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Exploring linkages between geoscience and humanitarian shelter: workshop report

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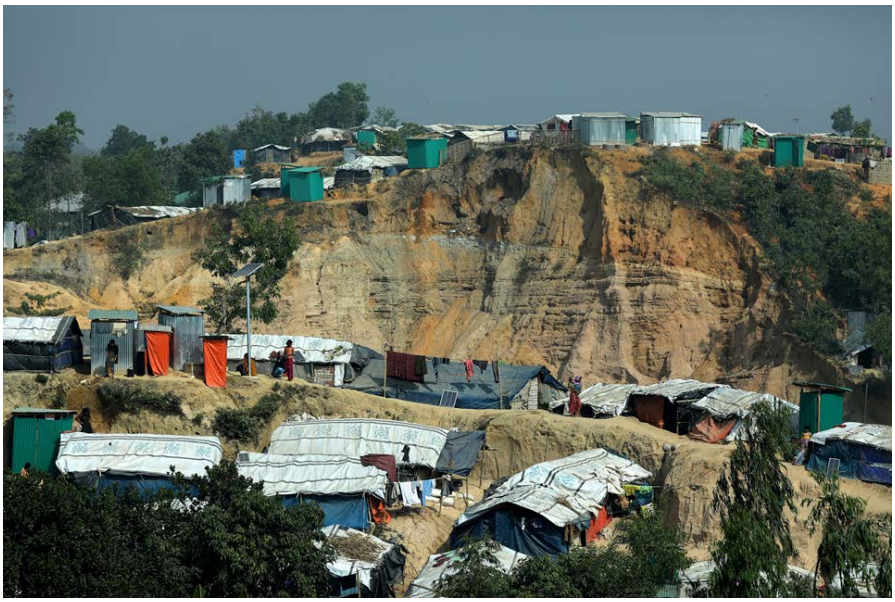

BRITISH GEOLOGICAL SURVEY

GLOBAL PROGRAMME

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Exploring linkages between geoscience and humanitarian shelter: workshop report

B Simons, S Sargeant

Keywords

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Cox's Bazar displacement camp, Bangladesh © 2018 Josh Estey / CARE

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Keyworth, Nottingham British Geological Survey 2020

BRITISH GEOLOGICAL SURVEY

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British Geological Survey offices

Nicker Hill, Keyworth,
Nottingham NG12 5GG
Tel 0115 936 3100

BGS Central Enquiries Desk
Tel 0115 936 3143
email enquiries@bgs.ac.uk

BGS Sales
Tel 0115 936 3241
email sales@bgs.ac.uk

The Lyell Centre, Research Avenue South,
Edinburgh EH14 4AP
Tel 0131 667 1000
email scotsales@bgs.ac.uk

Natural History Museum, Cromwell Road,
London SW7 5BD
Tel 020 7589 4090
Tel 020 7942 5344/45
email bgslondon@bgs.ac.uk

Cardiff University, Main Building, Park Place,
Cardiff CF10 3AT
Tel 029 2167 4280

Maclean Building, Crowmarsh Gifford,
Wallingford OX10 8BB
Tel 01491 838800

Geological Survey of Northern Ireland, Department of Enterprise, Trade & Investment, Dundonald House,
Upper Newtownards Road, Ballymiscaw,
Belfast, BT4 3SB
Tel 01232 666595
www.bgs.ac.uk/gsni/

Natural Environment Research Council, Polaris House,
North Star Avenue, Swindon SN2 1EU
Tel 01793 411500 Fax 01793 411501
www.nerc.ac.uk

UK Research and Innovation, Polaris House,
Swindon SN2 1FL
Tel 01793 444000
www.ukri.org

Website www.bgs.ac.uk
Shop online at www.geologyshop.com

Foreword

This report is a summary of a workshop to explore how links between geoscience and humanitarian shelter can be strengthened. It was held online on 15 July 2020.

Acknowledgements

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Contents

FIGURES

TABLES

Summary

This report describes a workshop held online in July 2020 to explore linkages between geoscience and humanitarian shelter. Thirty geoscientists, humanitarian shelter practitioners and disaster researchers took part and their discussions are presented here.

