. The spread of the new virus continues to be the major news item in print and electronic media. Citizens start to clamor for vaccines, but they are still not available. Antiviral drugs cannot be obtained. Police departments, local utility companies and mass transit authorities experience significant personnel shortages that result in severe disruption of routine services.

Soon, hospitals and outpatient clinics are critically short-staffed as doctors, nurses and other healthcare workers themselves become ill or are afraid to come to work. Fearing infection, elderly patients with chronic medical conditions do not dare to leave home. Intensive care units at local hospitals are overwhelmed, and soon there are insufficient ventilators for the treatment of pneumonia patients.

Parents are distraught when their healthy young adult sons and daughters die within days of first becoming ill. Several major airports close because of high absenteeism among air traffic controllers. Over the next 6–8 weeks, health and other essential community services deteriorate further as the pandemic sweeps across the world.

In countries in the Baltic region the pandemic flu peaks 6 weeks after it is first discovered, and lasts for 4 months. In that period 25 % of the population becomes ill. The average duration is 10 days. 20 % of those affected go to see a doctor. 3 % are hospitalized, and the hospitalization lasts on an average for 5 days. The fatality rate of those infected is 0,5 %.

Administrative consequences

Warning / time for preparation →

Preparation time for national authorities is limited, at most 1-2 months.

Duration →

The pandemic flu spreads quickly, and by mid January incidents are reported in all countries in the region. The pandemic flu peaks 6 weeks after it is first discovered, and lasts for approximately 4 months.

Affected areas →

All parts of the region are affected, creating a need for coordination across administrative units:

- Municipalities
- Regions
- Countries

Affected sectors →

A pandemic flu will probably affect all sectors in society. Examples are:

- **Health:** An increased number of people will be sick and have to stay home. The numbers going to the doctor will increase. There will be an increasing number of people with a need for medication, and also an increase in the number of patients being hospitalized. The health sector will be strained due to employees being sick. There will be challenges in organizing health care provision fairly and efficiently.
- **Critical infrastructure:** Critical infrastructure such as electricity, water, sanitation, telecommunication, trains etc. could all be affected as a result of people not attending work, failures that are not fixed, lack of spare parts, difficulties getting relevant information across due to absentees etc.
- **Goods and services:** People cannot or will not attend work. Public services such as schools, kindergartens, distribution of social welfare, financial services, health care, sanitation etc. are heavily reduced or simply not available. Because schools are closed people will have to stay home to look after their children. There will be halts in production and distribution of a wide array of goods and services, potentially including food, financial services, law and order, transportation etc.
- **Transportation:** Railroads, busses and airports could close as a result of lack of personnel to operate them. People will avoid public transportation due to fears of being infected. There could be a lack of personnel available to transport medicines, food etc. National authorities will have to coordinate transportation of critical commodities.
- **Emergency management:** National coordination of health sector measures.
- **Law and order:** There could be a lack of police.
- **Information:** There will be a strong need for coordinating information to the population. This information must be accurate and trustworthy to avoid anxiety and social disruption. Information must be coordinated with other authorities, organizations and between countries.

Need for cooperation and coordination →

All countries in the region are affected and their national resources will probably be exhausted. Cross-border assistance in-kind could be limited. There will, however, be a strong need for sharing and coordinating information.
This point will have to be addressed in the risk assessment.

Consequences/cascading effects

Human impacts

25 % of the population becomes ill. Among these, a substantial number dies. The fatality rate is estimated at 0.5 %.

A pandemic flu will have long term health effects, and a large number of patients will need medical attention also after the initial four months.

Economic and environmental impacts

A pandemic flu will have large economic impacts. Among economic consequences that needs to be accounted for are: people will not attend work, schools and kindergartens will close, there will be major halts in production and distribution of goods, there will be huge health care expenses, large insurance pay-outs etc.

A pandemic flu will have limited restoration and environmental costs.

Political / social impacts

A pandemic flu could cause public outrage and anxiety – effects will probably be different in different countries. As a result of social psychological impacts countries could experience a large number of people acting irrationally. This can have impact on order and safety.

