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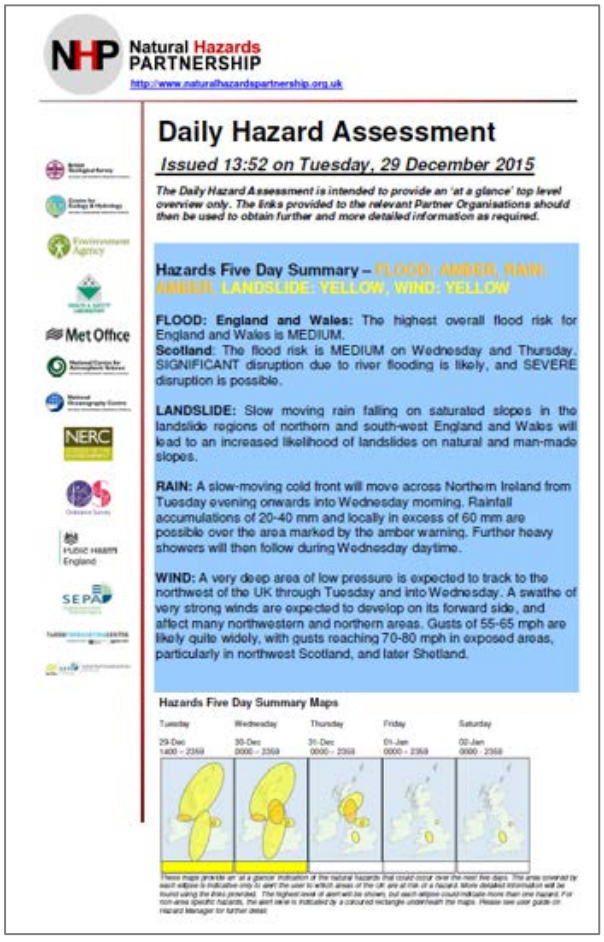
A Workshop Focussing on Communication of Hazard Assessment Information; Summary of Discussions

Engineering Geology and Infrastructure Programme

Open Report OR/18/014



BRITISH GEOLOGICAL SURVEY

ENGINEERING GEOLOGY AND INFRASTRUCTURE PROGRAMME

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A Workshop Focussing on Communication of Hazard Assessment Information; Summary of Discussions

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Foreword

On behalf of the Natural Hazard Partnership, a workshop led by the British Geological Survey and the Health and Safety Executive, was held on the 29th September 2017. The workshop was funded by the National Centre for Resilience, Scotland, and focussed on the communication of hazard assessment information to a range of end users.

This report summarises the discussions that took place during the day.

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Summary

The Natural Hazard Partnership, held a workshop on the 29th September 2017, led by the British Geological Survey and the Health and Safety Executive. The workshop was funded by the National Centre for Resilience, Scotland.

The day was used as an opportunity for the science researchers, stakeholders and the resilience community to share their views and experiences with a view to improving hazard communication.

1 Introduction

The **Natural Hazards Partnership** (NHP) is a consortium of seventeen public bodies and government departments. Since its creation in 2011 the NHP has aimed to build on existing science, expertise and services from across the partnership to deliver *useful*, *usable* and *used* natural hazard advice to governments, civil contingency and responder communities throughout the United Kingdom (UK). The NHP has established itself as the UK's trusted voice for coordinated natural hazard advice by playing a leading role in the development of frameworks and processes in support of the UK's multi-hazard planning, preparation and emergency response needs.

It is recognised that the NHP products are only useful if what is being disseminated is what is required and that it is understood by the user community. Ongoing development of models and research underpinning NHP activities means that relevance and detail of the disseminated assessments is continually changing.

2 Communication of Hazard Assessments

A remit of the NHP is to "*ensure natural hazard information is communicated appropriately and effectively, responding to user needs*". The success is reliant on close collaboration between members of the Natural Hazards Partnership (NHP); including the British Geological Survey (BGS), the Met Office (MO), the Health and Safety Laboratories (HSL) and the Centre for Ecology and Hydrology (CEH).

The Hazard Impact Modelling Group (HIMG) is specifically tasked with developing impact models to enhance the forecasting, preparedness and resilience to the effects of hazards. Impact modelling for Surface Water Flood (SWF) and Wind are already very advanced, with information being used at operational level to verify information and aid understanding of hazard assessment. A stakeholder workshop was organised with the objective of ascertaining views on the format in which information should be disseminated, and to inform future development of the Landslide HIM.

In early 2017, the HIMG comprising the organisations named above, submitted a proposal to Scottish Government to run a workshop specifically with users of the NHP Daily Hazard Assessment (DHA), a product described further in Section 3.2.3. The proposal envisaged Scottish end users of the DHA be targeted to discuss

1. The hazard information provided within the DHA
2. How information from Hazard Impact Models (HIMs) could be delivered to best serve the user
3. How hazard impact data is collated

In conjunction with gaining stakeholder views on the content and future DHA, further information was sought regarding post event practice of collection, documentation and analysis of impact data from stakeholder organisations. This is required by the HIMG to assist with verification of the impact models.

