



Science for Humanitarian Emergencies & Resilience (SHEAR) Catalyst grants

Closing date for Catalyst Outline bid proposals: 21 November 2017 at 16:00 GMT/UTC

Closing date for invited Full bid: 10 April 2018 at 16:00 BST/UTC+1

Information about your application, including the personal information provided on the forms, will be processed and stored electronically by the SHEAR Secretariat and representatives of SHEAR's Funders (NERC and DFID). The Information contained in your application may be passed on to external reviewers in confidence. Reviewers will be asked to destroy information after the review and selection process is complete.

Your application and personal information will be stored by the SHEAR programme for management purposes but will not be shared with other organisations outside the SHEAR partnership. We will use details provided in the application for correspondence about the call and may also use this information for future analyses of the performance of the programme.

By submitting your application to the SHEAR Programme you have indicated your acceptance of these data protection terms and conditions.

1. Summary

The Natural Environment Research Council (NERC) and Department for International Development (DFID) invite Outline Bid proposals for a Science for Humanitarian Emergencies and Resilience (SHEAR) catalyst grant research call. SHEAR is a 5-year interdisciplinary programme funded by DFID and NERC to improve understanding and monitoring of disaster risk and generate more reliable natural hazard prediction across South Asia and Sub-Saharan Africa.

This call will aim to support small projects with a maximum project size of £250k cost to NERC; with UK institutions eligible for 80% FEC with the usual exceptions paid at 100% and overseas organisations eligible for 100% direct project costs. The total available budget for this call is £2.5M and it is anticipated that 10-12 projects will be funded. It is expected that projects will start in September 2018 and have a maximum duration of two years.

Projects will be expected to focus on weather-related hazards such as floods and droughts, heatwaves and the events weather can trigger, such as landslides - and improving peoples' resilience to these, in Sub-Saharan Africa or South Asia. The Catalyst grants should not duplicate already funded research, including current SHEAR grants, but will compliment ongoing activities. They should be coherent activities to address the SHEAR goals. Projects that include an interdisciplinary approach are welcome.

All projects are required to have a Principal Investigator based in a UK Research Organisation eligible for NERC funding. Projects with co-investigators and researchers based in other organisations, particularly in low and middle-income countries, are strongly encouraged, but will receive funding through the lead research organisation.

The submission of an Outline Bid proposal is a requirement of the call. Outline Bid proposals must be submitted via the UK Research Councils' Joint Electronic Submission (Je-S) system before 16:00 GMT/UTC on 21 November 2017.

2. Background

2.1 Programme background

Science for Humanitarian Emergencies and Resilience (SHEAR) is a 5-year interdisciplinary research programme funded by DFID and NERC to improve understanding and monitoring of disaster risk and generate more reliable prediction across South Asia and Sub-Saharan Africa. It has four main scientific objectives:

- Improving risk assessment and prediction of drought and flooding.
- Enhancing multi-hazard risk assessment and monitoring across South Asia, with a focus on the interaction of 'cascading' hazards such as landslides.
- Strengthening understanding of the underlying drivers of risk toward more integrated, multi-hazard risk monitoring and warning systems.
- Getting the right information, to the right people in the right ways – research to enhance the uptake and use of risk information in practice.

SHEAR also had the following cross-cutting themes:

- Real-time monitoring of vulnerability and risk, including through novel applications of satellite and remote sensing data, social media, socioeconomic data, big data and others.
- Economics and social science of the communication and use of risk information in disaster resilience, preparedness and response
- Assessing and improving the reliability of forecasts for application in multi-hazard early warning systems and disaster resilience.

SHEAR aims to work with users to co-produce demand-led, people-centred science and solutions to improve risk assessment, preparedness and resilience to natural hazards. For SHEAR, it is equally important that projects deliver development impact as well as world leading science.

2.2 SHEAR Consortia call

The SHEAR Research Consortia Grants aim to undertake large-scale, complex and interdisciplinary research targeted at improving knowledge and providing tools to support decision making and reduce the impacts of natural disasters in Sub-Saharan Africa and South Asia.

