Flooding in the Gulf of Finland – January 2005

RAIN Workshop

Critical Infrastructure Safety in the Context of Climate Change

Delft

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Aims of this presentation

- Identification of the most probable extreme affects caused by flooding of 2005 at the Gulf of Finland.
- Analysis of risk to critical infrastructure for single events and cascading effects.
- Describing the societal, security and economic impacts of critical infrastructure failures.
- Identification of lessons learned and response strategies that can mitigate risk to critical infrastructure.

Flooding 2005 at the Gulf of Finland

- The severe gale in the Northern Baltic took place on January 7th, 2005. A violent storm formed over the British Isles and moved east to central Finland.
- Several countries were affected by the violent storm including the United Kingdom, Norway, Denmark, Sweden and the Baltic countries.
- The highest winds occurred south of Finland and the biggest problem was the rise in sea level, which was as much as +197cm in Hamina.

7th January 2005

- The early warning indicators notified that the sea level will get high in next 48h.
- Severe flooding in Finland, Estonia and Russia was predicted.
- In Finland critical moments were in Helsinki and Loviisa, but the situation was managed quite well due early weather data.
- Estonian government was struggling with response in Haapsalu, Saaremaa and Viimsi.
- Situational awareness was rather incoherent.
- The flood affected also the Russian coast.
- Resulted to more systemic response, planning and streamlined CM system in Finland and Estonia.

- On 7 January the Finnish Institute for Marine Research (FIMR) received weather forecasts showing a very strong winter storm approaching Southern Finland.
- Operational wave and sea level model forecasts were checked by the FIMR staff and they showed that something unusual may happen at sea. The comparative analysis of both Finnish and foreign models were conducted.
- The FIMR began to analyze the situation as model results differed considerably from each other. For example, for Helsinki the highest model forecast was +240 cm and the lowest + 95 cm.

- A forecast for the sea level in the Gulf of Finland was made based on model results and an assessment of the situation.
- The man-made forecast stated that the sea level might rise by up to +150 cm in Helsinki where the previous record was +136.
- Furthermore, the forecast stated that the duration of the flood will be unusually long lasting for several hours and will include two peaks.

- A storm with winds of 25 m/s was forecasted for Saturday-Sunday night for southern and southwestern Finnish sea areas and high winds for land areas.
- Waves reached heights of up to 8 meters and there was a significant sea level rise in the Gulf of Finland by the evening of 8 January.
- The wind will be more than 25m/s with gusts of almost 30m/s.

“The southwest wind will become stormy on southern and southwest sea areas. On the North Baltic Sea as well as on the Gulf of Finland the wind will blow around 25m/s. The wind will become dangerously strong in the land areas of the southern parts of the country until Sunday. Rain will reach Southwest Finland on Saturday afternoon and rainfall is in places predicted to be over 20mm in the night between Saturday and Sunday.”

- Large-scale flood and storm damage was avoided, but water cut off roads and traffic in the coastal areas.
- Traffic was cut off in many places in Helsinki region. Routes that were partly cut off included Kehä I in Otaniemi as well as intersection of Kehä III and Itäväylä.
- Traffic in Pohjoisranta and Pohjois-Esplanad was also cut off. Water closed roads throughout the coastal region.
- The wave height was almost a record on the North Baltic Sea, where the significant wave height was 7.2m at its maximum. The record is still 7,7m, measured during the Rafael storm before Christmas 2004.

Nuclear Plant in Loviisa

- The nuclear power plant in Loviisa was observing the rise of sea level and was preparing to shut down the reactors.
- According to security code of conduct, preparation should be started if the sea level rises over 1,75 meters.
- At Baltic Sea following sea level measurements: Turku +130 cm (earlier record +127cm), Hanko +132 cm (+123 cm), Helsinki +151cm (+136 cm), Hamina +197 cm (166 cm) and St Petersburg +239 cm.
- Highest level in Hamina was measured as 198cm. That created rescue measures for the households.
- In Pärnu (Estonia) the flood waters reached record high 295cm and sea shore moved 2km towards inland.

Flooding 2005 - case study

- Qantitative data collected and weather data
- Media review (Finland, Sweden, Estonia)
- Qualitative data i.e. interviews of stakeholders and emergency responders
- Tactical/operational assessment (response)
- Political/strategic assessment (decisions)
- Legal and intergovernmenal framework
- First draft ready by end of April

Serious challenges

- Unlimited number of scenarios
- Fragmented/sectoral SITCEN
- Lack of up-to-date standardized metadata
- Insufficient communications and inter-connectivity in a multi-enclave environment
- Public sector resistance/lack-of-trust to adapt new methods and learn from ”outside”
- Technology driven ”reforms” often hindering intra-organizational evolution

Questions remaining

- Whether the national crisis management systems should be based on centralized or specialized model?
- Role of first responders, i.e. citizens, still an unused resource?
- Why recognised & forwarded signals often lead to wrong or untimely response?
- Complex & dynamic situations - how to avoid information overload & task complexity?

Thank you!

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