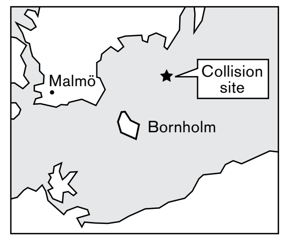
A pandemic flu will probably not have democratic consequences, although politicians and authorities are likely to be heavily criticized.

Scenario 5: ACCIDENT AT SEA

Geographical location
29 nautical miles North-East of Bornholm (see the map below).

Time
The time of accident is spring May 5, at 05:00 in the morning (CET +1).

Weather conditions
Advection fog/sea fog (clears up at 11:00). South-east moderate breeze (5 metres per second), sea temperature: 10 °C and air temperature: 6-8 °C. The sea current is 2 knots southwestward.



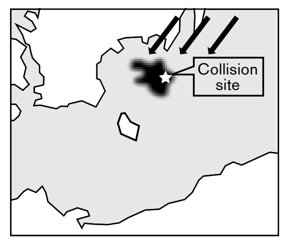


Fig. 2. A low-pressure area gives rise to rains and shifting, increasing winds at the collision site during the first day following the accident.

The accident is caused by a collision between an oil tanker and a passenger vessel. The passenger vessel is sailing from Gdynia, Poland to Karlskrona, Sweden and the oil tanker from Vysotsk, Russia to the Kattegat strait, Denmark. The accident is caused partly by heavy fog and low visibility, and partly by a power blackout on the passenger vessel. The passenger vessel has 1 700 passengers and a crew of 250. At the time of collision it has a speed of 10-12 knots. The oil tanker has a crew of 22. The ship is carrying 50 000 tons of crude oil. The oil tanker also carries 1 000 tons of bunkers oil. The collision causes a fire in the machine room on the passenger vessel. The crew is unable to put out the fire. The fire spreads throughout the ship. The captain sends a distress signal and orders evacuation of the ship. The passengers are mainly from Poland and Sweden, and primarily between 30 and 60 years of age. The collision causes a rift in the hull of the oil tanker, causing an instantaneous oil leak – approximately 8 000 tons of crude leaks into the sea. The 8 000 tons emulsify and the volume consequently doubles.

Day 1: At 2 PM a low-pressure area approaches from the South-Eastern Baltic Sea/North-Eastern Poland causing heavy rains and a wind shift into a North-Eastern strong breeze (> 10.8 m/s) that lasts until 9 AM the day after the next day. Initially moving towards the coasts of Swedish provinces Blekinge and (North-Eastern) Skåne, the oil is now drifting south-westwards, posing an immediate threat to the Danish islands of Ertholmene and Bornholm as well as the South-Easternmost part of Skåne and, within days, the German island of Rügen and the coasts of mainland Germany and Poland.

Day 2: There is a North-Eastern strong breeze and rains in the area throughout the second day after the collision.

Day 3 to a couple of weeks: In the morning of day 3 the winds slow down to a moderate breeze from the same direction (North-East) and the rain stops.

The fire on the passenger vessel: The Captain sends a distress signal and orders evacuation of the ship at 5.20 AM. 1500 passengers are evacuated in lifeboats within two hours while 150 injured passengers remain on board while about 50 passengers are missing, some of whom are reported to have jumped into the sea in panic. The RITS-force (Rescue Response at Sea/Maritime Incident Response Group) based in Karlskrona (about 25 nm North-West of the collision site) arrives at 7.50 AM and re-initiates firefighting operations together with the crew. With the help of additional RITS-forces the fire is completely extinguished at 11.00 AM and the ship is subsequently towed to the port of Karlskrona.

The oil spill: The weather conditions during the first and, especially, the second day hamper the efficiency of cleanup operations. When conditions improve at 9 AM the third day, i.e. 52 hours after the collision, the main bulk of the oil remains at sea and has at this time already hit the islands of Ertholmene and the North-Eastern coast of Bornholm. Cleanup operations can be expected to take weeks (cf. Fu Shan Hai 2003) and full recovery of affected shores up to a few years (Svenska Miljöinstitutet 2007).

