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'Capacity building and preparedness for multi-hazards in Ethiopia' workshop report

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BRITISH GEOLOGICAL SURVEY

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'Capacity building and preparedness for multi-hazards in Ethiopia' workshop report

C Vye-Brown

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View of ground fissuring in the Dabbahu rift axis, Afar, Ethiopia.

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Foreword

This report is the published summary report resulting from a workshop held in Addis Ababa on the 13th January 2012 in association with the Magmatic Rifting and Active Volcanism Conference organised by the Afar Rift Consortium. The workshop brought together Ethiopian and international stakeholders from industry, academia, government departments and administration as a multi-disciplinary, cross-institute group to discuss needs, capacity building, preparedness and knowledge of multi-hazards in Ethiopia. The workshop focused on volcanic and earthquake hazards with discussion of landslide hazards and recent research arising from the NERC-funded Afar Rift Consortium. These data may contribute in the future to hazard and risk analyses and assessments and identify crucial areas for future investment and development to reduce risk and increase resilience to geohazards in Ethiopia.

Acknowledgements

We would like to acknowledge Dr Getnet Mewa, Head of the Natural Hazards Division of the Geological Survey of Ethiopia for assistance in organising the workshop. Colleagues from Addis Ababa University within the Institute of Geophysics, Space Science and Astronomy (IGSSA) – Drs Atalay Ayele and Elias Lewi and the School of Earth Sciences – Prof Gezahegn Yirgu and Dr Asfawossen Asrat provided consultation prior to the workshop and advice on participants to ensure the success of the event. Finally, the Afar Rift Consortium, funded by NERC, requested BGS as project partners to lead the workshop and provided the financial support to enable participation of all workshop attendees and provided the logistical support alongside the Magmatic Rifting and Active Volcanism Conference.

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Summary

A workshop was organised and facilitated by BGS in collaboration with the Geological Survey of Ethiopia and Addis Ababa University on 13th January 2012 on ‘Capacity-building and preparedness for multi-hazards in Ethiopia’. The workshop was designed to bring together a multi-disciplinary, cross institute group of the Afar Rift Consortium members plus Ethiopian stakeholders to discuss the range of geohazards and potential impacts in Ethiopia and identify how to support and build in-country capacity for managing multi-hazards, facilitating preparedness and increasing resilience. The workshop occurred in conjunction with the Magmatic Rifting and Active Volcanism Conference in Addis Ababa in January 2012 and discussions were used to formulate a series of recommendations for future action that collectively could be used to increase the awareness of geohazards in Ethiopia, enable timely provision of science to support emergency responses, embed science in policy to reduce risk and increase resilience.

1 Introduction

Ethiopia suffers from the impacts of a range of natural hazards including: drought, flooding, earthquakes, ground cracking, landslides, volcanic eruptions and famine. Ethiopia is ranked eleventh of 233 countries in terms of vulnerability to physical climate impacts and ninth in terms of overall vulnerability (Centre for Global Development 2010). As a consequence of the high exposure, vulnerability and impacts, the country is the third highest recipient of bilateral aid from the UK (£329 m; DfID 2014). As a result, there have been advances in the levels of knowledge and expertise in DRM (Few et al. 2014). Science-based characterisation of natural hazards and collaboration are essential to support risk assessment and disaster risk management programmes (Paton et al. 2008).

From 2007-2012 the Afar Rift Consortium (ARC) conducted research into magmatism, rifting and volcanism in northern Ethiopia that contributed key new data to address the gaps in our knowledge. It became apparent during the research conducted by the ARC that the data arising from this multi-disciplinary project would enable consideration of volcanic hazards in Ethiopia by multiple stakeholders as well as the consideration of future actions for the mitigation of hazards and risks. There is evidence that volcanic activity and eruptions pose a risk in Ethiopia and there have been impacts from these geohazards in the past (EM-DAT; Yirgu et al. 2014). Based on data from 2000 to 2011 the average population growth rate is estimated to be 2.7% (Central Statistical Agency 2013) so the exposure and potential impacts from these geohazards in the future will increase in this highly populated region (Aspinall et al. 2011). The ARC project was amongst the first to enable monitoring of unrest and activity for a period of time in Ethiopia at sufficient resolution to identify the temporal and spatial evolution of magmatism. However, earthquakes and volcanoes still have a low impact in Ethiopia by comparison with other natural hazards (particularly drought). Volcanic hazards account for <1% of the hazards occurring on the African continent but this low occurrence rate does not mean that the current risk is low or may not pose a significant threat in the future (OFDA-CRED 2012).

