

## SNOW AVALANCHES AND ACCOUNTABILITY – EXAMPLES FROM SVALBARD, NORWAY

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**ABSTRACT:** Nation states and local authorities involved in disaster risk reduction decision making are increasingly faced with the legal consequences of their decisions prior to or following a destructive event. In recent rulings, other actors, such as geoscientists involved in the decision making process, have also been found legally accountable. The rulings have triggered an interdisciplinary dialogue on the roles and responsibilities of those involved in decision making in the face of a disaster. We discuss legal accountability following two destructive slab avalanches that occurred within 14 months in the community of Longyearbyen, Svalbard, Norway. The first avalanche struck on 19 December 2015, resulting in two fatalities and the destruction of 11 residential buildings. On 21 February 2017, a second avalanche destroyed two additional apartment buildings which were home to more than 25 people. This avalanche did not result in any fatalities. We introduce these two examples from Svalbard and describe the meteorological and snowpack data available prior to the events. We discuss the decisions made and their possible legal consequences. Furthermore, we explain how the two avalanches have led to increased integration of theoretical expertise in the local avalanche forecasting program. Finally, we consider the accountability issues that might arise for geoscientists given their evolving role in the decision making process. The case study contributes to the ongoing dialogue on accountability of different actors involved in hazard forecasting programs and risk reduction decision making. Our work highlights the benefits and challenges associated with integrating an interdisciplinary approach (legal, scientific and operational) for avalanche risk reduction measures and procedures.

**KEYWORDS:** Avalanches, accountability, risk-management decision making, disaster risk reduction.

### 1. INTRODUCTION AND BACKGROUND

Until the late 20<sup>th</sup> century, disasters were considered acts of God which could occur without any significant chances of avoiding their consequences. Less attention was given to the fact that some natural hazards become disasters while others do not (Weichselgartner, 2015). Recent decades have brought about a fundamental change in how disasters are understood. This has led to the now widely accepted understanding that disasters are a 'social phenomenon' that can be controlled and avoided, at least to a certain extent (Lauta, 2012; Weichselgartner, 2015). Along with this development, the question of who should be legally responsible for implementing appropriate and timely risk reduction measures to avoid disasters has arisen. National and local authorities responsible for reducing risk have been held legally accountable

for failing to make correct and timely decisions in a disaster's aftermath (Binder 2016; Scarwell, 2017; Raju and Da Costa, 2018). At the European level, the 2008 judgment of the European Court of Human Rights (ECHR) in the case of *Budayeva and others vs. Russia*, serves as an example.

In order to improve risk-management decision making, both national and local authorities increasingly implement theoretical and practical expertise in their risk-management programs (Dolce and Di Bucci, 2015). Despite a steady development towards the integration of scientific knowledge, disasters continue to occur.

In this context we discuss two avalanches that occurred in the community of Longyearbyen, which is located in central Spitsbergen in the archipelago of Svalbard, Norway. The first avalanche struck on 19 December 2015, resulting in two fatalities and the destruction of 11 residential buildings. The event led to an investigation into whether criminal negligence had occurred prior to the avalanche. On 21 February 2017, a second avalanche destroyed two additional apartment buildings, which were home to more than 25 people. The avalanche did not result in any fatalities and has not led to a legal action. The

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2017 event has, however, triggered a dialogue on how to improve the integration of theoretical and operational expertise in the risk-management decision making process and refine the roles and responsibilities of different actors who contribute to risk-management in the community.

## 2. THE 2015 AVALANCHE

On 19 December 2015, a slab avalanche released from Sukkertoppen Mountain (hereafter Sukkertoppen) above the neighborhood of Lia in Longyearbyen, Svalbard. The snowpack data available prior to the 2015 avalanche entail a total of six snow profiles shared on regObs, a crowd-sourced observation platform operated by the Norwegian Water Resources and Energy Directorate (NVE). The profiles indicate the thin early-season snowpack consisted of well-developed basal facets underlying a crust-facet-crust sequence topped by thin wind slabs.