The damaged oil tanker: The oil tanker initially stays afloat but the bow is gradually sinking. Abandoning the vessel in lifeboats, the crew is picked up by other ships in the area. At 1.30 PM of day 1, the oil tanker sinks completely.

Administrative consequences

Warning / time for preparation

No warning time.

Duration

The distress signal is sent and evacuation starts at 5 AM in the morning. The fire is extinguished six hours later, and the rescue operation as such is considered terminated. The oil spill and the clean-up operations are ongoing for another 3-4 weeks.

Affected areas

Denmark (Bornholm) is hit by the oil slick/spill and possibly also the Swedish provinces of Skåne and Blekinge as well as North-Eastern Germany and North-Western Poland. The ferry accident would, in different ways and to various degrees, affect the residential municipalities of the passengers.

Affected sectors

The accident would have a number of short-term and long-term consequences. Given that the immediate priority would be to save lives, the oil spill would be secondary in terms of rapid response (even considering the fragile wildlife) and could therefore have more severe consequences than if it had not occurred in combination with a ferry accident.

An accident at sea of this unprecedented character and magnitude would require a response from the Swedish disaster management system at all levels (municipalities, county councils/regions, non-governmental organizations, government agencies, central government) and across sectors (Search and Rescue - SAR, oil remediation, health care, social services etc.). In addition, these responses would need to be coordinated with Danish, German and Polish interventions. Simultaneous crisis management of a burning passenger vessel and a leaking oil tanker implies particular challenges for communication; especially command and coordination of available resources (cf. SkagEx11, Evaluation Report)[1]. In accordance with the Swedish system, corresponding operations (SAR and oil remediation) would involve two different incident commanders.

Need for cooperation and coordination

There would be a clear need for cooperation and coordinated crisis management concerning the oil spill (Denmark, Germany and Poland) as well as the fire on the passenger vessel. The volume of the spill exceeds the current maximum (10 000 tons) that the Swedish Coast Guard is capable of fighting with national resources (Swedish Coast Guard 2011). The ferry accident would require co-operation with various Polish agencies given the nationalities of the passengers. However, it should be noted that the collision site is geographically closer to Denmark, Germany and Poland than the locations of some specialized Swedish resources (e.g. RITS-forces). Moreover, Polish citizens constitute one of the largest groups of immigrants in Sweden (as of 2011) which means that a significant number of the Polish passengers may be residing and working in Sweden.

1 According to the SkagEx 11 evaluation, the following weaknesses were displayed by the exercise: inadequate horizontal as well as vertical information sharing; absence of a common operational picture; lack of a joint system for prioritization, registration and identification of evacuees and casualties; and lack of shared systems or registers of available resources.

Consequences/cascading effects

Human impacts

The accident would lead to immediate fatalities as well as injuries among the passengers and the crew of the ferry. Exposure to crude oil through evacuation in oil-infested waters may lead to instant and long-term health problems, e.g. among people who suffer from asthma.

Economic and environmental impacts

The accident would have severe environmental impacts on oil stricken islands and coastal areas.

There are bird reserves and other nature reserves in the oil threatened areas.

The oil spill could affect industrial fishing.

The accident and oil remediation efforts could complicate other sea traffic given that the waters where the collision occurs are among the busiest of the Baltic Sea.

Political / social impacts

The accident could have social impacts in terms of anxiety among victims, their families and the general public as well as public outrage against the government, not least considering that the risk of major oil spills and passenger ferry disasters in the Baltic Sea are not unknown and that, viewed separately, the disasters involved in the scenario have happened before although on a different scale.

Swedish democracy, nor the international position of the country are likely to be undermined as a consequence of the accident. However, depending on the overall performance of the authorities involved, it could intensify calls for improved domestic as well as international crisis management systems.

The scenario does capture at least some necessary preconditions in order to assess cross-border impacts and the need for international assistance in dealing with this kind of incident. The collision site is located in a sub-region where the estimated risk of en-route collisions is relatively high according to the BRISK project[2]. However, an oil spill of 8 000 tons, as originally prescribed, is within the national handling capacity estimated by the Swedish Coast Guard (though weather conditions may reduce this capacity).