The Research Consortia Grants call had two main research themes:

- World-leading research into hydrological controls on landslide hazard in South Asia as part of multi-hazard risk assessment and toward warning systems
- Flood and drought risk assessment, modelling and forecasting in Sub-Saharan Africa; including better understanding the multifaceted and complex drivers of risk and building toward more risk-based monitoring and warning systems.

The [NERC SHEAR programme website](#) has more detail on the Consortia call.

Four Consortia were funded, two on floods and droughts in Africa and two on landslides in South Asia.

The information below details the title, lead PI and broad scope of the existing projects.

Sub-Saharan Africa

- [Toward Forecast-based Preparedness Action \(ForPac\): Probabilistic forecast information for defensible preparedness decision-making and action](#) - Kenya / Greater Horn of Africa (GHA) (Lead PI: Professor Martin Todd, University of Sussex)
- [FATHUM: Forecasts for Anticipatory Humanitarian Action](#) - Mozambique, Uganda (Lead PI: Dr Elisabeth Stephens, University of Reading – Professor Hannah Cloke covering whilst Dr Stephens is on maternity leave)

South Asia

- [Landslide Multi-Hazard Risk Assessment, Preparedness & Early Warning in South Asia: Integrating Metrology, Landscape and Society \(LANDSLIP\)](#) – India (Lead PIs: Professor Bruce Malamud, King's College and Dr Helen Reeves, British Geological Survey)
- [Citizen science for landslide risk reduction and disaster resilience building in mountain regions](#) - Nepal (Lead PI: Dr Wouter Buytaert, Imperial College, London)

[NERC Grants on the Web](#) and Annex A provides further details on the funded projects.

The funded SHEAR Consortia PIs form a Consortium Coordination Team (CCT), which has responsibility for ensuring that there is coordination and integration scientifically across the projects.

2.3 SHEAR Studentships Cohort

The funded SHEAR Consortia project teams are leading a focused cohort of doctoral training students in SHEAR related research. The cohort is being commissioned and the research projects are still to be defined. The studentships will start in 2017/18 academic year.

2.4 SHEAR Knowledge Broker

SHEAR has a dedicated Knowledge Broker activity, led by Practical Action and Red Cross Climate Centre (RCCC). The Knowledge Broker team is tasked with maximising the impact of SHEAR by connecting and communicating with users, undertaking meta-analysis and other studies, and ensuring coherence across the projects and shared story lines.

Projects supported under this call, will be expected to work closely with the SHEAR Knowledge Broker whose responsibility is to facilitate the uptake of the outputs of the research.

2.5 Wider SHEAR programme links

The SHEAR programme also works with the World Bank Global Facility for Disaster Reduction and Recovery (GFDRR) to deliver an innovative toolkit of new open data and tools to support preparedness and resilience through a competitive challenge fund. For an overview of the Challenge Fund and projects and institutions supported, see the [GFDRR website](#). This partnership leverages GFDRR's on-the-ground expertise and networks to ensure that the outputs are demand-led and deliver value for money through building upon existing projects and delivering private sector contributions. Potential applicants may wish to build on this.

DFID also commissions ad hoc research through the SHEAR programme, for example monthly medium-term weather/climate forecasts, to warn of potential near-term extremes of relevance to the humanitarian community, to inform emergency preparedness and response activities.

3. Scope of Catalyst grant round

Projects will focus on weather-related hazards such as floods, droughts, heatwaves and the events weather can trigger, such as landslides - and improving peoples' resilience to these, in Sub-Saharan Africa or South Asia and will be expected to address one or more of the following research challenges:

- Improved understanding of the hydrological, geological and hydro-meteorological factors that determine the occurrence, duration and impact of the hazard/s and how they impact on local communities;
- Improved understanding of how governance, political interventions and societal factors influence the impact of the hazards and can contribute to better preparedness and resilience;
- Development of techniques for multi-hazard risk assessments by building on multi-hazard modelling to include cascading hazards¹ and concurrent hazards²;
- Development of improved impact models which take into account the vulnerability, exposure and capacity of the affected community;
- Development of integrated, multi-hazard risk monitoring and early warning systems;
- Improved understanding of how social and behavioural factors affect the communication, uptake and use of risk-based information and how this can be taken into account when designing effective monitoring and warning systems; and
- Expanding on existing ongoing research, in particular to scale-up to the regional/national level or to transfer approaches and methodologies to a different area

In order to achieve development impact, SHEAR will welcome interdisciplinary teams of researchers working with users through a co-design/co-production approach. Risk/hazard information end-users should have a role in defining the research questions and make a commitment to working as part of the projects to bring research into use to reduce the impacts of disasters.

