Social dimensions of volcanic hazards, risk and emergency response procedures in southern Iceland

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Contents

Abstract

The Katla volcano in southern Iceland is one the most hazardous in the country. Frequent, destructive eruptions producing catastrophic jökulhlaup (glacial outburst floods), tephra fall and lightning hazards pose a serious risk to many local communities. Extensive geological and geophysical research details the current state of Katla and provides insights into past eruptive episodes but only one study, conducted with residents from two communities in 2004, had assessed Katla with respect to the local population. In order to develop successful risk mitigation strategies however, emergency management agencies must consider the hazard in conjunction with the varying factors affecting the society at risk.

As a result, this research explores some of the social dimensions of hazard, risk and emergency response procedures in relation to Katla. The aim of the research is to provide a social framework for disaster risk reduction by offering an in-depth social assessment to complement the physical. Using mixed methods research, the study incorporates field observations during evacuation exercises, semi-structured interviews with emergency management officials and residents, and structured questionnaire interviews with residents, tourists and tourism employees.

The research shows that each stakeholder group is inherently different and volcanic risk mitigation strategies need to be structured accordingly. Recent efforts which culminated in full-scale evacuation exercises in 2006 did not take this into consideration. On a practical level, these exercises indicated that most residents would respond positively to evacuation orders. At a conceptual level however, this research identified many contextual issues, (e.g. knowledge and perception of hazard and risk, level of trust) which affect people's ability to adopt the recommended protective action. In rural communities, emergency management agencies need to consider local knowledge, livelihood connections and attachment to place in order to develop effective mitigation strategies. Within the tourism sector, emergency management agencies must ensure that education campaigns raise awareness of hazard, risk and emergency response procedures. Significant effort is still urgently needed to address disaster risk reduction in southern Iceland as Katla is thought to be in a heightened state of activity and an eruption, without prolonged precursory signals, is expected in the near future.

Útdráttur

Katla er ein virkasta og hættulegasta eldstöð Íslands. Íbúum í nágrenni Kötlu og ferðamönnum stafar hætta af gosi í eldstöðinni vegna hamfarahlaupa, gjóskufalls og eldinga. Viðamiklar jarð- og jarðeðlisfræðilegar rannsóknir hafa verið gerðar á Kötlu, en þrátt fyrir þá hættu sem fólki stafar af henni hefur til þessa aðeins ein rannsókn verið gerð um áhrif Kötlu á íbúa.

Til þess að hægt sé að móta skilvirkar viðbragðs- og rýmingaráætlanir vegna náttúruvár er nauðsynlegt að skilja skynjun fólks og þekkingu á náttúruvá og hvernig það muni bregðast við aðsteðjandi hættu. Sú rannsókn sem hér er kynnt tekur heildstætt og ítarlega á hinum félagslega þætti og er ætlað að vera viðbót við þá þekkingu sem er til staðar á Kötlugosum og áhrifum þeirra. Markmiðið er að draga úr þeirri hættu sem fylgir gosi í Kötlu.

Beitt var fjölbreytilegum aðferðum. Í almannavarnaæfingunni Bergrisanum árið 2006 var beitt þátttökuathugun, tekin viðtöl við stjórnendur neyðar- og björgunarmála sem og íbúa og loks voru lagðar spurningar fyrir íbúa, ferðamenn og ferðaþjónustuaðila.