1 Introduction

1.1 WHY MEET?

The purpose of the workshop was to bring together geoscientists and humanitarian shelter practitioners to explore links between geoscience and humanitarian shelter. For the purposes of the discussion, we used the following definitions:

Geoscience is the term used to describe a wide range of disciplines that investigate the physical environment. It includes the study of earth processes such as hazards, soil, water, mineral and energy resources and climate change. Geoscientists may have specialist training and expertise in fields including seismology (including earthquakes), volcanology, hydrogeology, geotechnical engineering (which includes slope stability, soil and rock behaviour), remote sensing (use of satellite data) and geomorphology (study of landscapes and processes). **Shelter** is often one of the key aspects in a humanitarian response and provides *more than just a roof* - it can affect health, facilitate access to livelihoods and education, provide safety and protection, and support community cohesion. Therefore, shelter often goes beyond immediate emergencies and can effectively support longer-term recovery of households and communities, bridging the humanitarian - development divide.

The two fields of shelter and geoscience intersect in a myriad of different ways. For example, to ensure longer term resilience, the shelter sector provides risk reduction messaging (Shelter Cluster, 2017) post disaster and in conflict displacement. These messages usually centre around building to withstand particular hazards, for example through bracing buildings against tropical weather or building on plinths to mitigate against flooding (see Figure 1). These messages may be variably adopted, for a number of different reasons.

Figure 1 Reconstructed home on a raised plinth after flooding in Bangladesh © 2017 Beth Simons

Communities and humanitarians often recover and work in rapidly changed landscapes where hazard understanding might have evolved. Cascading hazards, such as the 2018 Sulawesi, Indonesia Earthquake with the subsequent tsunami, liquefaction and landslides, may create challenges for shelter reconstruction that require geoscience expertise. In Sulawesi it was not

initially clear where it was safe for people to rebuild and place temporary camps due to the extent of liquefaction. It also later emerged that research showed areas of the city of Palu were considered high risk for liquefaction, yet this had not translated into policy or planning (Fiantis and Minasny, 2018). Aspects of geoscience research that could be utilised in humanitarian response and preparedness often remain out of sight and out of mind to those working with communities, and communities themselves.

Humanitarians may be operating in multi-hazard environments or with "invisible" hazards. For example, in Turkey there are over 3 million Syrian refugees. Turkey has a high seismic risk and higher levels of seismic activity than Syria, but this may not be known and communicated. In other locations, people may be recovering from one hazard, such as a tropical storm, in the presence of a potentially high impact, but low frequency "invisible" earthquake fault zone. Finally, resources such as water, timber, soil and sand are also essential not only for reconstruction, but also for livelihoods. Many humanitarian agencies will operate cross-sectoral programmes involving shelter, water, sanitation & hygiene (WaSH) and livelihoods in post-disaster and post-conflict early recovery planning. Aspects of geoscience relating to land use planning, water resources and sustainable resource extraction may intersect with these integrated programmes.

1.2 WORKSHOP OBJECTIVES

This small meeting brought together representatives from the geoscience and humanitarian communities as a starting point for a longer conversation around how the two sectors could work together. The objectives of the meeting were:

- To share experiences of working with the other sector – the challenges and barriers that people have encountered and how these could potentially be overcome. What are the priorities for action?
- To explore how geoscience could be a resource in the humanitarian shelter practice, what the limitations of geoscience data are and the challenges with communication.
- To build links between the geoscience and humanitarian shelter sectors.

1.3 AGENDA

Item		Time	Who
1	Welcome & objectives of the meeting	0930-0945	Susanne Sargeant and Beth Simons
2	Micro presentation: Research findings on how the physical environment affects shelter self-recovery & recommendations	0945-1000	Susanne Sargeant and Bill Flinn
3	**Session 1 - Sharing experiences of being involved in disaster risk reduction, response or recovery in dynamic, multi-hazard landscapes** Breakout groups: What has been your experience of working with geoscientists/humanitarians and/or communities in these settings? What's worked well? What challenges have you encountered?	1000-1050	All
	BREAK	1050-1100	
4	**Session 2 - Information & Expertise - Strengthening links between geoscientists and humanitarian decision makers**	1100-1200	

	Micro presentations (15 mins total) ● Sierra Leone: Availability of geoscience expertise, availability and accessibility of technical information at the appropriate scale. ● Nepal: Linking geoscience with humanitarian response after the 2015 earthquake. ● Bangladesh: The need for geoscience support in the Cox's Bazar displacement camps Breakout groups & feedback: How can the geoscientists and humanitarian decision makers work together to tackle some of the challenges discussed? Get creative!		Colm Jordan Basanta Raj Adhikari Step Haiselden
5	Plenary - priorities, next steps	1200-1225	All
6	Closing comments	1225-1230	Susanne Sargeant and Beth Simons