The funded Catalyst grants should not duplicate the already funded work, including other SHEAR projects, will complement and where appropriate build on these activities. The Catalyst projects should be coherent activities to address some/all of the SHEAR goals. An interdisciplinary approach is welcomed to deliver the knowledge which will have demonstrable application in the real world.

The funders will seek to ensure that a balanced portfolio of case studies in Sub-Saharan Africa and South Asia (and across different countries within those regions) are supported that ensure the SHEAR programme objectives are fully addressed.

The expected outcome of the programme is improved research and innovation capacity and new collaborative partnerships in the UK, Sub-Saharan Africa and South Asia that will position the research community to respond to future calls, for example from the [Global Challenges Research Fund](#) and [Newton Fund](#).

¹ For instance generation of debris flows and downstream flooding, or flooding following valley blockage

² For instance wind and rain: storm surge and pluvial flooding

4. Programme Requirements

4.1 Programme Funding

This is an open call for proposals, which aims to support 10-12 small projects rather than large research projects. The total available budget for this call is £2.5M. The maximum project size is £250k cost to NERC (with UK institutions eligible for 80% FEC with the usual exceptions paid at 100% and overseas organisations eligible for 100% direct project costs). Projects will start in September 2018 and have a maximum duration of two years.

Projects must focus on either Sub-Saharan Africa or South Asia geographical regions. To reflect DFID's priorities at least half the available budget will be spent on research focused on low-income countries³ in these regions. Similarly, work in any relevant research discipline is eligible, but to align with NERC's priorities projects should include novel, innovative environmental science.

Awards will be made under the standard NERC research grant terms and conditions.

The call has two stages: an Outline Bid and an invited Full Proposal. The submission of an Outline Bid is a requirement for this programme and only applicants successful at the Outline Bid stage will be eligible to submit Full Proposals.

4.2 Eligible Research Organisations

All projects are required to have a Principal Investigator based in a UK Research Organisation eligible for NERC funding. Projects with co-investigators and researchers based in other organisations, particularly in low and middle-income countries, are strongly encouraged, but will receive funding through the lead research organisation.

NERC research and fellowship grants for all schemes may be held at approved UK Higher Education Institutions (HEIs), approved Research Council Institutes (RCIs) and approved Independent Research Organisations (IROs). Full details of approved RCIs and IROs can be found on the [RCUK website](#).

Non-UK organisations and other UK organisations not currently eligible to receive NERC funding⁴ cannot act as the lead organisation. Individuals based in these organisations may be named as a Co-Investigator (if a collaborator on the project and receiving funding through the grant), or a Project Partner (if providing significant cash or in kind contributions to the project) or a sub-contractor (if purely providing a service, with no intellectual property, author or other rights) and receive funds through the lead organisation.

It is important to highlight that the UK Research Organisation awarded the grant is responsible for the conduct and administration of the grant. It is accountable for the effective use of public funds, and must therefore ensure that all grant monies are subject to proper financial management processes. It is the Research Organisation's responsibility to ensure that expenditure on collaborations in the UK and abroad is subject to robust controls to ensure value for money and propriety and that all costs should be fully vouched and maintained for possible inspection and checks by, or on behalf of, the funding organisations (NERC and DFID).

³ See [DAC list of ODA Recipients](#) of low income countries

⁴ Funding for these organisations will come from DFID and not the Research Councils. These organisations will not be eligible for any other UK Research Council funding, unless specifically stated by an individual Council.

If any of the Research Organisations that receive funding from NERC wishes to sub-contract research to an overseas research organisation or include a Co-Investigator at an overseas research organisation then the UK Research Organisation must undertake due diligence checks to ensure that the funding will be appropriately used.

