

Announcement of Opportunity

Funding for Scoping Studies

Increasing resilience to natural hazards in earthquake-prone and volcanic regions

(Date issued: 7 September 2010; closing date: 7 October 2010)

1. Summary

The [Research Councils UK \(RCUK\)](#) is commissioning a new interdisciplinary programme of research on resilience and vulnerability to seismic and volcanic-related natural hazards. The [Natural Environment Research Council \(NERC\)](#) is leading a joint programme with the [Economic and Social Research Council \(ESRC\)](#) as a contribution to the Research Councils UK (RCUK) '[Global Uncertainties](#)' Programme. This new £7M investment will support interdisciplinary, basic, applied and strategic research and will include an important element of knowledge transfer. The first round of funding will focus on capacity building.

The high-level goal of the programme is to build resilience in earthquake-prone and volcanic regions by reducing risks from multiple natural hazards, thereby increasing economic and social resilience to, and recovery from, high impact events. The strong interdisciplinary approach to research throughout this programme aims to improve forecasting and uptake of scientific advice and increase understanding of vulnerability and risk.

2. Announcement of Opportunity

The research programme will comprise a major grant round, preceded by scoping studies. RCUK is now inviting proposals for first round scoping study awards. The aim of these small studies is to facilitate interdisciplinary potential consortium groups to build and refine the focus of the main programme research agenda in potential study regions. Study outputs will be used by an Increasing Resilience to Natural Hazards (IRNH) Advisory Group to define the detail of the call for full consortia to undertake the main programme. The scoping studies could comprise, for example, of mapping the current research and community landscape - by evaluating the administrative framework within which scientific capacity will be built; and engaging with local communities, decision-makers and government in potential study regions in order to scope the key priorities within the research objectives from the stakeholder perspective. Applicants are also encouraged to use these awards as an opportunity to build interdisciplinary working and to identify potential opportunities for further collaboration.

3. Context

Earthquakes cause enormous human suffering, economic and social damage, and over the last two decades have accounted for the loss of well over 0.5 million lives, at a cost of billions of dollars¹. Volcanoes have caused 0.2 million deaths¹ over the last 200 years with commensurate large scale economic loss.

¹ Topics Geo Natural catastrophes 2008 Analyses, assessments, positions: Munich Re.

Further research effort is needed to enhance the understanding of the physical, social and economic processes behind such natural hazards, their effects and implications for their prediction and mitigation.

Long-term economic and social costs of disasters² resulting from earthquakes, volcanoes and associated hazards (e.g. landslides and mudflows), through damage to local, regional and national economies, impacts on long-term health, well-being, business, housing and households, and education are immense³, particularly in the developing world. Many scientists believe that the potential for a one million death disaster is accelerating and may be realised soon⁴.

Natural hazard-related losses are expanding rapidly¹, due to the increasing exposure and vulnerability of human populations in affected regions.¹ This is partly explained by population growth and urbanisation, but is also a result of poor utilisation of natural hazard and social science research evidence, during regional development planning as well as in emergency decision-making processes during and after a crisis. Combining and building on the strengths of social and natural science has the potential to significantly reduce these losses over time, and will help minimise vulnerability and long-term economic and social damage.

Every dollar spent in preparing for a natural disaster saves seven in response³. Society places increasing emphasis on mitigating risks and building economic and social resilience, for instance through capacity building and emergency preparation.⁵ This research programme, in harnessing and integrating the progress made by physical and social science in areas relevant to this agenda, can contribute to the preparation for and post-event management of such events.

The [full natural and social science cases developed by the NERC and the ESRC](#) should be referred to in conjunction with this paper.

4. Scope of the Call

This first call for proposals under the Increasing Resilience to Natural Hazards research programme will provide funding for small scale scoping studies. The scoping studies are expected to last no more than four months and are expected to start by December 2010 in order to feed into the development of the subsequent call for consortium grants. Applications should be made in the small grant format. Up to £200k is available in total for the scoping study and we expect to make up to 7 awards. The scoping studies are intended to address the research agenda described in Section 5, to refine this, and feed, via the IRNH Advisory Group, into developing the full call for consortia to undertake the main programme. This second funding opportunity will be announced next year with an anticipated closing date in May 2011.