Table 1 Workshop agenda

2 Examples of shelter and geoscience intersection

2.1 SHELTER SELF-RECOVERY AND THE PHYSICAL ENVIRONMENT

Susanne Sargeant (British Geological Survey) and Bill Flinn (CARE International UK) gave a brief overview of recently published research (Sargeant et al., 2020) on the influence of the physical environment on self-recovery after disasters in the Philippines (typhoons Haiyan in 2013 and Haima in 2016) and Nepal (the Gorkha earthquakes in 2015). This work shows that the physical environment can have a significant effect on people's recovery. Changes in water supply (shortage or surplus), impacts of post-disaster geohazard events on infrastructure (particularly affecting transport) and the availability of technical advice all constitute barriers to recovery. The findings point to what needs to be in place to support self-recovery in dynamic physical environments, including geoscience information and advice, and restoration of infrastructure damaged by natural hazard events. However, further research is necessary to understand the issues this raises for the shelter and geoscience communities, particularly around availability of geoscience expertise, capacity and information at a local scale. Strengthening relationships between the geoscience and humanitarian sectors was one of the recommendations from the paper and the aim of this workshop was to take a step towards that.

2.2 LANDSLIDES, SIERRA LEONE 2017: A GEOSCIENCE PERSPECTIVE

Colm Jordan, British Geological Survey (BGS) provided an overview of the geoscience information provided to support humanitarian response and recovery after the landslides in Freetown, Sierra Leone in 2017. The response was part of BGS's ODA Programme on Global Geological Risk. This programme responds to major hazard events to provide geoscience data and build partnerships with local actors who can support local response and resilience longer term.

In Sierra Leone, heavy rains led to a series of landslides on the 15th August 2017 which resulted in over 1000 fatalities and left over 3000 people homeless. Following a request from UNOSAT, and the activation of the UN Space Charter, BGS provided maps of the landslides on the 16th August using satellite data from numerous agencies to support disaster response.

Maps showing the extent of the landslides were published on ReliefWeb and used by the government. A number of questions were asked by various actors, including: What area has been affected? What was the cause (e.g. God's will, earthquakes, rain, deforestation)? Will more landslides occur? Is it safe to go in? Where can we rebuild? How can we rehabilitate the landscape? Can we train local experts? Some of these were addressed by the mapping, but BGS also provided training to the National Minerals Agency of Sierra Leone on landslide hazard analysis, contributed to the World Bank's post disaster needs assessment and worked on site rehabilitation.

2.3 GORKHA EARTHQUAKES, NEPAL 2015: LINKING GEOSCIENCE WITH HUMANITARIAN RESPONSE

Basanta Raj Adhikari, Tribhuvan University, shared some of the challenges and opportunities for integrating geoscience with the humanitarian response from the Gorkha Earthquakes in Nepal. After the earthquakes, geological assessment assessments were conducted through the Geotechnical Extreme Events Reconnaissance (GEER) Association, which is an organisation that emerged from grassroots efforts to investigate impacts of earthquakes. As part of the assessment, maps were produced and information on the state of the landscape and infrastructure of remote villages were detailed to support disaster response (Hashash et al., 2015).

Many communities did not know what impact an earthquake of this magnitude would have, with debris flowing into valleys, liquefaction and major damage to infrastructure. It took a long time to communicate scientific concepts such as liquefaction to people, and what that meant for their land and homes and understanding of their landscape. Geoscientists know that landsliding may persist over time after earthquakes. For example, after the ChiChi earthquake in Taiwan it took 4-5 years for landsliding to "relax" to pre-earthquake conditions (Marc et al., 2015). Communicating aspects of science such as this is a major challenge when communities, the government, humanitarian and development actors wish to rebuild quickly.

Additional challenges were faced when the monsoon season caused further damage and no multi-hazard maps at the appropriate scale were available to inform reconstruction. There were no DRR and reconstruction policies before the earthquake, and communication channels were poor. Now there is a National Policy for DRR (Government of Nepal Ministry of Home Affairs, 2018), which includes use of geoscience data. Updated seismic maps were used to inform new building codes. However, effective implementation of new codes remains a challenge without sufficient governance. Finally, Basanta reinforced the need for co-working across multiple sectors to ensure sustainable responses for communities.