CGIAR organisations are eligible to be involved as part of an application with an eligible UK Principal Investigator. However, under DFID funding rules they should not apply as developing country partners since they have competitive international terms and conditions and are able to recruit internationally.

4.3 Research Roles and Eligibility

With the exception of project partners and 'staff' such as researchers and technicians, **individuals may be named on a maximum of two proposals submitted, and may be named as a lead Principal Investigator (PI) on only one.** The total time commitment across the applications with which they are involved should not exceed 100%. If individuals are named on more than two submitted proposals then additional proposals will be rejected, which may be to the detriment of both the individual and projects concerned.

Normal individual eligibility applies and the lead Research Organisation must be from a UK-based organisation and eligible to hold a NERC grant. Full information on individual eligibility and role descriptions can be found under Section C of the [NERC Grants Handbook](#).

4.4 Associated Studentships on a Proposal

Associated studentships (either Masters or PhD studentships) cannot be included on proposals submitted to this programme.

4.5 Programme Level Coordination and Integration

Representatives from all the funded projects will be expected to attend a programme kick-off coordination meeting in November 2018 (date and venue tbc). This meeting will provide an opportunity for the Catalyst grant project teams to meet each other, the funded Consortia projects and the Knowledge Broker in order to gain an overview of the broader SHEAR funded research.

SHEAR will be a strongly integrated Programme and the expectation is that PIs of funded projects will work together, with the existing PIs of the Research Consortium Consortia Coordination Team (CCT), the SHEAR Knowledge Broker and NERC and DFID as required. This includes participating in Programme-wide activities such as one-day cross-SHEAR workshops.

Each project is also expected to feed into the SHEAR programme level reporting requirements. This includes feeding into the Knowledge Broker on progress periodically for the NERC biannual programme reporting and the DFID Annual Review. Projects may be required to respond to other ad hoc queries for information from NERC and DFID.

5 How to apply

5.1 Outline Bid stage

Proposals for Outline bids must be submitted via the [Joint Electronic Submission \(Je-S\)](#) system by 16:00 GMT/UTC on 21 November 2017

The Outline Bid stage will be used to identify a number of projects to be invited to the Full Bid stage. One Outline Bid submission is required for each proposed project, it is expected that the Outline Bid will be submitted by the UK lead Principal Investigator. **Applications not**

submitted to NERC by the 16:00 deadline or where the proforma is incomplete or has exceeded the page limits will not be accepted.

All applications must be submitted in English and costed in pounds sterling (£/GBP).

In order to prepare a Je-S Outline Bid proposal submission the person preparing the proposal has to create a new proposal. The process for this is as follows:

- On logging into Je-S select the Research Council – NERC
- Select the Document type 'Outline Bids (FEC)'
- Select Scheme – 'Outline Bids (FEC)'
- Select call 'SHEAR Catalyst Outlines'

All applications must be submitted using single-spaced typescript of minimum font size 11 point Arial font or other sans serif typeface of equivalent size to Arial 11 with margins of at least 2 cm. References must also be presented in minimum font size 11 point. Arial narrow and Calibri are not allowable font types. Page limit restrictions apply and should be adhered to. Failure to adhere to these guidelines will result in rejection of your application. Please note that on submission all non-PDF documents are converted to PDF and the use of non-standard fonts may result in errors or font conversion.

Additionally where non-standard fonts are present, and even if the converted PDF document may look unaffected in the Je-S System, when it is imported into the Research Councils Grants System some information may be removed. We therefore recommend that where a document contains any non-standard fonts (scientific notation, diagrams etc.), the document should be converted to PDF prior to attaching it to the proposal.

Full Guidance on the application process, including details of eligible costs, is available in the [NERC Research Grants Handbook](#).

In order to prepare a Je-S proposal submission, the person preparing the proposal has to log onto Je-S and create a new proposal. Note that this person must have previously created an individual Je-S account for themselves. This should be done well in advance of the application deadline as there may be some delay in the approval of an individual Je-S account.

For the full proposal stage, any individuals that will be named on the application (with the exception of Project Partners and sub-contractors) must have an individual Je-S account for themselves or will need to create an account in order to be added to an application. It is also necessary for an individual's organisation to have been registered before they can register themselves. Guidance on how to register an organisation and how to create an individual Je-S account can be found [here](#). **For the outline stage only**, any overseas co-applicants who do not have Je-S accounts can be listed clearly (to include their organisation) in part 1 of the case for support instead.