Interdisciplinary applications are invited from potential consortium groups to evaluate research needs across natural, physical and social sciences, focusing on one of the research strands, but also recognising the inter-linkages between the two, particularly in relation to environmental,

² A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. (UNISDR Terminology on Disaster Risk Reduction 2008).

³ World Meteorological Office Bulletin. Interview with Sir David King April 2006 55 (2), 76

⁴ Natural Hazards Strategy: <http://www.nerc.ac.uk/about/strategy/documents.asp>

⁵ S. Sparks. Use the calm between the storms. Nature 450, 354 (2007)

economic and social resilience and post event management and recovery. This could comprise, for example, of mapping the current research and community landscape; evaluating the administrative framework within which scientific capacity will be built; building cross-disciplinary working; engaging with local communities, decision-makers and government in potential study regions; and, identifying potential opportunities for further collaboration. Applications are expected to adopt an interdisciplinary approach which will be reflected in the makeup of the consortia groups. Emphasis on local engagement and impact is encouraged.

A final report will be required from each funded study, and these will be drawn upon by the NERC and the ESRC to inform and shape the research programme's main call for proposals. This will be a large grant round with the aim of awarding one consortium per research strand (i.e. one studying earthquake-prone regions, the other volcanic), with funding set aside to ensure collaboration between the two to maximise synergies and knowledge transfer to all stakeholders. The announcement is anticipated April 2011, with an award length of 3-4 years.

The subsequent consortium grant round will be an open call – applications will also be accepted from consortia who did not apply at the small grant round, as well as building on those that did: these will need to demonstrate that they have considered local systems and will be likely to have a substantial impact in terms of sustained resilience. It is also recognised that certain members of the community may not intend to apply to the scoping study round but will at the later consortium round. These members will have the opportunity to feed in their perspectives on how to refine the strategic objectives via an on-line questionnaire, anticipated in January 2011 (please follow the NERC and ESRC's announcements pages).

5. Main Features and Themes of the *Increasing Resilience to Natural Hazards* programme

a. Overarching Aim

The overarching aim of the *Increasing Resilience to Natural Hazards* programme is to increase economic and social resilience to high-impact events in earthquake-prone and volcanic regions. This will be achieved by improving forecasting and uptake of scientific advice. For all communities from civil society to scientists to policy makers, the aim is to increase understanding of vulnerability and risk through interdisciplinary research with a view to minimising the impact of future events. The UK research community continues to play an instrumental role^{6,7} in the characterization of earthquakes, volcanoes, and associated landslide and mudflow events. Integration of social science research across the programme will enhance the potential for impact of the scientific gains by understanding the barriers to uptake of the evidence into policy and, hence, impacting upon the real-life scenarios of those affected by natural hazards, in the long and short term.

6 Subduction zone segmentation and controls on earthquake rupture: The 2004 and 2005 Sumatra earthquakes; Grant NE/D004381/1

7 How does the Earth's crust grow at divergent plate boundaries? A unique opportunity in Afar, Ethiopia. Grant NE/E007414/1

b. Programme Objectives

In the light of the evolving international disaster reduction agenda it is important that the UK focuses its efforts to ensure greatest future impact. This research programme has the following high level objectives, which the scoping studies funded under this call should seek to refine:

- a) to develop stress-strain change analysis to identify zones of greatest earthquake hazard;
- b) to temporally characterise volcanic hazards to inform decision-making in volcanic crises;
- c) to improve spatial and temporal characterisation of landslides and mudflows in earthquake-prone and volcanic regions;
- d) to increase the uptake of and responses to natural hazard advice in earthquake-prone, volcanic and other regions through improved risk analysis, community and policy maker engagement as well as governance and other social science research;
- e) to build economically and socially viable resilience into the assessment of, planning for, and management of natural hazards, with a specific focus on high consequence, regional-scale events in volcanic and earthquake-prone areas; and,
- f) to manage knowledge transfer to ensure lessons learnt from volcanic and earthquake disasters are also learnt in other areas, such as flooding.