This report summarises a workshop at which key results were presented to a diverse group of stakeholders to disseminate research produced by the ARC beyond academic circles. A one-day workshop was held in conjunction with the Magmatic Rifting and Active Volcanism Conference in Addis Ababa, Ethiopia on the 12th January 2012. The workshop was led by Dr Getnet Mewa, Head of Natural Hazards, at the Geological Survey of Ethiopia and was organised and facilitated by the Geological Survey of Ethiopia and a multi-disciplinary, cross institute group of the Afar Rift Consortium members. Financial support was provided by NERC and conference sponsors: Stratex (International and East Africa), IASPEI and BGS.

Invitations were extended to all attending the main conference and by specific invitation to Ethiopian and international government agencies, non-governmental organisations, and academics with specific interest in natural hazards in the East African Rift.

1.1 WORKSHOP AIM AND SPECIFIC OBJECTIVES

The workshop aimed to: 1) discuss the outcomes from the Afar Rift Consortium in terms of magmatism and volcanism and the implications for geohazards and potential impacts in the Afar Rift and across Ethiopia, and 2) identify how the international research community could collaborate with in-country scientists to best support and build in-country capacity for managing multi-hazards and facilitate preparedness to increase resilience.

It became clear during the consultation process that a workshop specifically on volcanic hazards was a narrow theme and engagement with scientists and practitioners with experience in other hazards would enable discussion of volcanic hazards and apply research experience from and to other natural hazards. As a result, the workshop was given the title of ‘Capacity building and preparedness for multi-hazards in Ethiopia’.

1.1.1 Aim

The overall goal of the meeting was to discuss the range of geohazards and potential impacts in Ethiopia and identify how to support and build in-country capacity for managing multi-hazards, facilitating preparedness and increasing resilience.

1.1.2 Specific objectives

The specific objectives of the workshop were agreed between the management committee of the Afar Rift Consortium and Ethiopian collaborators at AAU. The objectives were to:

1. present the current levels of volcanic and seismic activity and likely hazards and impacts to key national and international stakeholders;
2. evaluate requirements for the development and support of geohazard monitoring, assessment and mitigation;
3. investigate methods of dissemination of hazard information;
4. identify what information, tools and techniques are needed to address vulnerability;
5. discuss a strategy for increasing resilience to geohazards in Ethiopia in the context of development.

1.2 PROGRAMME

The workshop consisted of a series of presentations from invited speakers on new research and methods being applied in Ethiopia to volcanic hazards and risk, earthquakes and landslides. The afternoon session was allocated for breakout group discussions on a series of themes to gain the collective response from participants as well as a roundtable discussion. Group and individual responses were encouraged.

- | | |
|-------|--|
| 09:00 | Opening ceremony and welcome – Mr Tolosa Shagi (State Minister, Ministry of Mines), Getnet Mewa (GSE, Ethiopia) |
| 09:20 | Introduction to natural hazards, risk and vulnerability – Steve Sparks (Bristol University, UK) |
| 09:50 | Practices and challenges of geohazard mapping in Ethiopia – Getnet Mewa (GSE / Ministry of Mines, Ethiopia) |
| 10:15 | Report of the 2009 ICTP meeting and progress report for the EAR – Cindy Ebinger (University of Rochester, USA) |
| 10:40 | Summary of recent activity within the Afar region – Tim Wright (University of Leeds, UK) and Dereje Ayalew (AAU, Ethiopia) |
| 11:05 | Break |
| 11:35 | Monitoring earthquakes in Ethiopia and GEM – Atalay Ayele and Elias Lewi (AAU, Ethiopia) |
| 12:00 | Monitoring volcanic crises, building capacity and GVM – Sue Loughlin (BGS, UK) |
| 12:25 | Remote monitoring of Ethiopian volcanoes – Steve Tait (IPGP, France) |
| 12:50 | Break |
| 14:00 | Discussion – chaired by Steve Sparks (Bristol University) |
- How do we define geohazards – Kathy Cashman
 - What are the requirements for geohazard monitoring, assessment and mitigation – Atalay Ayele
 - How and to whom should hazard information be disseminated – Gezaheyn Yirgu