5.1.1 Documents required at the Outline Bid stage

The Outline Bid application will comprise a Je-S pro-forma and a case for support attachment, which will include detail on the composition and experience of the team and description of proposed research. Details of what is required are given in this section.

The **Je-S pro-forma** has a series of sections that need to be completed:

- Title of the proposal
- Applicants
- Objectives
- Impact Summary

- Summary
- Summary of Resources requested
- Cash and In-Kind Project Partner contributions

The **Case for Support** is comprised of two parts:

- 1) Previous Track Record – **up to 2 sides of A4** including the composition and experience of the research team.
- 2) Description of Proposed Research – **up to 2 sides of A4** including the following information:
 - Objectives and anticipated outputs, demonstrating how the outputs will contribute to the delivery of the SHEAR programme objectives; and
 - Outline of research proposed and how it fits the scope and addresses the scientific objectives of the call.
 - Summary of potential impact including how the research will contribute to better preparedness and improved resilience

Full Pathways to Impact, Official Development Assistance (ODA) Statement and Data Management plan are not required at the Outline Bid stage, but will be required for full proposals.

Applicants will be informed in January 2018 if they are to be invited to proceed to the Full Bid stage. Further details of the Full Bid application process will be provided at this time.

5.1.2 Project Finances

The indicative financial cost of the project should be identified in the outline Je-S proforma at this stage. All applicants are advised to consult their institutional finance officers when completing the financial parts of the application.

A full Justification of Resources and detailed budget will be required at the full bid stage and the information provided below is to enable applicants to ensure the indicative budget is realistic for the research proposed.

Details of eligible costs are given in the [NERC Research Grants Handbook](#). All costs should be in pounds sterling (£/GBP).

The maximum project size is £250k cost to NERC; with UK institutions eligible for 80% FEC with the usual exceptions paid at 100% and overseas organisations eligible for 100% direct project costs (including overheads and any NERC facility costs). Any applications which go over the budget of £250k will be automatically rejected. UK based organisations will receive 80% (FEC) with the usual exceptions paid at 100% while the non-UK organisations can request 100% direct costs.

As per normal NERC rules NERC will not provide additional funding to cover fluctuations in exchange rates.

UK and non-UK organisational budget is indicated below:

UK Organisational Budgets:

- UK organisations will receive 80% of the full economic cost of the project, as per standard Research Council funding rules. UK universities are required to calculate the FEC using the “TRAC” (Transparent Approach to Costing) methodology.

- Other eligible UK organisations use an equivalent methodology, which has been validated by the Research Councils.
- Overseas travel and expenses costs incurred by members of UK institutions will be paid at 80% and must be included as costs related to that UK institution.

Non-UK Organisation Budgets:

- Non-UK organisations are expected to be able to comply with full and transparent costing for budget elements.
- Non UK organisations will be supported at 100% of the Directly Incurred costs of the research (e.g. staff, Travel, consumables).
- In addition indirect costs (including estates costs) maybe charged on staff salary and other staff-related costs (i.e. statutory contributions analogous to UK National Insurance or Superannuation contributions).
- Overheads may not be charged on non-staff related direct costs, for example, equipment, travel and subsistence, consultancies, conferences, etc.
- The following rates for indirect costs should be applied: - for applicants from low and middle-income countries, the rate is 50%; for applicants from high-income countries and CGIAR institutes the rate is 20%.
- For further guidance on what overhead budgets can be used please see [NERC Research Grants Handbook](#)
- Non-UK organisations should not enter any costs in the 'Estates' section of Je-S. All overheads should be entered as an 'Other Directly Incurred Cost' of Je-S.
- Non-UK organisations should identify all costs as an 'Exception' on Je-S, using the exceptions tick boxes, for the full (100%) cost to be paid.
- Costs from UK and Non-UK organisations should be entered as separate items. For example T&S costs for field work should be entered as two separate lines i.e. that related to UK organisations payable at 80% and that related to non-UK organisations payable at 100%, by using the Exception tick box.