Funding was successfully secured and a joint Scottish Resilience Community/ NHP workshop was held on 29th September 2017. The remainder of this report summarises the workshop, held at the British Geological Survey Scottish Headquarters (Lyell Centre); detailing the outcomes, communication recommendations, and suggestions how to improve, develop and formalise communication pathways with the Scottish responder community

3 Workshop Review

The workshop was planned as a tool to engage with stakeholders, and continue to ensure natural hazard information is communicated to users appropriately and effectively, whilst also responding to user needs. The format and stakeholder invitations of the workshop were designed to address whether the information within the DHA is currently useful, usable and used.

A series of questions were determined prior to the workshop day to guide the discussions (see Appendix 1 for a full list). Invites were sent out across the NCR address book. Attendees on the day included n=25 representatives from;

National Centre for Resilience	Council representatives
Scottish Government	EoS RRP
Prestwick Airport	SEPA
Civil Contingency Service	University of Dundee
Scottish Fire and Rescue Service	Met Office
Centre Ecology and Hydrology	British Red Cross

3.1 INTRODUCTIONS: OVERVIEW OF PRESENTATIONS

3.1.1 National Centre for Resilience Overview

Alessia Morris of the Scottish Government gave an overview of the National Centre for Resilience (NCR).

Following severe weather experienced by Scottish communities in winter 2015, the NCR was created as a collaborative partnership bringing together resilience partners, communities and academia to enhance resilience and preparedness to natural hazards in Scotland.

NATIONAL CENTRE FOR RESILIENCE
BUILDING SCOTLAND'S RESILIENCE TO NATURAL HAZARDS

http://www.readyscotland.org/ready-government/ncr/

The remit of the NCR is to help improve understanding of the impact of both natural hazard risks and emergencies on Scottish communities, and to provide community groups with access to learning and exercising opportunities. The NCR has 6 strategic priorities:

- Improve Scotland's resilience to natural hazards such as severe weather, flooding and landslides
- Build Community Resilience across Scotland
- Contribute to the development of Scotland's Resilience Research capability on natural hazards and community resilience
- Improve the protection and resilience of Scotland's water assets and critical infrastructure
- Scope the development of innovative approaches to natural hazards training

- Exploit world class multi-agency resilience arrangements at the local level to build national resilience

The NCR has a core staffing presence at the Crichton Campus, Dumfries, formally opened in March 2016. Although having a base, the NCR operates on a network basis, involving a wide range of organisations across Scotland including:

- Scottish Government
- Met Office
- Scottish Fire and Rescue Service (SFRS)
- Scottish Environment Protection Agency (SEPA)
- Police Scotland
- Scottish Funding Council (SFC)
- Scottish Flooding Forum
- Edinburgh Centre for Carbon Innovation
- University of Glasgow
- Transport Scotland
- British Geological Survey
- Natural Hazards Partnership

The NCR receive their core funding from Scottish Government and Scottish Funding Council.

3.1.2 Natural Hazard Partnership Overview

Helen Reeves, Science director for Engineering Geology and Infrastructure, and joint chair of the Hazard Impact Modelling Group subgroup (HIMG), gave an overview of the NHP and HIMG.

Established in 2011, a collaboration of UK government Agencies and organisations (Figure 1a), NHP is already gaining international recognition as world leading. The range of innovative science, services and coordinated advice already developed and delivered by the NHP include the services outlined below www.naturalhazardspartnership.org.uk:-

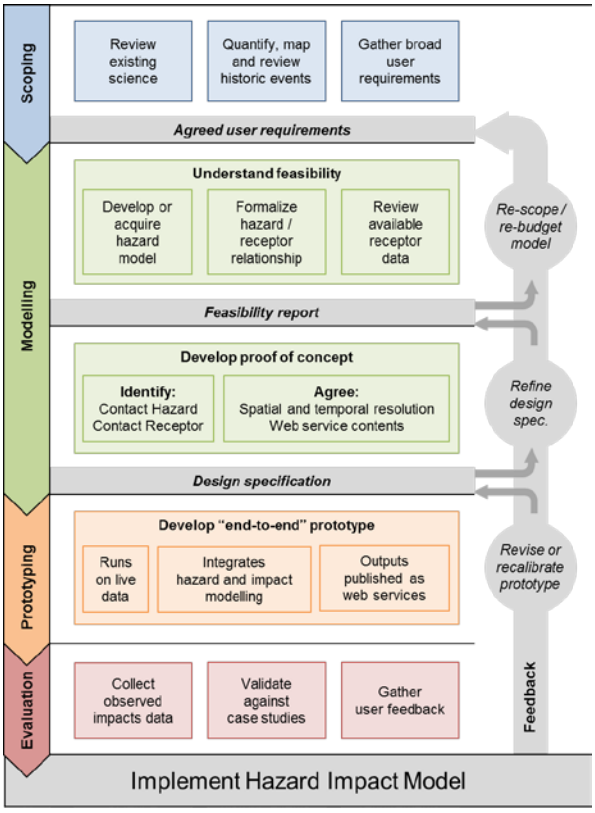
- The **Daily Hazard Assessment (DHA)** delivers a daily 'heads-up' on a range of natural hazards likely to have an impact in the UK in the following five days. The overview document includes links to the more detailed warnings and advice provided by the responsible agencies. The DHA is available to thousands of category 1 and 2 responders through the met office's hazard manager service www.metoffice.gov.uk/publicsector/hazardmanager and through ResilienceDirect www.gov.uk/guidance/resilient-communications#resiliencedirect.
- A set of expertly informed **natural hazard guidance notes (**Figure 1b**),** available on the website, to provide top-level information about each hazard and associated impacts. www.naturalhazardspartnership.org.uk/products/science-notes.