The ferries that the scenario may refer to – enjoy high standards of fire protection and the crew routinely performs joint fire emergency exercises with the RITS-force of Karlskrona in 2011. While a rapidly progressing fire may seem unlikely from a strictly technical viewpoint, it could still happen due to the human factor.

2 BRISK was an EU Strategy for the Baltic Sea Region (EUSBSR) flagship project 14.2, defined and implemented under the EUSBSR Priority Area 14 (of the EUSBSR Action Plan version 2009).

Scenario 6:
NUCLEAR ACCIDENT

Geographical location
Place of accident is Loviisa Nuclear Power Plant, Finland. A large number of countries will be affected, see figures 3 and 4.

Time
The time of accident is in the winter.

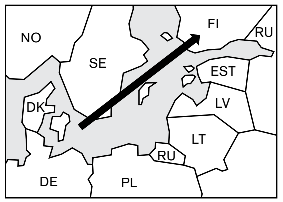


Figure 1. Low pressure area with a strong winter storm enters Finland after passing over the southern parts of the Baltic Sea region. The storm lasts one day.

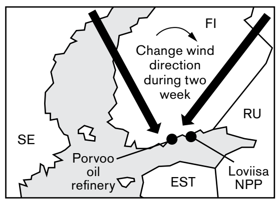


Figure 2: The wind changes rapidly and brings cold high pressure air from the north.

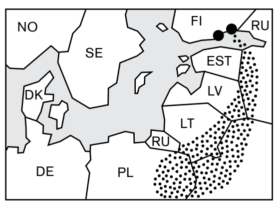


Figure 3: Approximate area affected by the radioactive cloud at three-four days after the release start.

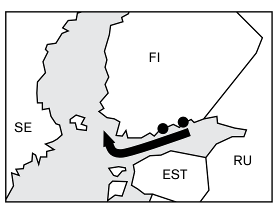


Figure 4: Movement of radioactive substances released directly to the sea.

Accident is caused by an extreme winter storm, leading directly and indirectly to failures in multiple safety systems at the Loviisa power plant. The storm damages the national transmission power grid, creating a long-term (several days) electrical blackout in southern Finland. The storm also affects the combustion air intake of the emergency diesel generators and cooling air intake of air cooled safety equipment at the power plant. In addition, an oil leakage from the Porvoo oil refinery causes a hazard of water intake.

As a consequence of the power shortage, problems with the emergency diesel generators and water intake hazard results in loss of the cooling of nuclear fuel. The fuel heats up and finally melts. When the fuel is overheated or molten, radioactive substances are released from the plant, causing a severe reactor accident. This leads to the loss of the leak-tightness of the reactor, and radioactive substances are released to the environment.

About 0.1 % of the reactor inventory of radioactive material is released, mainly consisting of volatile fission products such as iodine and noble gases.

January 10: Extreme winter storm in Finland caused by an extended low-pressure area in the Baltic Sea region. The route of the low-pressure area is from Denmark towards the Kola Peninsula (Fig. 1).

- In southern Finland and in the northern parts of the Gulf of Finland the wind is first in the southwest but turns to blow from the west.
- Wind speed exceeds the design basis of the main power transmission lines (> 39 m/s in three-second gusts).
- High (> +2 m) sea water level in the Gulf of Finland.
- Heavy snow fall (wet snow, precipitation > 100 mm/day in water).
- Temperature around zero.
- Just after the storm there is no ice in the Gulf of Finland.

January 11 to a couple of weeks: After the heaviest storm (1 day from its beginning) the temperature decreases rapidly in a day or two below -20 °C because of a large high-pressure area approaching from the west that brings cold air (Fig. 2) from the north.

The high-pressure area moves very slowly and stays over southern Finland and near-by area about two weeks.

- The wind turns to blow from the northwest and then it changes gradually so that at the end of the period it blows from the south-southeast or east.
- The wind speed is very low during the first four days after the storm.
- Sea ice is rapidly forming because of decreasing air temperature.