- What information, tools and techniques are needed to address vulnerability – Sue Loughlin
- How do we facilitate capacity building in each of these areas – Bekele Abebe
- How do we acquire funds to support disaster risk reduction work – Steve Sparks

16:20 Roundtable discussion – chaired by Getnet Mewa (GSE, Ethiopia)
‘Forward planning for increasing resilience to geohazards in Ethiopia’

16:50 Concluding remarks

1.3 PARTICIPANTS

In total, 38 people attended including participants from: Ethiopia, Cameroon, France, Israel, Italy, Switzerland, UK, and USA, representing universities, national geological surveys, non-governmental organisations and the UK Department for International Development (see supplementary information). This workshop enabled initial discussions on multi-disciplinary science advice in Ethiopia and identified routes and methods for integrating new findings into national and regional long-term planning.

Participants included:

Ethiopia Getnet Mewa* (GSE), Masresha Gebreselassie (GSE), Samuel Molla (GSE), Gezahegn Yirgu (AAU), Asfawossen Asrat (AAU), Atalay Ayele* (AAU), Tigistu Haile (AAU), Elias Lewi (AAU), Zemedede Abebe (RIPPLE), Misganaw Kassie Wubneh (AAU), Yoyesusw Bekele, Demis Alamirew, Addisu Hunegnaw, Fekadu Aduna, Ghislain Zangmo Tefogoum, Tadiwos Chernet, Tesfaye Kidane, Leta Alemayehu, Asmesias Ababy, Amos Salamon

Cameroon Mabel Wantim

Kenya Merlin Gountie Dedzo

Uganda Vincent Kato (Geological Survey of Uganda)

UK Charlotte Vye-Brown* (BGS), Tim Wright (University of Leeds), Steve Sparks* (University of Bristol), Sue Loughlin (BGS), Roger Callow (ODI), Shaun Hughes (DFID), Mohammednur Desissa (BGS Northern Ireland), Gareth Hearn (URS)

USA Kathy Cashman (Oregon University), Simon Carn (MTU), Cindy Ebinger (Rochester University)

Italy Giacomo Corti

France Steve Tait (IPGP), Jacques Varet (BRGM), Alexander Nercessian

Those underlined above gave presentations; * indicates Chair or convenor for a discussion session.

2 Process of collaboration

The ARC project built on the preceding Ethiopia Afar Geoscientific Lithospheric Experiment (EAGLE) project so that some of the personnel based in the UK and in Ethiopia had already collaborated successfully. A series of events and engagement activities were undertaken during the ARC project to enable effective collaboration. During the ARC project, joint fieldwork, meetings and conferences, and investigator visits in the UK and Addis Ababa enabled sharing of science and ideas. In addition to these activities, responses to volcanic eruptions in the research area required a rapid response and mobilisation to the eruption site to evaluate the activity and provide data to decision-makers. The activity in the research area was an opportunity to make research valuable to decision-makers and raise awareness of the potential impacts of volcanic

hazards. The team recognised a need as a result of these interactions for a discussion between all stakeholders to investigate how the UK-based research project could effectively assist and support the Ethiopian scientists to respond to in-country needs.

3 Workshop background

The workshop built on previous engagement activities including the ‘advanced workshop on evaluating, monitoring, and communicating volcanic and seismic hazards in East Africa’, held in 2009 (Aoudia et al., 2009). A concept note was circulated to a subset of the participants three months in advance of the workshop. This concept note was designed by a core group of participants from the Geological Survey of Ethiopia, Addis Ababa University and UK-based members of the Afar Rift Consortium who collectively contributed ideas for the aims, objectives, discussion themes and wording of the questions. As the workshop was advertised alongside the concurrent conference a full list of workshop participants was not known in advance of the event.