2.4 ROHINGYA REFUGEE CAMP, COX'S BAZAR, BANGLADESH: BENEFITS OF WORKING WITH GEOSCIENTISTS

Step Haiselden (CARE International UK) outlined some of the challenges in the refugee camps in Bangladesh. The camps in Cox's Bazar, Bangladesh are home to around 1 million refugees, who were largely displaced in 2017 after violence in Rakhine State, Myanmar. Camps that CARE work in are built over a series of hills with low-lying land in between used as paddy fields or for grazing cattle. The area has been largely deforested for firewood and shelter construction, and streams or rivers run through parts of the camp. Rain causes serious issues, with the soils turned to mud, flooding and landslides.

Maps of the camps made by staff and communities identified houses that were at risk of landslides and flooding. Later input from geoscientists provided maps that predicted flooding up to 10m to account for storm surge risk from tropical cyclones and slope stability within the camp. This led to identification of further homes at risk and relocation of almost half of camp infrastructure, including clinics. Space is at a premium in the camps, and many people do not have a choice about where they build. Science can help inform decision making, communicate risk to people and identify where infrastructure, such as drainage or retaining walls, are required in the highest risk zones.

Jamie Richardson (Catholic Relief Services) shared in discussions a community-led project from CRS-managed camps that integrated drone imagery, topographic and hydrological information

to facilitate community planning and management of risks and infrastructure (Mikulec and Richardson, 2018).

3 Discussion Session 1 – Challenges

For Discussion Session 1, participants were asked to share experiences of working with the "other" sector or with communities recovering in dynamic, multi-hazard environments. Participants were asked to consider the challenges, what communities know already / want or need to know and what impacts their recovery. A number of aspects were discussed broadly represented by the following themes.

Communicating risk, hazard & uncertainty: Communication and knowledge exchange was a key theme of the meeting, particularly the challenges around communicating risk(s), hazard(s) and uncertainty. Western views of science are often at odds with people's beliefs as disasters are commonly considered a "will of God". Finding trusted methods through which to communicate contextually appropriate messages before disasters and displacement occurs is important. The timeliness of hazard messaging when reconstruction starts quickly after disasters is often too late. Community-based management of their own risks is often a good mechanism of disaster resilience, but sometimes difficult to manage at scale. Involving entire communities is essential, particularly for low frequency events that may not persist in people's memories. Additional challenges are presented with climate change - linkages with geoscience could be useful to try and understand how environments will change in the future to ensure communities are informed.

"…working with them [communities] to produce communications in various formats that are contextually suitable, delivered by a trusted individual and reach all the people that they need to…"

Understanding community perspectives and priorities: Challenges such as appropriately assessing community priorities (e.g. shelter, livelihoods, markets, food) and understanding how people view their own landscape were mentioned by multiple participants. Additionally, humanitarians not knowing how hazards (e.g. floods, volcanoes) or resource extraction represent livelihood opportunities was noted as negatively impacting peoples' capacities for recovery. There are challenges where peoples' lack of access to finance or opportunities mean that they have no choice to support living away from hazards, leading to bad practice and negative outcomes from relocation programmes. Understanding and acknowledging indigenous knowledge and linking this with science and build back safer messaging was reported as a challenge, and an aspect in an emergency that is difficult to find the space for to build trust and dialogue. It should also be recognised that understanding people's priorities and trauma after conflict and disasters is one of the many aspects essential for research ethics (Gaillard and Peek, 2019).

"We are focused on what we know and nothing else".

Communicating with each other: Two main themes emerged around the geoscience and humanitarian shelter communities working together (1) language and (2) networks. Different languages are used across the different sectors, which are different again from communities and authorities - "layers of communication". Shelter practitioners are often not aware of the geoscience information available to inform decision making, nor do they fully understand multi-hazard or cascading hazard contexts. Conversely, geoscientists may not know how humanitarian systems function. Building networks that function at different stages of the humanitarian response is a challenge, and often personal relationships are relied upon which are difficult to replicate at scale.

"If you don't communicate what you know to those who need or want to know you might have well not have bothered."

Local geoscientists: Linking with local scientists and engineers was acknowledged as a key solution to ensure appropriate communication and ensure sustainability of DRR activities. However, aspects such as short-term placements, colonialist attitudes of international scientists

and lack of capacity within local organisations were provided as challenges in effective engagement.