Figure 1 a) The NHP collaboration b) NHP Science Notes

- The NHP provides a coordinated 'review and challenge' function as part of the UK's and Scottish national risk assessment process. The NHP has also provided support to the committee on climate change work in developing the UK climate change risk assessment 2017 report.
- Protocols and collaboration for a more coordinated approach to the development of innovative Hazard Impact Models (HIMs), is led by the **Hazard Impact modelling Group (HIMG)** and hazard impact reporting networks. Early outputs from this work include the prototype 'high wind vehicle overturning' and 'surface water flooding' HIMs
- The **Hazard Impact Framework (HIF)** (Figure 2a and 2b) is being developed by the HIMG as standard protocol for development of future impact models ensuring a consistent and traceable approach to outputs.

There are currently three HIMs in various positions of development and operational use, related to flood, wind and landslides:

- Surface Water Flooding (SWF) is developed and being operationally trialled in real time at the Flood Forecasting Centre.
- Vehicle over Turning (VoT) is available to forecasters in Met Office Operations Centre to provide evidence for DHA warnings and by Highways England Public Weather Service daily report. There is also a Bridge vulnerability model in operational progress.
- Landslide HIM is a work in progress. A beta version of the base model, is being reviewed daily as part of the DHA assessment



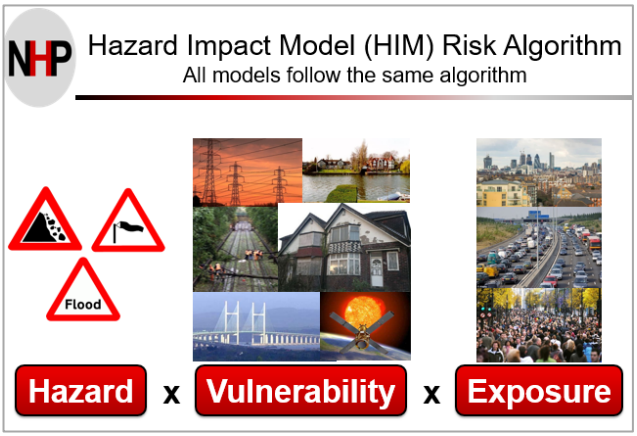


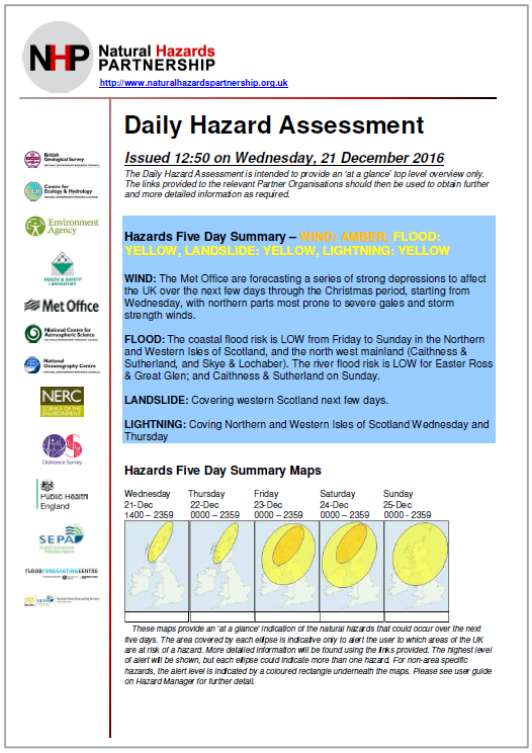
Figure 2 a) The Hazard Impact Framework and b) The NHP risk Algorithm

3.1.3 The Daily Hazard Assessment

Katy Freeborough from the British Geological Survey gave an overview and introduction to the Daily Hazard Assessment (DHA) and its content.

The DHA (Figure 3) is designed to deliver a daily 'heads-up' on a range of natural hazards likely to impact the UK over the following five days (currently a 24 hours assessment for landslides). Assessment is provided on a red, yellow, amber, green scale with a covering matrix offering clear explanation as to the interpretation of the assessments for the different hazards and the timescales covered (Figure 4). The assessment is issued daily at 2 pm, and information is provided for a range of well known natural hazards such as wind, surface water flooding and landslides, alongside, amongst others, space weather, extreme temperatures and air pollution.

The document includes links to more detailed warnings and advice provided by the responsible agencies. The DHA is disseminated through a formal pathway via a hazard manager portal operated by the Met Office www.metoffice.gov.uk/publicsector/hazardmanager and the ResilienceDirect portal www.gov.uk/guidance/resilient-communications#resiliencedirect. The information is accessible to a wide range stakeholders, ranging from category 1 and 2 responders, local authorities and other users.



Natural Hazards PARTNERSHIP
http://www.naturalhazardspartnership.org.uk

Daily Hazard Assessment

Issued 12:50 on Wednesday, 21 December 2016

The Daily Hazard Assessment is intended to provide an 'at a glance' top level overview only. The links provided to the relevant Partner Organisations should then be used to obtain further and more detailed information as required.