The workshop had high aspirations with particular aims and objectives to work toward integration of volcanic hazards and risk into national level disaster risk management. However, there was limited engagement with practitioners involved in disaster risk outwith the scientific community. Instead, the workshop formed a base foundation among in-country and international academics to create a network of partners to support future events.

Notes were taken during the meeting by C. Vye-Brown. Individual and anonymous contributions were offered using post-it notes for each discussion session and collected by C. Vye-Brown so that all views were collated even if time constraints due to the schedule curtailed discussion. Verbal summaries from each subsidiary group discussion were provided by each nominated group leader.

4 Workshop results

Results of the discussions and are presented in order of questions 1-6. The discussions focused on several actionable items which were agreed by participants during the meeting and are reported below as priorities for future work.

1. How do we define geohazards?

Geohazards are defined in Ethiopia as including: volcanoes, earthquakes, landslides, flooding and drought. Hydrometeorological hazards and landslides are the most common and have the highest impact in Ethiopia. Therefore, decision and policy makers have the greatest awareness and plans for disaster risk reduction and management for these hazards. The workshop was held to address multi-hazards rather than specifically limit any discussion to volcanic hazards. Although there are highly experienced seismologists, geodesists, and petrologists, there are no dedicated volcanologists in Ethiopia. In addition, volcanic hazards rank as a comparatively low priority by comparison with hydro-meteorological hazards, landslides, drought and famine. As many mitigation measures, planning and disaster management methods that are applied to other natural hazards can be adapted for responses to volcanic hazards the workshop considered how known hazards and risks could assist with planning for volcanic eruptions.

2. What are the requirements for geohazard monitoring, assessment and mitigation?

Requirements for geohazard monitoring, assessment and mitigation were numerous. The multi-disciplinary ARC research and the increased monitoring capacity afforded by instrumentation deployed to monitor activity from 2006-2012 provided invaluable insights into magmatism and volcanism in the Afar Rift. However, sustainability in monitoring is needed for DRM and investments by research projects to date provide some data but not the long-term permanent systems that are required. Capacity building is needed in Ethiopia for the acquisition of

instrumentation, software for data processing, and training. Furthermore, access to satellite data, mapping techniques and resources within which to assess vulnerability and risk are needed to develop hazard and risk products (e.g. maps, reports) in country. Researchers in Ethiopia do not conduct geohazard impact assessments for volcanic hazards. A key need in Ethiopia is the identification of resources, data and institutions that could be used to assess geohazards as well as collaboration with international colleagues.

3. How and to whom should hazard information be disseminated?

Hazard information should be disseminated to all stakeholders, at local and national levels. Integrated co-ordination between in-country departments is currently lacking but there is an established department (DRMFSS) to whom real-time data should be disseminated in the event of volcanic unrest and eruptions. It was suggested that the development of a group of scientists with complementary expertise to provide advice on natural hazards would help to raise the awareness of this area with DRMFSS as well as other government departments.

4. What information, tools and techniques are needed to address vulnerability?

Vulnerability and exposure to geohazards is not an area of knowledge or research that was particularly strong among the workshop participants. However, there was awareness of other resources and collaborations with academics working on hydrometeorological hazards that might enable future work on vulnerability.

5. How do we facilitate capacity building in each of these areas?

International collaboration and exchanges are important aspects of capacity building in Ethiopia. Aspects of capacity building can be incorporated into future research projects to further expand on the resources and capacity in Ethiopia. Funding for capacity building may be sought from development initiatives.

6. How do we acquire funds to support disaster risk reduction work?

Funding to support all of these areas of work, both the additional research and the application to DRR, could be sought internationally and in Ethiopia.

5 Recommendations

Several consistent themes were raised in the roundtable discussion on forward planning as priorities for action. The workshop was highlighted as the first in what is hoped to be a series of discussions between different Ethiopian and international stakeholders in natural hazards. Further discussions are needed with the leadership of these based in Ethiopia. Particular attention was drawn during this workshop to areas in which the international research community can work alongside Ethiopian colleagues to help Ethiopia achieve:

Local leadership and in-country co-ordination and engagement - Co-ordination by a national scientific team in country is essential to deliver, receive and share information, bring together expertise from across departments, enable decision-making and form a long-term mandate that includes work in non-emergency situations. This team could form an Ethiopian natural hazards scientific advisory group.