Throughout this programme, volcanoes and earthquakes are used as a lens through which to focus the broader issue of uptake of natural hazard scientific advice. An important focus of the programme is to ensure that lessons learned from research on these events are transferable, particularly between the developing and developed world contexts, including the UK itself. The objectives listed above are also described along disciplinary lines. However, through these scoping studies, the programme hopes to achieve a more fully integrated approach to articulating and achieving these objectives.

c. Research Strands

Interdisciplinary whole-systems consortia grants will be funded and integrative activities between the consortia will be developed, including the award of two Knowledge Exchange fellowships during phase two to help maximise the impact of the consortia's work to knowledge exchange internationally and in the UK.

Research Strand 1: Earthquake Hazard, Resilience and Vulnerability

The first research strand will explore earthquake hazard, resilience and vulnerability. Recent research has made significant contributions to forensic studies of earthquakes in the determination of spatial patterns of inter-seismic strain rates, on fault interactions and the subsequent migration of seismic activity, that together allow quantitative assessments of the zones of greatest earthquake hazard⁸. This potentially provides an opportunity for rapid regional assessments of future risk, physical, economic and social, to support prioritisation of disaster mitigation measures through planning. They also allow identification of changing hazard patterns based upon near real-time assessment of stress on faults and fault populations. This, combined with insights that social science can bring to the problem (see below), has the potential to significantly reduce casualties through rapid assessment of areas within which aftershocks⁹ are most probable. Further development of such techniques by the UK community is encouraged, particularly to build on opportunities afforded by new geodetic technologies.

8 e.g. Update on Seismic Risk in Sumatra: Nalbant et al. Nature 435, 756. (2005).

9 e.g. McCloskey et al. Near-real-time aftershock hazard maps: Nature Geoscience 2, 154 - 155 (2009).

Research Strand 2: Volcanic Hazards, Resilience and Vulnerability

The second research strand focuses on volcanic hazards, and associated factors of resilience, vulnerability and recovery. Significant advances in process-based approaches to modelling volcanic behaviour have been made over the last decade. However, improved forecasts of the *timing* of volcanic hazards (e.g. explosive eruptions, lavas, pyroclastic flows of different magnitude and intensity) are urgently required to ensure disaster risk reduction. Recent advances in monitoring, process parameterisation (including use of proxies such as seismicity to model magma flow and phase changes), time series analysis, and finite element modelling techniques offer the potential to support near-real time volcanic hazard analysis to provide better advice in volcanic crises and for risk management. The programme aims to exploit potential advances in this area, coupled with engagement with the social sciences (see below), to ensure that the fullest possible benefits of new natural and physical science advances are realised.

d. Cross theme and integrative elements of the programme

Landslides and mudflow

Landslide and mudflow disasters are connected to both strands and may underpin either. A very high proportion of losses in earthquake-prone and volcanic regions are caused by landslides and mudflows activated during earthquakes or volcanic events. Significant scientific advances (particularly in the spatial characterization of such landslides, mudflows and lahars in relation to topographic effects, precipitation¹⁰ and hill-slope hydrology) provide considerable potential for development within risk management. Applicants are encouraged to consider these related disasters as part of their proposals under both research strands.

Integrating social science and environmental research

Applicants will be expected to develop innovative proposals that integrate the physical, environmental and social sciences, in order to meet the programme's aims with lasting impact. Applicants must demonstrate their potential to develop novel, cutting-edge physical science, however, social science approaches must also be used, for example, to improve and understand planning, assessment, decision-making, economic and social recovery management, and governance.

Common lessons and evidence to inform and shape policy and practice interventions are expected to arise from both research strands which will be transferable between each. Examples might include how to manage and facilitate economic recovery and development in the medium to long term following an event or improvements to civic response planning and tools.

Transferable Lessons – Knowledge Exchange

Identifying transferable lessons across these strands, to other natural hazard events, and between the developed and developing worlds is a critical element of the research programme. The programme will appoint two Knowledge Exchange Fellows who will facilitate knowledge exchange and communication with a full range of stakeholders. A key part of this will be driving exchange between consortia in each research strand and supporting a Strategic Advisor for the programme. Further details of these appointments will be included in the second call for proposals.