Hazards Five Day Summary – WIND: AMBER, FLOOD: YELLOW, LANDSLIDE: YELLOW, LIGHTNING: YELLOW

WIND: The Met Office are forecasting a series of strong depressions to affect the UK over the next few days through the Christmas period, starting from Wednesday, with northern parts most prone to severe gales and storm strength winds.

FLOOD: The coastal flood risk is LOW from Friday to Sunday in the Northern and Western Isles of Scotland, and the north west mainland (Caithness & Sutherland, and Skye & Lochaber). The river flood risk is LOW for Easter Ross & Great Glen; and Caithness & Sutherland on Sunday.

LANDSLIDE: Covering western Scotland next few days.

LIGHTNING: Coving Northern and Western Isles of Scotland Wednesday and Thursday

Hazards Five Day Summary Maps

Wednesday 21-Dec 1400 – 2359	Thursday 22-Dec 0000 – 2359	Friday 23-Dec 0000 – 2359	Saturday 24-Dec 0000 – 2359	Sunday 25-Dec 0000 - 2359

These maps provide an 'at a glance' indication of the natural hazards that could occur over the next five days. The area covered by each ellipse is indicative only to alert the user to which areas of the UK are at risk of a hazard. More detailed information will be found using the links provided. The highest level of alert will be shown, but each ellipse could indicate more than one hazard. For non-area specific hazards, the alert level is indicated by a coloured rectangle underneath the maps. Please see user guide on Hazard Manager for further detail.

Figure 3 The Daily Hazard Assessment

UK NHP Daily Hazard Assessment Colour State Matrix

Colour State	5-day UK (unless otherwise stated) Hazard Impact Assessment			5-day UK (unless otherwise stated) Hazard Forecast						UK Reported only Hazards		
	Weather *- Rain, wind, ice, snow, fog, lightning, hail*	**Flooding** *- River, tidal, coastal, surface water, groundwater* (England, Wales & Scotland only)	**Volcanic Ash**	**Space weather** (Earth impact forecast)	**Landslide** (24-hour forecast)	**Wildfire**	**Extreme Temperatures** (Public Health England only)	**Air Quality**	**Aero Allergens**	**Earthquake**	**Drought**	**Space Object Re-entry or Near Earth Objects**
Green	Disruptive weather not expected or low likelihood of minor disruption.	Disruptive flooding not expected or low likelihood of minor disruption.	Disruptive volcanic ash not expected or low likelihood of minor disruption.	No significant space weather event(s) expected.	Landslides are not likely and there are no reports of landslides.	Elevated wildfire conditions not forecast (low risk of wildfires).	Threshold conditions not forecast to be reached.	Low air pollution levels *or* Isolated areas of moderate air pollution levels forecast.	Low / medium *and/or* areas of high aero allergen levels forecast.	No reports of significant earthquake(s).	No reports of drought conditions.	No reports of: possible space object(s) re-entry into earth's atmosphere; **or** near Earth object(s).
Yellow[1]	Low likelihood of significantly disruptive weather or minor disruption expected.	Low likelihood of significantly disruptive flooding or minor disruption expected.	Low likelihood of significantly disruptive volcanic ash or minor disruption expected.	Strong space weather event(s) expected.	Likelihood (or report) of isolated landslides.	Elevated wildfire conditions (likelihood of manageable wildfires) forecast.	Moderate likelihood of threshold conditions being reached or exceeded.	Widespread moderate air pollution levels *or* Isolated areas of high air pollution levels forecast.	Widespread high *and/or* area(s) of very high aero allergen levels forecast	Reports of significant earthquake(s).	Drought conditions declared.	Reports received of: likely space object re-entry into earth's atmosphere; **or** near Earth object(s).
Amber[2]	Likelihood of significantly disruptive weather.	Likelihood of significantly disruptive flooding.	Likelihood of significantly disruptive volcanic ash.	Severe space weather event(s) expected.	Increased likelihood (or reports) of multiple landslides.	Severe wildfire conditions (likelihood of difficult to control wildfires) forecast.	High likelihood of threshold conditions being reached or exceeded.	Widespread high air pollution levels *or* Isolated areas of very high air pollution levels forecast.	Severe aero allergen event expected.	Reports of significantly disruptive earthquake(s).	★	★
Red[3]	High likelihood of severely disruptive weather.	High likelihood of severely disruptive flooding.	High likelihood of severely disruptive volcanic ash.	High confidence of extreme space weather event(s).	High likelihood (or reports) of major landslide events.	High confidence of severely disruptive wildfire(s).	Severe or prolonged period of threshold conditions reached or exceeded.	Widespread very high air pollution levels forecast to continue for more than 2 days.	High confidence of severe, large scale aero-allergen impact(s).	Reports of major earthquake(s).	★	★

★ Ongoing hazard assessment recorded under "Ongoing Issues" or updated as appropriate.

1 Limited/localised hazard impact or low confidence in assessment of severity/location of hazard event
2 Significant potential for hazard event impacting large numbers of people
3 Hazards impacting large numbers of people across multiple sectors and high confidence in assessment of severity/location of hazard event

Figure 4 The Daily Hazard Assessment Risk Matrix

3.1.4 Importance of Impact Data.

Tim Aldridge from the Health and Safety Executive gave a presentation on the importance and variety of Impact data.