January 25 and onwards: The weather situation in Northern Europe and throughout the Baltic Sea area gradually normalizes i.e. interchanging moderate low and high pressures with accompanying rain/snow or sun. The overall effect is that all of the possible released gas will disperse and cover more areas but will also dilute.

Administrative consequences

Warning / time for preparation →

The strength of the winter storm comes as a surprise to the meteorologists. Necessary warnings are not given. After the accident, notification is sent to neighbouring countries as well as to International Atomic Energy Agency IAEA. Recommendations to stay indoors, as well as intake of iodine tablets are given to the population living close to the power plant. International recommendations indicate that some areas should be evacuated due to the increased exposures to radioactivity. In addition to immediate radiation doses to the population, radioactive contamination of a larger area, economical and social consequences also arise.

Duration →

The accident at the plant will last for weeks (cf. Fukushima). The accident will have consequences for years (cf. Chernobyl)

Affected areas →

Most countries in the region will be affected, including Belarus and the Russian Federation. There will be a need for coordination across different administrative units:

- Municipalities
- Regions
- Countries

Affected sectors →

There will be cross-sector issues that will have to be dealt with. Examples:

- **Health:** Hospitals in the vicinity of Loviisa will be inaccessible or unusable. People will have to be treated due to radiation. There will be a need for distribution of medicines to affected areas (also outside Finland). A surge of people seeing doctors and hospitals.
- **Critical infrastructure:** Closing of Loviisa will have some impact on the production of electricity, but the impact on critical infrastructure will probably be limited.
- **Goods and services:** Due to fear of radiation and advice from authorities people in affected areas will not attend work. This will affect schools, kindergartens, social welfare and health institutions. There could also be halt in production and distribution of food and other goods. There will be a need for distribution of clean water. Long term consequences for production of food in some regions.
- **Transportation:** Some areas might be closed due to contamination. There could be lack of work force, stopping public transportation.
- **Emergency management:** Need for coordinating the evacuation in and around Loviisa, the cleaning up phase (short and long term) and managing help from abroad.
- **Law and order:** Areas around Loviisa temporarily inaccessible for the police and other types of governmental authorities due to contamination.
- **Information:** Strong need for coordinating information to the affected population, neighboring countries, the media etc.

Need for cooperation and coordination →

A nuclear accident will create a need for cooperation and coordination. Finnish national authorities will have to coordinate and distribute information to affected regions and countries. The accident will probably require international assistance to Finland and other affected countries. This will require multinational coordination. This point will have to be addressed in the risk assessment.

Consequences/cascading effects

Human impacts

The accident will lead to deaths, possibly also direct fatalities at the plant. Long term the accident will create a large number of sick people, primarily due to cancer. It will also lead to premature deaths.

A large number of people will be permanently displaced from the vicinity of the plant.

Economic and environmental impacts

Highly-volatile and gaseous radioactive materials are firstly transported airborne towards Russia and eastern Estonia, and later all over the Baltic Sea region (the amount of the released material into the air and sea water is approximately the same as in the Fukushima accident). A large area will be deemed unusable for a period, both for living, farming, husbandry etc.

There will be large economic costs for national authorities in Finland and other countries, for individuals and for companies/businesses. There will be large economic costs in the emergency phase and later for securing the plant to avoid further dispersion. The government will have to pay compensations to individuals and professionals. There will be insurance pay-outs, long term health costs both in Finland and abroad.

Political / social impacts

The political impact will probably be limited and the accident will not have consequences for the democratic system.

In terms of social impact the consequences could be significant, creating anxiety and creating public outrage against the government.

The international position of Finland would be undermined as a consequence.

Notes

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EUSBSR Flagship Project 14.3 – Nanna Magnadóttir – Gertrude Opira (14.3 Task A Project Management CBSS Secretariat)

Fourteen Point Three Notebooks Edited by
Egle Obcarskaite – Anthony Jay Olsson (14.3 Task B CBSS Secretariat)

Visual
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