Multi-disciplinary working and holistic approaches: Throughout the meeting discussions there was acknowledgement that there is a need for multi-disciplinary working at the right time and the right scale. Different communities - DRR, shelter, geoscience and engineering often don't speak to each other until there is an emergency, when there is not the time to engage properly. For shelter practitioners, there are huge challenges with the number of different aspects they have to contend with in a response, from programme management, tenure and legal aspects of shelter, infrastructure, livelihoods, protection, DRR and shelter. There is often a lack of time, capacity and funding in the humanitarian sector to engage fully with multi-disciplinary approaches.

"When we have a lot of engineers, we find engineered solutions...not social".

Funding models: The humanitarian shelter sector reported major challenges with access to preparedness funding, with most money provided for response. During response, it is more difficult to engage geoscientists with risk reduction activities due to competing priorities.

Geoscience data: Often there is a disconnect between the granularity of data that can be provided by geoscientists and what is wanted, and needed, by humanitarian actors. An example from the Philippines was provided where community-level risk maps would have been useful for shelter and settlements planning, yet this level of data didn't exist. Geoscientists do not know what granularity of data are required and which form is most useful. There are challenges with finding the right scale of data, expertise, and how this might vary across different contexts. Questions were raised as to whether geoscience data could be used for advocacy, for example in cases of "no build zones" or significant land use changes that could lead to shelter issues.

Geoscience "rules of thumb": Rules of thumb, such as key messages for different hazard types and "how to spot" dangers in the landscape are wanted by humanitarian practitioners and do exist within the sector. Geoscientists challenge that these can be badly conceived and interpreted, and the nuance of different contexts are often lost. Sometimes, scientists and engineers are not comfortable in engaging in informal settlements outside of building controls; this is a challenging area where ethics meets professional integrity.

Figure 2 Keywords emerging from the discussions about challenges © CARE International

4 Discussion Session 2 - Ways to strengthen links between geoscientists and shelter practitioners

For Discussion Session 2, participants were asked to consider what they had heard in the conversations and mini presentations and to think about ways that geoscientists and humanitarian decision makers could work together or actions that need to be taken to tackle some of the challenges discussed. These are the main points from the discussions.

Practical ways to bring geoscience and humanitarian practice together

- Existing shelter tools being developed as part of the GCRF "Self-recovery from humanitarian crises" project could be assessed by geoscientists (see next steps).
- Existing tools in shelter, such as the Participatory Approach for Safe Shelter Awareness tool (PASSA), could be reviewed by geoscientists. Ongoing projects, such as the Protocol for Informing Choice for Better Shelter, which aims to develop shelter communications materials, may benefit from geoscience input.
- A number of gaps in research emerged relating to community preparedness, hazard communications, community-based hazard monitoring, landscape memories and participatory mapping that could be explored as part of future funding calls.

Enhancing humanitarian shelter practice

- Better capture and recognise land systems during assessment as a space for creating a shared language about risk with communities.
- Strengthen links with development actors who may be able to address risks that are outside the scope of intervention in humanitarian context.
- Bring geoscience input into the participatory mapping process. This holistic mapping technique incorporates different perspectives within communities and captures tangible and intangible aspects of the environment. It may capture important aspects, such as markets, that are essential for self-recovery but may be impacted by hazards.
- Explore how the physical environment and other risks could be brought into area-based approaches. These multi-sectoral approaches are typically used in urban settings and use a geographic location, rather than a particular group of people, to detail humanitarian response and recovery. Is there an appropriate place for using aspects of the physical environment to determine the area not only in urban settings?
- Formalise arrangements with local engineers and scientists. Link experts to community members would be a good step towards ensuring continuity and availability of information.

Enhancing geoscience practice

- Explore potential opportunities for geoscientists to provide input to a response.
- Provision of information from both sides about how a humanitarian response "works" and what kinds of geoscience information could be available.
- Build understanding of the ways in which geoscience can support humanitarian response (e.g. what information is useful and in what format?) and an appreciation for the complexities of different disaster settings.
- Make it clear to the humanitarian sector what information is (and is not) available.
- Identify where geoscience information could be shared so that it is accessible to humanitarian practitioners. Potentially involve an agency like Map Action in future discussions.
- Where geoscience research potentially has an impact in humanitarian response and / or recovery, use this network to share that information. Avoid research stuck behind paywalls.
- Building relationships and networks – 'start, start anywhere'
- Do not underestimate local scientific capacity.
- Be aware that short-term placements and sector-specific jargon can create barriers to geoscientists and humanitarian practitioners working together.