Niðurstöður rannsóknarinnar sýna að þekking og viðhorf íbúa á náttúruvá tengdri Kötlu og hvernig þeir myndu bregðast við hættunni er breytileg eftir hópum og þarf því að taka tilliti til þess við hönnun viðbragðsáætlana. Það var ekki gert fyrir æfinguna árið 2006. Rannsóknin bendir til þess að flestir íbúar myndu bregðast jákvætt við tilskipunum um rýmingu svæðisins en þó hafa margir samverkandi þættir áhrif á það hvort þeir sjái sér fært að fylgja ráðleggingum um varnarviðbrögð. Til að viðbragðsáætlun verði skilvirkari er því nauðsynlegt fyrir stjórnendur neyðar- og rýmingaráætlana að leita samvinnu við bændur, taka tillit til staðbundinnar þekkingar þeirra og hversu tengdir þeir eru við búskapinn og staðinn sem þeir búa á. Mikilvægt er að skipuleggjendur neyðaráætlana tryggi að miðlun upplýsinga og fræðsla til ferðamanna og ferðaþjónustuaðila skili sér í aukinni þekkingu á hættu og neyðarviðbrögðum vegna Kötlugosa. Brýn þörf er á úrbótum svo hægt verði að draga úr áföllum og hættu vegna náttúruhamfara á áhrifasvæði Kötlu því margt bendir til þess að hún gjósi í náinni framtíð og að gos geti hafist með skömmum fyrirvara.

Candidate's statement

I certify that the research in this thesis entitled 'Social dimensions of volcanic hazards, risk and emergency response procedures in southern Iceland' has not been previously submitted for a degree nor has it been submitted as part of requirements to any other university or institution other than Macquarie University and the University of Iceland.

I also certify that the thesis is an original piece of research and it has been written by me. Any help and assistance that I have received in my research work and the preparation of the thesis itself have been appropriately acknowledged.

In addition, I certify that all information sources and literature used are indicated in the thesis.

The research presented in this thesis was approved by Macquarie University Ethics Review Committee, reference number: HE26MAY2006-M04676.

This thesis is an amalgamation of five papers of which, I was the sole author on one and lead author on four. My contribution to each of the papers follows.

Chapter 2: Bird, D.K. 2009. The use of questionnaires for acquiring information on public perception of natural hazards and risk mitigation – a review of current knowledge and practice. Natural Hazards and Earth System Sciences, 9(4):1307-1325.
– Conceptual: 100%, practical: 100%, analytical: 100%, written: 100%

Chapter 3: Bird, D.K., Gisladottir, G. and Dominey-Howes, D. 2010. Volcanic risk and tourism in southern Iceland: Implications for hazard, risk and emergency response education and training. Journal of Volcanology and Geothermal Research, 189(1-2): 33-48.
– Conceptual: 100%, practical: 50%, analytical: 100%, written: 100%

Chapter 4: Bird, D.K., Gisladottir, G. and Dominey-Howes, D. 2009. Resident perception of volcanic hazards and evacuation procedures. Natural Hazards and Earth System Sciences, 9(1):251-266.
– Conceptual: 50%, practical: 65%, analytical: 100%, written: 100%

Chapter 5: Bird, D.K., Gísladóttir, G. and Dominey-Howes, D. submitted. Residents' perception of and response to volcanic risk mitigation strategies in a small rural community, southern Iceland. Bulletin of Volcanology.
– Conceptual: 25%, practical: 50%, analytical: 100%, written: 100%

Chapter 6: Bird, D.K., Gísladóttir, G. and Dominey-Howes, D. submitted. Different communities, different perspectives, different mitigation strategies? Issues affecting residents' behaviour and response in southern Iceland. Bulletin of Volcanology.
– Conceptual: 50%, practical: 50%, analytical: 100%, written: 100%

Deanne Katherine Bird
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List of acronyms and definitions[1]

EC	Emergency centre
EH	Emergency headquarters
EMA	Emergency management agencies
Eyjafjallajökull	Glacier and volcano in southern Iceland
EWIS	Early warning and information system website
ICP	Icelandic Civil Protection
Jökulhlaup	'Glacier run' meaning a glacial outburst flood
Katla	Volcano in southern Iceland
Mýrdalsjökull	Glacier in southern Iceland
Rangárvallasýsla	Municipality to the west of Mýrdalsjökull
Vestur-Skaftafellssýla	Municipality to the south and east of Mýrdalsjökull
Þórsmörk	Popular tourist destination to the north of Eyjafjallajökull and west of Mýrdalsjökull

[1] The most frequently used Icelandic terms in the thesis are listed here. Others appearing in the text are explained *in situ*.