Tim began with an overview of natural hazards such as earthquakes, hurricanes and tsunamis, which have caused billions of dollars' worth of economic impacts. Comparatively here in the UK, notable storms since 2013 have caused extensive damage, breaking records and hitting headlines. Whilst data is collected in various guises, none is formally recorded and shared amongst different agencies.

As the result of the summer 2007 floods, the Pitt Review made recommendations for issuing "warnings and impact information on severe weather and flooding emergencies to responder organisations and the public". The EU directive 2007/60/EC also calls for member states to consider both flood hazard and its impacts, whilst the UN Sendai Framework also identifies understanding disaster risk as a key priority action.

The science of impact modelling has changed the messages that organisations can communicate, to both the responders, resilience planners and public. People want to know the impact of the weather on their lives and how it may disrupt their 'normal' daily routine; they want to know three things:

- What does it mean to them?
- What does it mean to their family?
- What do they need to do right now?

The NHP is using the opportunity of collaboration to combine data and expertise from partners to identify and forecast the impact on populations, areas and assets from a range of natural hazards. The challenges of providing real-time national guidance on impacts include the potentially complex modelling requirements (e.g. in urban environments) and the timely delivery of relevant and reliable information. Tim presented an overview of the Surface Water Flooding HIM.

The perception of hazards and impacts was also discussed; HSE reported that workshops they had been in evolved in had highlighted a difference in the view of the science and responder communities (pers comm).

3.2 OUTBREAK GROUP: WHAT INFORMATION DO YOU RECEIVE AND WHAT TRIGGERS A REPONSE?

The discussion format for the first session of the morning was planned to be centred on the stakeholders' experience of the DHA; gathering information regarding how the Daily Hazard Assessment (DHA) fits into organisational strategies and clarification of how it is used to manage the potential impacts of natural hazards. However, although the workshop invitation had stated 'for users of the DHA', an early show of hands in the room, highlighted that none of the attendees were actually users.

Examples of the DHA released in the run up to, and during, Storm Frank (29th -30th December 2015) were shown to the group for them to review and consider the information provided. Discussions within the group centred on what information was gathered, accessed and triggered a response or planning for a response? Experiences were discussed allowing the NHP representatives to gain insight into important timing, information sources, and possible actions that might be taken. Below is a summary of the key discussions divided into the key themes of **experience**, **communication** and **impact modelling;**

Experience:

1. Local experience and knowledge does count and is paramount in resilience planning.

Edinburgh Airport reported how after hearing a specific weather warning, a culvert was checked that had previously (2012) been the source of an unexpected flood event. The warning provided the reason to prioritise maintenance in advance of the storm and thus preventing the localised flooding from occurring again.

Severe wind warnings can lead to woodland tree inspections on specific roads and routes.

The group also recalled that during Storm Desmond (4th – 5th December 2015), communities were engaged with at an early stage (Wednesday/ Thursday). However, the ultimate severity of the event was not known.

The discussion centred on hazard forecasting showed an understanding of limits. Whilst flooding can be modelled and impacts calculated and prepared for, the specific geographic location and timing of a storm cloud, thunder, lightning, or landslides remains elusive.

Local communities and responders know the hot spots for hazard, but not exactly what will happen and when it will occur.

The DHA gives local experts the opportunities to consider multihazards or hazard cascades.

2. Other sources of information and data

Views on how the stakeholders were receiving the information was also varied, ranging from modelled information and graphs; to personal contact and updates; and on the ground knowledge and expertise of specific hazards and likely affected infrastructure (e.g. roads).

The local level council specific or regional detail already provided to users is more applicable to the site-specific level. The DHA being countrywide does not offer a specific set of information, however it does offer an overview of the countrywide situation.

3. Information already being received is detailed local and therefore more relevant to Category 1 responders.

Due to recent advances in forecasting and monitoring science, and the increase of government mandates, the organisations required to trigger a plan, or influence a decision to act, were all confident that they were already receiving the best available *local* information, at an early enough time and understood the information that was being received. It is this information that is more useful to responders than a statement in the DHA and therefore some of the stakeholders were confused at who the DHA was directly aimed at.

Others fully supported the idea that the document was designed as an overview of all hazards, nationally. It was recognised by some that it was a useful information document to see what was happening elsewhere, both in Scotland and nationally. However, this again did raise questions as to who the document was actually aimed at.

The attendees felt that although they received better, more useable detailed information for their specific hazard of interest or local area, a 'heads up' of other hazards was informative, if not always useful.

4. Timing is important.

The Stakeholders agreed with the approach of the five-day broad-brush overview but where the DHA was concerned 2 pm was too late for 24 hours' notice.

The Scottish Environment Protection Agency (SEPA) described working in partnership with the Met Office through the Scottish Flood Forecasting Service to generate data 24 hours a day which they have access to. This helps to predict the likelihood and timing of river, coastal and surface water flooding.

Communication

1. There is still a level of confusion within the language, use of terminology and interpretation of assessments, which needs to be considered.