10 e.g. Meunier et al. Topographic site effects and the location of earthquake induced landslides doi:10.1016/j.epsl.2008.07.020

6. Guidance for Applicants

a. Eligibility

Principle Investigators on applications should be based at UK higher education institutions (HEIs) or independent research organisations (IROs) recognised by the NERC or the ESRC.

A list of IROs recognised by the UK Research Councils can be found online here:

<http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/documents/eligibilityiros.pdf>. Only those IROs recognised by the NERC or the ESRC are eligible to apply.

Co-Investigators must also be based at UK HEIs or recognised IROs, however international academics or organisations can be sub-contracted on to proposals as project partners.

b. Governance and Performance Management

An expert Strategic Advisor will oversee the integration of the various programme elements and an IRNH Advisory Group will advise the Programme Executive Board (PEB) on the delivery of the Research Programme.

Management, reporting and monitoring procedures will be in line with NERC policy, details of which can be found online at:

<http://www.nerc.ac.uk/about/delivery/documents/investments.pdf>

c. Assessment Procedure

Applications for the scoping studies invited under this call will be peer-reviewed by an interdisciplinary Assessment Panel against the criteria below. There will not be an opportunity for PI responses to the peer review.

- the prospects for excellent physical and social scientific progress in earthquake and volcanic hazard research;
- the importance of the question to be addressed, in terms of timeliness and potential for impact;
- the relevance of the research to policy makers and local communities;
- the interdisciplinary and integrative nature of the proposal and the added value provided through the collaboration;
- the innovation and novelty of the proposal; and,
- plans for managing knowledge transfer, public engagement and dissemination.

The NERC will manage the administration of this programme.

d. Programme Timetable

The timetable is as follows:

- i. open announcement of opportunity - published September 2010 (this document);
- ii. call closes – Thursday 7th October 2010;
- iii. panel meeting / awards announced early November 2010;
- iv. work must begin in early December 2010, with a completion of March 2011 at the latest;
- v. Announcement of Opportunity for 2nd round large grants is anticipated for April 2011.

e. Application Procedure

Application forms must be submitted via the [Joint Electronic Submissions \(JeS\)](#) system by **4pm on Thursday 7th October 2010**.

Please note that once the proposal is submitted by the applicant, it is then passed on to the lead organisation's submitter pool. It is only once the application has been submitted by the submitter pool that applications are received by the Research Councils. ***Please ensure that adequate time is allowed for this stage, to ensure that applications are received by the Research Councils before the deadline.***

Applicants must ensure that their application is received by **NERC** by 4pm on the closing date. Any application that is received after that time, is incomplete, or does not meet the eligibility criteria will be returned to the applicant and will not be considered.

The Principal Investigator must submit an application form detailing the financial request, together with the Case for Support and other attachments. All attachments submitted must be completed in single-spaced typescript of minimum font size 11 point, Times New Roman or Arial font, with margins of at least 2cm.

f. Application Form

Attachments should include:

- a Case for Support incorporating the Previous Track Record (up to 2 sides of A4 detailing all previous **relevant** research, awards and outcomes) and Description of Proposed Research (up to 2 sides of A4, including all necessary tables, references and figure). NB: This is one attachment in the JeS system;
- a separate Justification of Resources of up to 1 side of A4;
- CVs for all Principal and Co-Investigators named in the proposal (up to 2 sides A4 for each CV);
- CVs for named research staff (including Researcher Co-Investigators) and Visiting Researchers (up to 2 sides A4 for each CV);
- letters of support from any named Project Partners (up to 2 sides A4 each);
- application forms for Aircraft (ARSF and FAAM), HPC and Ship-time/Marine Equipment (if applicable);
- a Pathways to Impact Plan (up to 1 side A4). Full guidance on writing and submitting Pathways to Impact Plans can be found online at:
<http://www.nerc.ac.uk/funding/application/impactplans.asp>

In addition to the normal requirements for research grant proposals, the Case for Support should include details of all associated proposed and secured collaborations and co-funding.

7. Contact Us

Initial queries should be directed to:

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