Weather forecasts and warnings for a major winter storm across central Spitsbergen verified in the 48 hours prior to the avalanche event. Strong easterly winds approaching 30 m/s were experienced near Longyearbyen and 18.1 mm of precipitation was recorded at the Svalbard Airport – all of which fell as snow. These strong winds and heavy snowfall resulted in storm snow accumulations in excess of 2 m on the Sukkertoppen slope above the Lia neighborhood. The storm snow load overburdened the existing weak snowpack, and the avalanche released on a layer of facets sandwiched between melt-freeze crusts. Further event documentation can be found in Hancock et al. (2018) and Jaedicke et al. (2016).

The lack of an active avalanche forecasting service in Longyearbyen severely limited available operationally-relevant snowpack data. The Norwegian Geotechnical Institute (NGI) had undertaken numerous hazard assessments in the community and established evacuation routines prior to the 2015 avalanche on a contractual basis (Hestnes et al., 2016). Based on their own assessments, NGI had in its reports to the local authorities recommended various risk reduction measures to be implemented in Longyearbyen (e.g. Hestnes et al., 2016). Even with NGI's recommendations, neither active avalanche forecasting service nor long-term risk reduction measures had been continuously implemented in Longyearbyen prior to the 2015 avalanche, despite the well-documented and recognized hazards.

The lack of an avalanche forecasting service or formalized hazard assessment routines contrib-

uted to failure to adequately warn residents and evacuate endangered infrastructure.

Some of the residents that survived the avalanche have furthermore argued that they were not aware that they were residing in an avalanche hazard zone to begin with (NRK, 2018).

## 3. THE 2017 AVALANCHE

In the aftermath of the 19 December 2015 avalanche, a local avalanche forecasting program was formally established in the community, first on a contractual basis by NGI and then overtaken by NVE (Jaedicke et al., 2016, Landrø et al., 2017). Similarly, evacuation routines were better defined and employed, leading to the evacuations of the neighborhood below Sukkertoppen, on several occasions between the 2015 and the 2017 avalanche.

With regular observation routines established as part of the NVE's operational forecasting program for the 2016-2017 winter, more readily available snowpack data existed prior to the 21 February 2017. Snow profiles taken in the week prior to the avalanche show that positive air temperatures and rain at most elevations near Longyearbyen formed a thick melt-freeze crust capping deeper instabilities. Soft-slab avalanches ran on a thin layer of facets sitting on this crust during light snowfall in the 72 hours before the destructive avalanche, with up to 20 cm of snow available for transport observed in Longyearbyen on the evening of 20 February 2017.

During the night of 20-21 February, winds increased from the east-northeast, readily transporting the new snow onto lee aspects.

On the morning of 21 February, the regional avalanche hazard rating was increased to HIGH due to strong winds and snowfall. Accurate hazard assessments for the upper start zone from which the avalanche released were precluded by a lack of operationally relevant snow depth data for this location. As no avalanches had previously been observed to release from the upper start zone, hazard assessments were based on field observations in the lower release area where considerably less snow had accumulated and failed to account for unexpectedly large accumulations further up the slope (Landrø et al., 2017).

The avalanche released on the faceted weak layer and ran on the melt-freeze crust (Landrø et al., 2017; Hancock et al., 2018), destroying two apartment buildings. No warning had been issued to the residents, who continued to reside in the hazardous zone when the avalanche released.

## 4. DISCUSSION

### 4.1 *Legal context and consequences*

The two avalanches have triggered questions of legal accountability. If it is generally accepted that disasters can to some extent be avoided, then the legal responsibility to take measures to prevent disasters lays with someone. Likewise does the legal accountability if those necessary measures are neglected.