Small differences between the communication of events (and impacts) of hazard are important and depend on the hazard, and area, being referred too, e.g. the 'likelihood' of snowfall is as important as 'severe' rain in some areas. The DHA can help in preparedness for media communications.

Scientific vs public communication is important. This was highlighted in a discussion regarding flooding when it was posed that the '*flood warning'* is the important factor not always the cause. Whilst differentiating the cause may always be important to scientists, in terms of communication to public and responders on the ground, *warnings* related to river, coastal and ground water flooding are all the same. They do not need to be distinguished for an action to occur, and affected people need to know what to do if their property may be at risk of flooding, not the science for what is causing it.

2. ***The different assessments levels (red, amber, yellow, green) have very different responses****.*

Assessments levels need to be high to trigger a response. A *yellow* is considered a heads up, whereas *amber* alerts require a response. Partners are engaged, awareness is raised and a response plan is actioned with an amber warning.

At the other end of the scale, not all hazards are reported in the same way, *green* is considered an alert level for flooding; it is the first level of an alert and if there is no hazard, there is no colour.

Impact modelling

1. Where modelling of impact is concerned, to a responder saving lives is key

There is still a link between lives at risk vs economic risk. A small blocked road with low-density housing may be considered as low impact for economic risk; however, impact assessments change rapidly. *Denial (of services)* quickly moves into *danger* if an inhabitant of the cut off community was to fall ill and ambulance recovery was required.

2. Local route understanding is key knowledge

Interpreting impact level can be locally skewed. An event occurring on a 'minor road' in a national context could be perceived as low impact, but in Scotland, this may be the only road to a community and *denial* (of services) could be as important as *danger*. Similarly an event on a trunk road which has no *danger-to-life* impact after the event, may have large *denial* consequences, for both life and economy, for a long time after (e.g. A9, Rest and be Thankful).

Interdependency is a key issue in Scotland. Questions such as 'who else is affected' 'What can be done to improve/ manage the situation?' should be considered at each stage.

3.3 OUTBREAK GROUP: COLLECTION OF IMPACT RELATED DATA

Disaster loss data is highly regarded by all stakeholders. Many organisations are active in data collection using approaches such as household surveys, social media and collection of digital press reports. The data collected was mainly used for creating and refining impact models and for benchmarking current hazardous events against historical records.

The group cited a number of issues with current practices. These included concerns over data quality and coverage, availability and accessibility of data, and issues relating to managing multiple services. For the future, the group liked the concept of a unified database but this raised questions about ownership, management and resourcing. Instead, there was general support for a collated register of datasets across the Scottish resilience network. There was also interest among local government participants for making more use of their post-event briefings, which hold unstructured impact data in free text documents.

Further information and the outcomes from the break out groups can be gained from the HSE report (Gunawan, 2018).

3.4 AFTERNOON SESSION: FORWARD LOOK ON THE FUTURE REQUIREMENTS FOR DHA

The afternoon session provided an opportunity for open discussion about the DHA, its concept, its format and potential future wish lists. The discussion was guided by issuing the following questions:

What do we want? Where do we want to get to? What are the gaps?

- Is the information currently being communicated helpful?
- How could information be communicated to further prepare you to deal with an event?
- How could the DHA fit better into your strategies to manage the impacts of natural hazards as part of your daily role/job?
- What information could further assist you in making more informed decisions in response to natural hazard warnings?

Discussions are summarised below.

1. Who is the DHA aimed at?

Described as an 'at a glance overview', the group agreed that the DHA is fit for purpose. It gives a clear overview of potential hazards for the following 5 days; however, the overview is still considered quite 'broad level'. The inclusion of links to more detailed sources of information for particular hazards is positive and useful.

The group discussion still questioned who the DHA is aimed at, and questioned the list of the responder community (Category 1 and 2), local governments and other resilience professionals. In reality, the responders on the ground and organisations making the decisions during the more well-known natural hazard events (such as flooding and extreme weather) have access to more detailed, real time information, and local knowledge.

As a further positive, the group concluded that sharing of expertise is important in these situations, and the DHA does promote an understanding or awareness of other hazards not affecting their own local region to responders or responsibilities. The group greatly valued the multi-hazard approach to the document.

There were a few suggestions that the document could be more valuable as a regionally specific overview.

There was a suggestion that the DHA is more suited as a public overview. With the emphasis on public groups, school and community communications. It was discussed that feedback from the Environment Agency making the flood Guidance Statement accessible to the public should be followed up, in the context of the DHA potentially being more applicable to the public than the responder community. The Flood Guidance was also first applicable to the responder community but now is in the public domain. Within this context, the action is important, for example, the key is not just telling people, it will be windy, and instructing them in actions such as 'tie trampolines down' is the key.

2. Timing of dissemination

All parties stated that 2 pm was too late for the document to arrive in the inbox and questioned the reasoning behind this timing. Within the responder community and those involved in hazard event resilience planning, access is available to 24-hour information for the better-known hazards (e.g. flooding). Again, the agreement was such that the overview for the other hazards without specific response teams (e.g. landslides) the document is useful.

In a discussion about community, preparedness to hazard it was stated that contrary to potential opinions of increased vulnerability, local rural communities could be better prepared out of experience and improved community collaboration. Discussion and experience presented by stakeholders working with rural communities summarised that a greater level of expectation of problems give rural and remote communities the ability to engage and a drive to improve preparedness at community level. Stakeholders commented that routine communications with local resilience teams are more likely to occur and often the communities are more willing to embrace advice.