- Create spaces for interdisciplinary/multi-sector conversations.
- Recognise the value of informal, personal relationships as well as the need for more formal networks/structures.
- Conduct a review of existing networks to see what might work for bringing the humanitarian and geoscience sectors together, recognising that a blended top-down and bottom-up approach might be necessary.
- Build on/work with what's already in place in a country (e.g. standing shelter clusters)
- Strengthen links between DRR and humanitarian communities - these relationships should be in place prior to a disaster happening.
- Explore networks/network funding opportunities through professional bodies.

Learning

- Learn from other sectors such as WaSH and their approach to community projects.
- Examples of where the relationship between geoscientists and humanitarian practitioners has worked well, and where it hasn't worked well would be helpful to understand the scope of the two sectors working together and where this could be improved.

Funding

- Explore potential funding models and sources to support long-term collaboration between the sectors. For example, short-term research funding coupled with long-term NGO presence in a country. It will likely require a blended approach drawing on multiple funding sources.
- A network is really required ahead of funding calls to ensure bids can be successful.

5 The way forward

5.1 OUTPUTS FROM THIS WORKSHOP

Concrete outputs from this workshop completed / underway include:

- Workshop report and dissemination through geoscience and humanitarian shelter networks.
- Joint submission to the UKADR 2021 conference that highlights the discussions.
- Presentation for the UK Shelter Forum - next meeting potentially themed around decision making.
- Shelter Self-recovery Guidance currently being developed as part of the GCRF Translations Project will have a section on barriers to self-recovery. The physical environment will be included, along with capturing community hazard perceptions and understanding in context analyses.

5.2 NEXT STEPS

Longer-term next steps include:

- Shelter context analysis work that aims to capture more than the technical shelter aspects, and Shelter Response Profiles that include hazard information, would benefit from geoscience input.
    - **Action**: Please contact Enrique at CRAterre to support (e.sevillano.gutierrez@gmail.com).
- Build an interdisciplinary network that starts with this group to respond to future funding calls, starting with the British Academy Knowledge Frontiers 2021 call.
    - **Action**: Contact Susanne Sargeant at BGS (slsa@bgs.ac.uk) / Charles Parrack at CENDEP (cparrack@brookes.ac.uk) if you're interested in meeting in early September.
- Review of existing networks to see what might work for bringing the humanitarian and geoscience sectors together, recognising that a blended top-down and bottom-up

approach might be necessary. It is recognised that a stronger network could help to work on many of the challenges identified including hazard communication & understanding, links with local geoscientists and knowing where to obtain geoscience assistance when required.
    - **Action**: Members of the GCRF Research Translations "Self-recovery from humanitarian crises" project to take this forward. Please get in touch with Charles Parrack if you are interested.
- Collate case studies of geoscience and humanitarian shelter linkages in action, or where linkages were required to inform response planning. Should cover both positive and negative experiences, identifying what lessons can be learned and how they can improve practice on both sides.
    - **Action**: Beth at CARE (simons@careinternational.org) to look at this. Please get in touch if you are interested.
- Collate existing "rules of thumb" or default positions to consider that exist in shelter & settlements materials for sharing with the geoscience community. Review to see whether there are common themes relating to particular hazards and consider whether something could be provided that covers common questions humanitarian shelter practitioners might ask.
    - **Action**: This was a major discussion point of the meeting and requires someone to lead it.

Appendix 1 List of participants

- *Addis Ababa University*: Getnet Mewa
- *British Geological Survey*: Anna Hicks, Colm Jordan, Donald John MacAllister, Susanne Sargeant, Charlotte Vye-Brown
- *CARE International UK*: Bill Flinn, Step Haiselden, James Morgan, Amelia Rule, Beth Simons, Emma Weinstein Sheffield
- *CRAterre-AE&CC*: Eugénie Crété, Enrique Sevillano Gutiérrez
- *CRS*: Lorenza Esquinca, Cristina García, Jamie Richardson
- *German Red Cross*: Sonia Molina Metzger
- *Habitat for Humanity*: Pia Jensen
- *IFRC / Global Shelter Cluster*: Cecilia Schmöelzer
- *Independents*: Fabian Prideaux, John Twigg
- *Loughborough University*: Ksenia Chmutina, Tom Dijkstra
- *Oxford Brookes University*: Charles Parrack, Sue Webb
- *Tribhuvan University*: Basanta Raj Adhikari
- *University of Bristol*: Liz Holcombe
- *University of Oxford*: Tamarah King
- *University of Portsmouth*: Andy Gibson

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