The roles and responsibilities of the Governor of Svalbard and the Longyearbyen Community Council (LCC) in relation to crisis management and disaster preparedness, are well established in Norwegian law (c.f., Royal Decree of 19 June 2015 Instructions for the county governors' and Governor of Svalbard's work relating to civil protection, emergency preparedness and crisis management and regulation from 18 December 2012, on the application of the Civil Protection Act in Svalbard). Svalbard's complex sociopolitical history has however, certainly affected its legal development in addition to the development of the town's infrastructure and governance. Svalbard has special status under both international and Norwegian law (Rossi, 2016; Norwegian Ministry of Justice and Public Security, 2016). Similarly, the local governance of Longyearbyen has unique roots, having long been administered by a Norwegian coal company, Store Norske Spitsbergen Kulkompani AS, as the town evolved around coal mining. Only in the last three decades has the local governance increasingly ceded to the Norwegian government, represented by the Governor of Svalbard and a local democratic body, Longyearbyen Community Council (Hisdal, 1998; Grydehøj, 2014).

While Svalbard's unique roots might have complicated its development of disaster risk-management infrastructure, it is established that the European Convention on Human Rights is applicable in Svalbard, (c.f. Art. 5 of the Norwegian Human Rights Act from 1999; n. Lov om styrking av menneskerettighetenes stilling i norsk rett av 1999). The rulings of the ECHR, including *Budayeva and others vs. Russia* from 2008, therefore become relevant for national and local authorities in Longyearbyen. (See also *Öneryildiz vs. Turkey*, 2004; *Kolyadenko and others vs. Russia*, 2013 and; *Ozel and others vs. Turkey*, 2015).

In the *Budayeva* case, the ECHR found Russia's negligence to implement essential mitigation measures to be a direct cause of loss of life and property when numerous mudslides struck the town of Tyrnauz in central Caucasus between 18-25 July 2000.

The court concluded that Russian authorities had failed to implement essential mitigation measures such as warning the residents living in the hazardous zone and evacuating them during periods of elevated hazard.

Even though the events of the *Budayeva* case differ somewhat from those in Longyearbyen (no investigation was undertaken into potential criminal negligence of the Russian authorities), the judgment of the ECHR sheds a different light on the investigation that took place in Longyearbyen after the 2015 avalanche. The investigation was undertaken into the potential criminal negligence of the Governor of Svalbard, the Longyearbyen Community Council, and Store Norske Spitsbergen Kulkompani AS, which owned the buildings destroyed in the avalanche. The investigation was initiated by the Governor's office itself, but undertaken by the Regional Prosecutor (n. statsadvokaten) who decided to dismiss the case. The parents, who lost their two year old daughter in the avalanche, appealed the dismissal of the case to the Director of Public Prosecutions (n. riksadvokaten) who in turn concluded the case should be investigated further by the Norwegian Bureau for the Investigation of Police Affairs (n. spesialenheten for politisaker). Their final outcome confirms that the LCC had at their disposal reports establishing slope hazards in the neighborhood of Lia, while it describes that the Governor had limited information on slope hazards and the central (national) authorities had not prioritized providing the local authorities in Svalbard with professional forecasting of slope hazards. It goes on to explain that based on experience, only small slides that would not reach the Lia neighborhood had been expected and that there was no known or concrete indication of a particular avalanche risk prior to 19 December 2015. The ruling states that LCC's main responsibility for hazard assessments was linked to the construction of new buildings and that the buildings that were destroyed in the avalanche, had been built before previous owner, Store Norske Spitsbergen Kulkompani AS, knew of the disaster risk. The Norwegian Bureau for the Investigation of Police Affairs found no criminal liability could be proven and that the actions did not establish grounds for imposing penalties for the investigated actors (c.f., Case no. 727/16 – 123 of 1 November 2017).

While the decisions made prior to the event did not constitute a criminal act, the barriers for a civil law compensation claim are generally lower. The parents have also claimed compensations for the death of their daughter and for loss of income in the aftermath of the event (NRK, 2018). The status or outcome of the compensa-

tion claim is however not currently known to the public.