3. Terminology

The inclusion of the hazard matrix was generally supported with clear and concise overview of the hazard and assessment level (*red, amber, yellow, green*).

As the hazard statements are applicable for 5 days and cover many hazards, the detail included could be considered very vague. Again the group agreed that within the remit of an ‘at a glance overview’ this was acceptable; however within regard to ‘useable information’ there was confusion.

Much discussion about the terminology being used in communications took place. There is a difference in the responder community about the set of words used to communicate hazard and the implied meaning. As a rule of thumb it is assumed that:

> “*Assessment*” should be an overview of the hazard
>
> “*Alert*” is an early indication to be prepared
>
> “*Warning*” means take action. The terminology of warning also implies an imminent issue with a consequence and a high level of quality and decisiveness about the data.

The DHA should be reviewed ensure it reflects these interpretations, given the community that it is aimed at. Currently some of the hazards on the DHA could be worded as warnings, but should be deemed alerts or assessments.

4. Document format

There was agreement that the PDF lay out is clear and useable, with clear headlines throughout, providing structure to the document. The inclusion of the hazard matrix within the document was also supported for the clear definitions without having to refer back to further information or documentation.

There was a discussion that the document contains too many logos. Whilst it was understood there was a clear message of partnership, acknowledgement and inter-agency collaboration, the NHP logo should be enough. The number of logos now distract from the front page limiting space that could be used for hazard information. Another suggestion was that if involved agencies did want recognition, the logos could easily be relocated to the final page.

The 5-day summary maps were appreciated in the context of the DHA being a useful summary overview, however it was agreed that this was not in any way a useable level of detail. There was strong agreement that if the maps were slightly clearer, with a differentiation between hazards and

labelled with appropriate symbology, then they could be more useable, even in the at-a-glance format.

5. Future

There was a large discussion regarding the arrival of the document in inbox, in PDF email form, at 2 pm in the afternoon. Whilst the DHA offers a heads up, with data feeds, there is a potential that possible scenarios may already have been highlighted. In the interest of honesty, several of the attendees said during event periods the DHA would probably be ignored, due to the lack of detail. Local communication would be taking place, inboxes would be full and communication with relevant parties on the ground would be all consuming.

The concept of a portal, rather like Hazard Manager, that gave access to all the relevant data in the same place, constantly updated and accessible was discussed. Something more accessible and interactive, accessible on a mobile device, was suggested. Consistent information could be released, rather than many different sources of information to check.

The key was the multi-agency communications. An example was given where on the 7th January 2016, saturation levels were high and a modest amount of rainfall (not warning level) triggered unprecedented flooding. Through increased sharing of experiences and knowledge "more engagement at the coalface" experiences like this could be better prepared for.

Whilst some agencies are already taking this as a step (Multi Agency Debrief – MAD) the wealth of knowledge in local and duty officers needs recording. Local resilience partnerships are embracing the MAD but an increase in this would prove beneficial.

The Science community need to be proactive in their communications. In addition, continue to stress the importance of documenting experiences.

4 Conclusions and actions

Whilst there was initially disappointment that the group who attended the day were not in fact day-to-day users of the DHA, the initial reactions and views of the group were still very valid. Interest in the document was positive and all the feedback ultimately considered useful. Outcomes and comments from the review process closely align with work undertaken by Lui and Demeritt (2017). It is clear that the DHA achieves some of it aims successfully and that simple changes could be made to the document to increase its usefulness as part of a full review.

Whilst all the comments have been recorded in this document, the main summary and suggestions for change, as gathered from the stakeholders, can be simply summarised as follows:

1. The DHA is fit for purpose as an at-a-glance overview; however who the document is specifically aimed at should be discussed further
2. Terminology should be consistent, the document and organisations feeding in to the assessments should review the use of their own terminology if emergency response is not within their usual mandates. Clarify if alert, assessment or warning.
3. The 5 day summary maps should be reviewed to assess the potential for clearer visuals.
4. Options aiding the dissemination of the DHA should be reviewed

All of the overview comments from this workshop have been forwarded to the DHA communications team, for consideration in their 2018 revision of the document.

Discussion from the impact session will be reviewed by the HSE team for follow up on future projects and fed back to the NHP group.

Appendix 1

List of lead prompt questions to instigate discussion as required:

Past event Experiences

- What information triggers a response or planned response?
- What timings are important?
- What other information sources you access for the different hazards?
- What actions might you take?

Impact Data

- What could impact data be used for?
- Is impact data important to you?
- Focus on collectors of impact data
- Focus on users of impact data

Forward look on future requirements for DHA

'What do we want?' 'Where do we want to get to?' 'What are the gaps?'

- Is the information currently being communicated helpful?
- How could information be communicated to further prepare you to deal with an event?
- How could the DHA fit better into your strategies to deal with the impacts of natural hazards as part of your daily role/job?
- What information could further assist you in making more informed decisions in response to natural hazard warnings?
- What would you prefer? - hazard information requiring you to use your knowledge and judgement as to impacts or more information and with an objective assessment of the potential impacts i.e. Hazard Impact Model outputs.