5.2 Full Bid stage

Only applicants successful at the Outline Bid stage will be invited to proceed to the Full Bid stage. It is expected that proposals will evolve between the Outline Bid and the Full Bid (including personnel and partnerships), but the major science elements are expected to remain broadly the same, within the confines of any feedback from the Outline Bid stage. Similarly, the Principal Investigator should not change between the Outline and Full Bid stages. Applicants considering any significant changes in the scope of a project should agree any significant proposed changes with NERC prior to submitting their Full Proposals.

Details on the submission and assessment procedures for Full Bids will be provided to the PIs of successful Outline Bids. At the Full Bid stage applicants should submit their proposal as a single Je-S application only. Joint applications are not allowed for this call. This call will award funds to the lead institution named on each application, which will then be responsible for disbursing funds to other institutions/organisations named on that application.

6 Assessment Process

All Outline Bids received will be assessed by an Assessment Panel to shortlist those that will be invited to submit Full Bids. Any sift of proposals will be made on the basis of the likely fit of applications to requirements of the call. Applicants will be given brief feedback from the Panel summarising the reasons why the application was successful/unsuccessful. No further feedback will be available.

7 Timetable

- Outline Bid AO published w/c 11 September 2017
- Outline Bid call closes 21 November 2017
- Outline Bid Sift Panel w/c 8 January 2018
- Full Bids Invited w/c 22 January 2018
- Full Bid call closes 10 April 2018
- Assessment Panel May 2018
- Grants start date 1 September 2018
- Kick-off workshop November 2018

8 Contacts

All queries should be directed to the SHEAR programme secretariat: Daniel Knight
shear@nerc.ac.uk

Annex A – Funded Consortia projects objectives

➤ **Sub-Saharan Africa**

[Toward Forecast-based Preparedness Action \(ForPac\): Probabilistic forecast information for defensible preparedness decision-making and action](#) - Kenya / Greater Horn of Africa (GHA)

(Lead PI: Professor Martin Todd, University of Sussex)

- **Abstract:** Drought and flood events remain a major threat to lives and livelihoods in sub-Saharan Africa, with significant impacts on long term development, due to the high exposure and vulnerability of populations. Existing early warning systems (EWS) whilst improving remain insufficient to protect vulnerable populations. Too often agencies and communities are only able to respond after a disaster has occurred rather than in advance, for a number of complex reasons. This project will address two of the primary limitations of EWS that hinder effective action in the face of hazard risks by; 1. Increasing the credibility and pertinence of hazard forecasts, by developing improved weather-climate forecasts and associated livelihood impacts over a range of 'seamless' lead times from days to seasons. 2. Overcoming barriers to preparedness action in advance of hazard events through the development and trialling of systematic and defensible approaches based on forecast information. Our project consortium brings together research institutes in the UK and East Africa with expertise in forecasting science, hazard impacts and vulnerability, with agencies responsible for EWS and humanitarian action. By building on these partnerships we will ensure effective collaboration, co-production and integration of research directly into practical application. Our project focuses on a set of existing EWS for flood and drought in Kenya, providing a platform for operationalizing and rapid uptake of results, new approaches and tools. The EWS case studies include both urban and rural contexts and are characteristic of hazard and development situations across much of Africa. We hope to share the benefits and lessons with similar systems across Africa . Our scientific advances will include development and evaluation of state-of-the-art weather-climate risk forecasts expressed in a probabilistic form. The physical basis of forecast skill will be established. These products will be linked to decision-relevant impacts on agricultural and pastoralist livelihoods. These products will be co-developed together with those agencies who operate EWS and plan for preparedness actions to ensure the pertinence and credibility of forecast products making them more suitable for uptake. We will incorporate these new forecast products into leading on-line hazard risk portals. Successful uptake into EWS will be facilitated through novel methodologies and practical tools of Forecast based Action that, by linking forecasts' attributes to risk reduction actions in well-defined action plans, which we hope will overcome institutional and technical barriers to preparedness action.

