

# Scientific Advisory Group for Emergencies – Nepal Earthquake

## Summary note of SAGE Teleconference

27 April 2015

1 Victoria Street, London

### List of participants

#### **Chair**

Mark Walport GCSA

#### **Members**

Vanessa Banks	BGS
Brian Baptie	BGS
Dave Britton	Met Office
Paul Cosford	PHE
Alex Densmore	Durham University
Tom Dijkstra	BGS
Philip England	University of Oxford
Colm Jordan	BGS
John McCloskey	University of Ulster
Alan McDonald	BGS
Katie Ovens	Durham University
John Rees	BGS
Susanne Sargeant	BGS
Julia Slingo	Met Office
Emily So	University of Cambridge
Bryan Wells	MOD
Chris Whitty	DFID

#### **Officials & Secretariat**

Patrick Bragoli	FCO
Emma Griffiths	GO-Science
Iain Hughes	GO-Science
Claudia Lally	GO-Science
Alex McLaughlin	DH
Marsha Quallo-Wright	GO-Science
Jasdeep Sandhu	DFID
Elizabeth Surkovic	GO-Science
Jack Wardle	GO-Science

#### **Apologies**

Sally Davies	DH
Robin Grimes	FCO

## ACTIONS

1. **BGS** (with input from the wider group) to develop revised worst case scenario mortality figure by 10:00am on 28 April. This figure to be based on evidence of a possible mortality rate of between 10% and 30% of people exposed to level VIII intensity shaking.
2. **Philip England and James Jackson** (in consultation with John McCloskey) to develop a paper setting out the most likely scenario with respect to further earthquakes and aftershocks. The paper to include a map showing clustering of activity to date and most likely sites of further activity.
3. **GO-Science** to set up mapping group to obtain and scrutinise satellite imagery of the region.
4. **Durham University** to share Nepal stakeholder map.
5. **PHE** to share situation reports from the WHO.
6. **Met Office** to continue to provide daily weather forecasts.

## **AGENDA ITEM 1: WELCOME**

GCSA welcomed participants to the SAGE meeting to consider the impacts of the earthquake in Nepal. Attendees were informed that they should continue to speak to the media in their capacity as experts but content from SAGE meetings was to be treated as confidential.

## **AGENDA ITEM 2: WORST CASE SCENARIO**

SAGE considered the worst case scenario figures produced by the US Geological Survey (USGS). No other data was available that conflicted with USGS figures. However, based on maps of the affected areas and a historical comparison with the 2008 Wenchuan earthquake, the mortality figure could be much higher. Estimates based on population data may not be reliable, especially in rural areas.

It was noted that 5.3 million people were exposed to intensity VIII (severe) shaking based on the Modified Mercalli Intensity Scale. In comparison with past earthquakes, it was estimated that mortality rates of between 10-30% of those exposed to this level of shaking could be expected. BGS were requested to revise the worst case scenario in light of this.

**Action 1 – BGS (with input from the wider group) to produce revised worst case scenario mortality figure by 10:00 on 28 April. This figure to be based on evidence of a possible mortality rate of between 10% and 30% of people exposed to level VIII intensity on the Modified Mercalli Intensity Scale.**

It was reported that buildings in Nepal are constructed with very little earthquake protection and would be prone to collapse. It was unlikely that there would be many survivors within collapsed buildings after 72 hours.

The Met office highlighted that the weather at the time of year was in general favourable for dealing with the impacts of the earthquake. However, heavy rain was expected over the next couple of days, especially in the mountains. After the rain the weather would improve and should provide a good window for relief operations.

## **AGENDA ITEM 3: AFTERSHOCKS**

Early aftershocks appeared to be located on the failing plane. Most future aftershocks were likely to follow this pattern, though off-fault aftershocks, whose location would be more challenging to forecast, could also cause significant damage.

Aftershocks were not likely to cause significant numbers of additional deaths, but knowing where they were likely to occur would help with planning assumptions. It was not possible to produce a quantitative assessment of aftershocks, but predictions would be made from information ascertained from early aftershocks.

It was noted that the earthquake was caused by 150 years' worth of strain slipping. The slip that caused the earthquake was reported not to have reached the surface. Studies of past earthquakes in the region highlight that the slip does eventually reach the surface, so the shallow part of this fault must slip eventually. Two scenarios exist: the shallow part of the fault would slip slowly, without earthquakes or it will slip in a future earthquake.

**Action 2 - Philip England and James Jackson (in consultation with John McCloskey) to write a paper setting out the most likely scenario with respect of further earthquakes and aftershocks. The paper to include a map showing clustering of activity to date and most likely sites of further activity.**

#### **AGENDA ITEM 4: LANDSLIDES**

The main shock triggered a number of landslides. Some of the slopes in Nepal rise by 2-3km which could result in very large landslides. Debris from these events could build up creating artificial dams. These structures would be unstable and could fail resulting in flooding downstream. Landslides could also have a major impact on infrastructure, including communication infrastructure.

Further landslides should be expected. These could be triggered by aftershocks or by the heavy rainfall expected. The onset of the monsoon in June would also result in landslides that could further hamper the recovery.

Satellite imagery would be needed as soon as possible to assess the impact of landslides and to identify areas at risk. This information should be used in identifying locations for temporary camps and new building work.

**Action 3 – Mapping group to be established to obtain and scrutinise satellite imagery of the region. First outputs to be produced in time for COBR tomorrow and to include guidelines about where new infrastructure should best be sited to protect it from the risk of landslides.**

**Action 4 – Met Office to continue to provide daily weather forecasts.**

#### **AGENDA ITEM 5: MAPPING**

Open source satellite imagery was available via the Copernicus Emergency Management Service and International Charter. China and India have already activated the Charter. A decision would be needed on whether to extend the Charter activation to other areas of interest once it was known which areas are being monitored by the current activation. Therefore, in addition to assessing the impact of landslides, the mapping group was requested to consider whether additional areas of satellite imagery would be needed.

#### **AGENDA ITEM 6: AOB**

SAGE identified a number of other areas of concern:

##### Water

Access to water in Kathmandu valley may be a concern. The area is highly dependent on ground water. There is a poor municipal supply in Kathmandu and people are reliant on personal or communal wells. Contamination of water supplies in this region is not unusual. The reliance on water tankers may be an issue as there could be access issues if the transport infrastructure has been affected.

Deep boreholes and borehole pumps could also have been destroyed by the earthquake. Shallow boreholes are less likely to have been destroyed but may still be affected if electric pumps were affected.

Some people in rural areas are reliant on natural springs for their water. The water supply is already low at this time of year.

## Communication

Through the Earthquakes without Frontiers project, Durham University had completed a Nepal stakeholder mapping exercise. This information could be of value to FCO and DFID in the response.

**Action 5 – Durham University to share Nepal stakeholder map.**

## Health

After injuries sustained from the earthquake the next major health concern would come from water-borne diseases (eg Cholera, Typhoid). The World Health Organization (WHO) will be producing regular situation updates.

**Action 6 - PHE to share WHO updates.**

## **SAGE Secretariat**