#### 4.2 Integration of theoretical expertise

Although the 2017 avalanche has not led to any known legal action, it has triggered rapid improvements to the risk-management structure in Longyearbyen. Numerous permanent disaster risk reduction measures have already been implemented or are underway (Sysslemannen, 2016), including the installation of snow avalanche fences above the area in which the 2015 avalanche struck. Geoscientists and experts with operational backgrounds have been actively involved in advising the local authorities in the process. An academic institute, the University Centre in Svalbard (UNIS) is in the process of taking over the management of observations for the local avalanche forecasting system for the winter 2018-2019. Additionally, snow depth and avalanche occurrence terrestrial laser scanning data, initially collected for research purposes, was used in the development of a new hazard zonation map (Gundersen et al., 2018) and began to be used for forecasting as well.

The increased integration of theoretical expertise in risk-management decision making has raised questions in relation to the role of science and legal accountability of scientists in the decision making process. Scientists who contribute to risk-management decision making processes, by sharing their expertise of potential risks of natural hazards have, in some jurisdictions in Europe, been held personally, legally accountable (Prats, 2012, Alemanno and Lautu, 2014; Simoncini, 2014, Binder, 2016). The case law identified from mainland Norway, indicates, however, that Norwegian law places the legal responsibility solely on local and national authorities, even though prior to the decision making, the authorities enjoyed the assistance of scientists (c.f., RG 2006:107).

This is in line with a recent study, in which ten experts, including geoscientists, who contribute to risk-management decision making in Longyearbyen, were interviewed about their perceptions of their roles and responsibilities. The findings indicate most of the experts perceive their roles and responsibilities to be relatively clear and known to them. Furthermore, the majority of the experts do not expect that they can be held personally, legally accountable for their contributions to risk-management decision making. Those who perceived their legal situation as more obscure were either not employed in risk-management positions (such as academics who are informally asked for an advice or opinion),

and experts undertaking contractual based consultancy work (Gunnarsdóttir, 2018).

Similar conclusions can be drawn from the criminal investigation that occurred in the aftermath of the 2015 avalanche in Longyearbyen. The investigation focused solely on the Governor, the LCC and Store Norske Spitsbergen Kulkompani AS. Its conclusion implies that it would be unlikely that an expert, advising the authorities, would be found responsible, given that the case against the authorities themselves, who have a clearly established mandate according to law, has not brought about legal consequences. Additionally, the conclusion of the criminal investigation refers to the measures taken (or neglected) by 'the employees' and 'persons' (c.f., Case no. 727/16 – 123 of 1 November 2017) of the authorities that were under investigation, thus shifting the focus from the potential criminal action or negligence of a specific employee to a collective, impersonal notion of the agency itself. This is a fundamentally different approach than can be seen in many European jurisdictions in which scientists and decision makers are personally held legally accountable.

#### 4.3 The way forward

The legal actions undertaken after the 2015 avalanche illustrate that the framework in which the local authorities operated, were not sufficient at the time of the event. While the risk-management structure in Longyearbyen has undergone a rapid development since 2015, numerous experts interviewed in 2018, still expressed their concerns in relation to the risk-management framework. The explained how roles and responsibilities between the different actors operating within the system could be better defined and that failure to do so, could potentially affect the efficiency and quality of risk-management decisions made in time-strained environment (Gunnarsdóttir, 2018).

With an increasing number of actors involved in the decision making process, it becomes even more important to address and define the issue of roles and responsibilities, including legal accountability (Dolce and Di Bucci, 2015). Further research is moreover needed to assess scientist's legal status as employees with the various public, private and academic entities in which the scientists contributing to disaster risk reduction decision making are employed.

## 5. CONCLUSIONS

The relatively recent understanding that risk of disasters can be avoided or reduced has raised questions on who should have the role to implement measures to prevent disasters and be

legally accountable when a disaster occurs. This paper described two avalanches that struck the community of Longyearbyen, Svalbard. The avalanches are discussed in relation to the potential legal accountability of the local authorities. Moreover, legal accountability of other actors that contribute to risk reduction decision making, as theoretical and operational expertise is increasingly integrated into decision making, is assessed. With an increasing number of actors contributing to the decision making process in Longyearbyen, it is important to refine and assess roles and responsibilities, including legal accountability, to ensure efficient and timely risk-management decision making.

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