[FATHUM: Forecasts for Anticipatory Humanitarian Action](#) - Mozambique, Uganda

(Lead PI: Dr Elisabeth Stephens, University of Reading - Professor Hannah Cloke covering whilst Dr Stephens is on maternity leave)

- **Abstract:** Disaster managers and development planners from around the world have realized that their skills and expertise could be put into action well before an extreme event happens, to enormously reduce suffering and avoid catastrophe. While this type of action was historically not possible, new "Forecast-based Financing" systems are now being piloted in more than 15 countries. These pilots automatically trigger preparedness actions based on a forecast of an extreme event, providing financing before a potential disaster actually happens. However, in many flood-prone locations in sub Saharan Africa, the dynamics of flooding are not well understood, nor is there clarity on what should be done if certain types of flooding are forecasted. What is

driving the flooding, and the flood forecasts? What preparedness actions build resilience, and which ones undermine local capacities? The FATHUM team proposes to bring together a group of interdisciplinary researchers who will work with the existing pilots to analyze and research how this new type of Forecast-based Financing system can quickly respond to forecasts of extreme events, while still contributing to long-term resilience goals and reducing the need for disaster response. The first group of researchers will tackle flooding itself. A mixed group of hydrologists and climate scientists will explore the causes of different types of floods, and identify what atmospheric patterns could allow the most important types of floods to be predicted. Opening two positions for "Applied Forecasting Impact Fellows", much of the research will be carried out by scientists from the African regions that are being studied, and will culminate in recommendations and maps for predictability in other regions that could also implement such Forecast-based Financing systems. The second group of researchers, will explore further the "why" of flooding. They will investigate the reasons behind the fact that certain floods are more impactful than others, and identify patterns of resilience stemming from local and indigenous knowledge. This will be grounded in an understanding of the rapidly changing environment in sub-Saharan Africa, ultimately helping identify what forecast-based actions can contribute to long-term meaningful change. While there is a good deal of research on both resilience building and disaster response, disaster managers in the existing 15 pilots are struggling to understand what types of action can meaningfully fit in this "forecast-based" middle ground. FATHUM researchers will work directly with the practitioners to explore these answers. The third research group builds on the first two, examining more concretely how humanitarian systems are currently structured, and where Forecast-based Financing can fit in. Why do humanitarians not already make use of the many types of flood forecasts around the world? FATHUM will map the science-policy-practice interface to identify what promotes or inhibits the use of forecast information, and what "successful" use of such information really looks like. Lastly, the fourth research stream is an interdisciplinary group of researchers that will explore the potential and constraints for scaling up the concept of Forecast-based Financing. Integration with existing systems, such as safety nets and risk insurance schemes, will be explored collaboratively with the existing pilot projects. Ultimately, FATHUM is a novel combination: expertise from academia that is integrated seamlessly into existing disaster risk management projects, allowing practitioners to work with scientists to self-examine and reflect on a game-changing new way of working in the humanitarian sector. Critical scrutiny of the hydrometeorological aspects as well as the socioeconomic implications of taking action based on a forecast will provide a foundation for humanitarians and development practitioners worldwide to build on in their own applications of this concept.

➤ **South Asia**

[Landslide Multi-Hazard Risk Assessment, Preparedness & Early Warning in South Asia: Integrating Metrology, Landscape and Society \(LANDSLIP\)](#) – India

(Lead PIs: Professor Bruce Malamud, King's College and Dr Helen Reeves, British Geological Survey)

- **Abstract:** About 13% of Indian land mass is prone to landslides, with the Himalaya and Western Ghats regions particularly prone due to climate, geomorphology &