Hazard and risk communication - There is an outstanding need to identify further national and international organisations and personnel that are active in this field and to establish communication. Engagement between scientists and stakeholders in DRR and DRM is essential for effective communication and provision of timely and accurate scientific advice whether for short-term response to events or long-term planning. User needs assessments are required to identify appropriate communication pathways, institutional responsibilities and requirements for

data for both scenarios. In addition government to regional to local communication pathways need establishing.

Capacity building for strategic monitoring - Although a campaign network of seismometers and GPS instruments were deployed for the duration of the ARC project, this network was not maintained for the purpose of long-term monitoring of volcanic activity in Ethiopia. The local seismic network is primarily positioned for observing tectonic earthquakes. The network consists of 12 instruments distributed around Ethiopia. Therefore, identification and observation of volcanic eruptions in remote areas of Ethiopia is currently almost entirely reliant on satellite observations and dissemination of the observations by international researchers to Ethiopian colleagues. The Toulouse VAAC has responsibility for projecting the dispersion of volcanic ash in airspace across Africa. However there is no other formal method (e.g. utilising available satellite images) that is directly accessible in Ethiopia as a resource for in-country scientists and decision makers to monitor eruptions or unrest on the ground. Facilities development and training are essential in this area.

Funding - The perception of volcanic risks as low priority in Ethiopia is due in part to the fact that there have been no medium to large-scale volcanic eruptions in recent history and documented losses from eruptions have been relatively small. As a result there has been almost no investment in volcanic hazards and risk to date and awareness among decision-makers is low. Education is required to address this, led by Ethiopian scientists, operating as a single voice. Existing research in the fields of drought and famine in Ethiopia highlights the high costs of late humanitarian response by comparison with resilience building activities. Furthermore, it is understood that resilience-building activities are significant for the economic development of Ethiopia. There are several levels at which DRR is conducted and therefore funding could be sought: international, national and local. Prioritisation is needed, using existing hazards and risks assessments, to identify where the most difference can be made with limited resources.

6 Outcomes

In this case, the ARC gained a detailed understanding of the magmatic processes influencing recent volcanism in the Afar Depression and worked closely with Ethiopian colleagues. The ARC research achieved the aim of raising the awareness of volcanic hazards and identifying key stakeholders in Ethiopia. As a result of the workshop, it was agreed that a group of local scientists would form to manage future science advice collectively for geophysical hazards whether that was needed in response to an event, to raise awareness of these hazards in Ethiopia, to facilitate monitoring, or to collaborate on research. Integration of the skills and expertise in Ethiopia has the potential to make significant contributions to long-term planning for volcanic hazards in the future by making use of the foundations built during the ARC project.

The workshop was one tangible event of many interactions during the ARC collaboration. One of the key discussion items at the workshop was that monitoring needs to be maintained in the long-term to establish background levels and normal variation so that thresholds for changing behaviour can be identified. However, a key challenge is how the international community can assist in-country partners in establishing methods for reducing volcanic risk in a cost effective way in countries such as Ethiopia.

One of the outcomes of the ARC project is that volcanic hazards and risk research in Ethiopia secured follow-on funding from 2014-2019 in the RiftVolc project. This funding will enable the next steps in volcanic hazard and risk research in Ethiopia. In particular, investigating the potential future threat from volcanic activity through probabilistic volcanic hazard assessments and modelling at some volcanoes with high population exposures in the Main Ethiopian Rift; and regional assessment of risk under conditions of uncertainty. This research was developed in collaboration with Ethiopian scientists and decision makers to help facilitate future steps alongside

disaster risk management efforts within Ethiopia. The hazards work package in RiftVolc will take forward many of the issues raised in this workshop as part of the project research and impact plans.

7 Acknowledgements

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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>.

More information about the Afar Rift Consortium project can be found: <https://www.see.leeds.ac.uk/afar>

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