User questions?

- "Go big go yellow" vs "too many yellows" what is the difference for you?
- What is your reliance on the DHA? Does it compliment other warnings or is it your initial contact for warning?
- In your area of work do you take note of other warnings than your own or are you specifically looking at one hazard?
- How are you currently receiving information; what is the future
  Web, mobile, text, paper ….App?
-

References

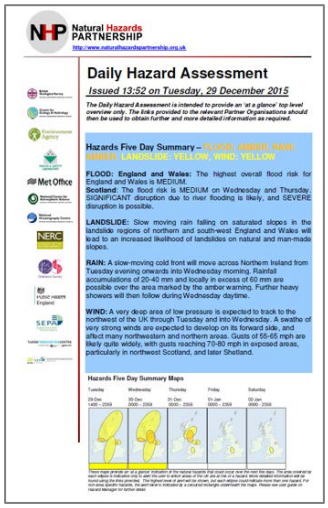
British Geological Survey holds most of the references listed below, and copies may be obtained via the library service subject to copyright legislation (contact libuser@bgs.ac.uk for details). The library catalogue is available at: https://envirolib.apps.nerc.ac.uk/olibcgi.

Lui, F., and Demeritt, D. (2017) The perception and use of the UK Natural Hazard Partnership Daily Hazard Assessment. A report for the Natural Hazard Partnership. Department of Geography, Kings College London.

Gunawan, O. and Aldridge, T., (2018) *Disaster Loss Data Management in Scotland* , Unpublished HSE report for the Scottish Government, DMS/2018/01.

Natural Hazards PARTNERSHIP

http://www.naturalhazardspartnership.org.uk


Natural Hazards PARTNERSHIP

Daily Hazard Assessment

Issued 13:52 on Tuesday, 29 December 2015

The Daily Hazard Assessment is intended to provide an 'at a glance' top level overview only. The links provided to the relevant Partner Organisations should then be used to obtain further and more detailed information as required.

Hazards Five Day Summary – FLOOD: AMBER, RAIN: AMBER, LANDSLIDE: YELLOW, WIND: YELLOW

FLOOD: England and Wales: The highest overall flood risk for England and Wales is MEDIUM.
Scotland: The flood risk is MEDIUM on Wednesday and Thursday. SIGNIFICANT disruption due to river flooding is likely, and SEVERE disruption is possible.

LANDSLIDE: Slow moving rain falling on saturated slopes in the landslide regions of northern and south-west England and Wales will lead to an increased likelihood of landslides on natural and man-made slopes.

RAIN: A slow-moving cold front will move across Northern Ireland from Tuesday evening onwards into Wednesday morning. Rainfall accumulations of 20-40 mm and locally in excess of 60 mm are possible over the area marked by the amber warning. Further heavy showers will then follow during Wednesday daytime.

WIND: A very deep area of low pressure is expected to track to the northwest of the UK through Tuesday and into Wednesday. A swathe of very strong winds are expected to develop on its forward side, and affect many northwestern and northern areas. Gusts of 55-65 mph are likely quite widely, with gusts reaching 70-80 mph in exposed areas, particularly in northwest Scotland, and later Shetland.

Hazards Five Day Summary Maps

Tuesday 29 Dec 1400 - 2359 | Wednesday 30 Dec 0000 - 2359 | Thursday 31 Dec 0000 - 2359 | Friday 01 Jan 0000 - 2359 | Saturday 02 Jan 0000 - 2359

A Workshop Focussing on Communication of Hazard Assessment Information

Date: Friday 29th September 2017

Venue: BGS Edinburgh, The Lyell Centre, Research Avenue South, Edinburgh, EH14 4AP

Aim of the workshop:
To continue to ensure natural hazard information is communicated to users appropriately and effectively, responding to user needs.

Objectives of the workshop:
Is the information within the DHA: useable, useful and used.

- What level of information do people need?
- When do people need this information?
- How do recipients use the DHA?

How does the Daily Hazard Assessment (DHA) fit into your organisational strategies to manage the potential impacts of natural hazards as part of your daily responsibilities?

09:30 - Registration and coffee

10:00 - Opening introductions

• The National Centre for Resilience	Alessia Morris –Scottish Government
• The Natural Hazards Partnership	Helen Reeves – British Geological Survey
• The Daily Hazard Assessment	Katy Freeborough – British Geological Survey
• The Importance of Impact Data	Tim Aldridge – Health and Safety Executive

10:45 - Coffee break

11:00 - Breakout sessions – 2 groups – (30mins per group)

1) *Past Event Experiences (e.g. Storm Frank)*
   - What information triggers a response or planned response?
   - What timings are important?
   - What other information sources do you access for the different hazards?
   - What actions might you take?
2) *Impact Data*

12:00 - Summing up & feedback from group discussions

12:30 - Lunch

13:15 - Forward look on future requirements for DHA.

What do we want? Where do we want to get to? What are the gaps?

- Is the information currently being communicated helpful?
- How could information be communicated to further prepare you to deal with an event?
- How could the DHA fit better into your strategies to deal with the impacts of natural hazards as part of your daily role/job?
- What information could further assist you in making more informed decisions in response to natural hazard warnings?

14:45 - Summary/ Q&A

15:00 - Coffee/ End