geology. Rainfall and earthquakes are the main triggers of these landslides, coupled with poor land management practices and increased development. The impact of landslides on people, business, culture and heritage can be considerable and wide-ranging, including fatalities, loss of agricultural land and infrastructure, and damage to ecosystems. LANDSLIP is a four-year grant (starting 11/2016) that brings together 36 physical and social scientists from three academic (KCL, Newcastle, Amrita), four government (BGS, CNR-IRPI, GSI, MetOffice) and two non-governmental organisations (Practical Action UK/India) in India, the UK and Italy. LANDSLIP's overall objectives are the following: (i) To enhance risk assessment and monitoring for hydrologically controlled landslides and related hazards in two main Indian study regions (Nilgiris; Darjeeling/East Sikkim), with a focus on *weather regimes, landslide domains and thresholds, societal factors and the interaction of 'cascading' hazards*. (ii) To develop methodologies on a *regional to catchment* spatial scale and a *seasonal to daily* temporal scale. (iii) To strengthen understanding of the underlying drivers of risk toward more integrated, multi-hazard landslide risk monitoring and warning systems. (iv) To get the right landslide information to the right people in the right ways (e.g., early warning systems, mobile networks, web-based gathering and dissemination of information to national/regional/local stakeholders including the public) including research to enhance the uptake and use of risk information in practice. LANDSLIP will explore replicability of methodologies developed in LANDSLIP for other landslide prone regions such as Uttarakhand, India and disseminate LANDSLIP project knowledge to the wider region of Southeast Asia (in particular, Afghanistan). Through advances in interdisciplinary science and application in practise, the collective ambition of this consortium is to contribute to better landslide risk assessment and early warning in a multi-hazard framework, and, by working with communities, better preparedness for hydrologically controlled landslides and related hazards on a slope to regional spatial scale and daily to seasonal temporal scale.

[Citizen science for landslide risk reduction and disaster resilience building in mountain regions](#) - Nepal

(Lead PI: *Dr Wouter Buytaert, Imperial College, London*)

- **Abstract:** Mountains are hotspot of natural disasters, in particular those related to landslides. At the same time, scientific understanding about the natural processes that cause these disasters is lagging behind, because of the complexity of the physical environment and the difficulties facing data collection. The impact of these disasters on society is very high, especially because mountain regions often host less developed infrastructure and vulnerable populations. As a result, there is an urgent need to improve our understanding about how natural disasters in mountain regions occur, how they can be mitigated, and how people at risk can be made more resilient. This proposal will leverage recent technological and conceptual breakthroughs in environmental data collection, processing and communication to leapfrog resilience building in data-scarce and poor mountain communities in South Asia. In particular, we identify three convergent evolutions that hold great promise. First, technological developments in sensor networks and data management allow for participatory and grass-roots data collection and citizen science. Second, web- and cloud based ICT makes it possible to build more powerful analysis and prediction systems, assimilating heterogeneous data sources and tracking uncertainties. Lastly,

this enables a more tailored and targeted flow of information for knowledge co-creation and decision-making. These evolutions are part of a trend towards more bottom-up and participatory approaches to the generation of scientific evidence that supports decision making on environmental processes, which is often referred to as "citizen science". We believe that a citizen science approach is particularly promising in remote mountain environments, because improving resilience and humanitarian response in these regions are inherently polycentric activities: a wide range of actors is involved in generating relevant information and scientific evidence, in decision-making and policy building, and in implementing actions both during a hazard and before and after. It is therefore paramount to strengthen the flow of information between these centres of activity, to make best use of existing knowledge, to identify the major knowledge gaps, and to allocate resources to eliminate these gaps. We will use the Karnali basin in Western Nepal as a pilot study. The Karnali basin is a remote and understudied basin that suffers from a complex interplay of natural hazards, including hydrologically-induced landslides and cascading hazards such as flooding. Over the last years, these hazards have caused serious damage to local infrastructure (e.g., roads, irrigation canals, houses, bridges) and affected livelihoods (e.g., 34760 families in the August 2014 floods). Using cost-effective sensor technologies, we will implement grass-roots monitoring of precipitation, river flow, soil moisture, and geomorphology. We will use those data to analyse meteorological extremes, and their impact on spatiotemporal patterns of landslide risk. By merging these data with other data sources such as satellite imagery, we aim to generate landslide risk maps at unprecedented resolution. At the same time, our participatory citizen science approach will enable us to design and implement a framework for bottom-up and polycentric community disaster resilience, based upon knowledge co-generation and sharing. Lastly, we will build upon the existing community-based flood early warning system implemented by our partner Practical Action Nepal, to create a comprehensive multi-hazard early warning system and knowledge exchange platform. For this, we will leverage recent developments in open-standards based, decentralized data processing and knowledge dissemination, such as mobile phones and web-interfaces.