

RGS-IBG KS3 Module 3: Tectonic hazards and emergencies

Slide 1: Introduction

Welcome to the RGS-IBG KS3 teaching tutorial on Tectonic Hazards and Emergencies. The aim of this module is to provide a range of teaching ideas, information and resources that can support planning for and teaching of this topic in a KS3 context. There is an emphasis on making learning enjoyable as well as linking with the Key Concepts, Key Processes, Range, Content and Curriculum opportunities in the geography programme of study as well as promoting progression within the subject. It is hoped that as students learn about hazards that they will begin to understand the value of geography in bringing together the physical and human variables that make up an understanding of this topic

Slide 2: Overview

An awareness of hazards is a central part of geographical education at KS3. This module will look at a range of hazardous tectonic zones in a number of different geographical locations, including both middle income and lower income (MEDC) and (LEDC) contexts. Students find hazards an interesting topic because it deals with both the forces of nature and in a very human way, the consequences of and responses to natural emergencies. Well chosen video material is a good way to engage students with this topic, and there is a good supply of such educational material available on tectonic hazards. Teaching the topic requires an understanding of the natural processes, but also knowledge of local circumstances and specific events, and this information is provided as a series of case studies in the teacher download.

Slide 3: Key facts on Hazards

The study of hazards in geography connects physical events and human experience. In terms of the physical world one tectonic event can trigger another hazardous scenario and management of such episodes needs to anticipate such events. Moreover an emergency may also trigger disease, civil unrest and political instability. Close scrutiny of case study material and a careful analysis of cause and effect will provide the most stimulating means of delivering this topic.

Slide 4: Case Studies

This module looks at a number of recent tectonic events and areas vulnerable to tectonic activity due either to tectonic movement and/or their proximity to populated areas. These case studies include:

The Indian Ocean (2004) earthquake and tsunami
Kilauea, Hawaii: a volcano and area threatened by eruption
The Mount Merapi eruption in 2006 and the earthquake near Yogyakarta
(pronounced Jogjakarta) in Java, Indonesia
And Mount Vesuvius as a highly populated and hazardous area

If, however, you or your school has some connection with a different tectonic region then you might use the approaches suggested here with your own location.

Slide 5: Place

When a natural hazard becomes an emergency it highlights the vulnerability of a specific population. The profile of a hazard or a disaster depends not only on the physical event but also on the nature the local population, such as sleeping, heightened awareness or in the midst of evacuation. Imminent risks may be entirely mitigated if all residents are evacuated and if there are appropriate plans and infrastructure to do this. In order to understand the details of a hazard, one therefore needs to know about the event, local conditions and the way that people are likely to deal with it. As an example, there is some concern that the high population density in the foothills of the ever restless Mount Vesuvius, along with the lack of a sufficient evacuation infrastructure, leaves the region highly vulnerable, especially in holiday seasons. The risk profile of this area requires knowledge of a number of variables. Can you have your students choose a tectonic area and work out what factors would make preparations for a tectonic event difficult? There is a downloadable sheet available from this webpage to assist in this process.

Slide 6: Space

The understanding of hazards requires knowledge of a set of patterns and networks of places. Tectonic hazards are often related to one another by plate boundaries whilst bodies of water are capable of conveying tsunami across large distances. Perhaps you can investigate these linkages in your lesson. There is an information sheet available for download for you and your students from this webpage. Human behaviour also has an impact on the potential severity of tectonic events in that it has an impact on where people are, what they are doing and what precautions they have taken. The subduction (movement) of the Indo-Australian plate beneath the Eurasian Plate, on which much of Indonesia sits, is broadly the cause of all Indonesian tectonic activity and certainly the cause of the 2005 (magnitude 6.2) earthquake just south of Mount Merapi on Java which killed around 5000 people. Movements and adjustments along this plate can produce related episodes along its boundary and it is important that the behaviour of these plates, their boundaries and their proximity to local settlements be constantly monitored. Perhaps your students could look at a map of tectonic plates in an

atlas and correlate this with a list of recent tectonic events. **You will find a student worksheet on this topic downloadable from this page.**

Slide 7: Scale

Tectonic activity occurs due to large scale physical events deep in the earth. Whilst the causes of these events are massive natural phenomena, the impact of this activity whilst often widespread, is personal and individual. Natural emergencies impact upon families, children, schools, hospitals and can often have the greatest affect on those with the least resources to flee or protect themselves. Engaging with the local scale provides an opportunity for students to understand the impact on individuals whilst examining the geographical coverage of a disaster provides a powerful sense of the true scale of an emergency. Can you find a way to connect students with the real stories of people who had experienced such events? YouTube can be a good source of this information.

Slide 8: Interdependence

Natural hazards and local conditions affect each other. It is useful for geographers to look at the way local communities have coped with devastation in order that lessons may be learnt for the future and even for other places. It is also important to consider the way that places are supported by aid. After the Indian Ocean Tsunami \$7 billion USD flowed into affected areas, on a scale never before experienced. Can your students find out which countries provided the most aid, in absolute terms and per capita? Perhaps they could make a choropleth world map. **You will find a student worksheet on this topic downloadable from this page.**

Slide 9: Physical and Human Processes

Hazardous tectonic zones have often had a very significant impact on human systems. In the case of Kilauea and the Big Island of Hawaii, the volcanic landscape has attracted tourists, provided rich soil, forged local culture and traditions, created distinctive landscapes and been the source of often sudden and widespread change to the land and livelihoods of its residents. In many respects this has also been the experience on the east coast of the Bay of Naples, Italy, in the foothills of Mount Vesuvius. People living with tectonic activity have learnt to adapt to it. Settlements in each volcanic area, to some extent, reflect the way that a tectonic and hazardous landscape has been locally managed and utilised.

Slide 10: Environmental Interaction and sustainable development

Despite the risks associated with tectonic zones many volcanic areas have been incorporated into national parks, including Mount Vesuvius and the active volcanoes of Hawaii. Whilst aspects of volcanic terrain are typically environmentally robust, regenerating areas can have a fragile ecosystem. Here it is necessary that visitors are protected from the hazards of the park and that the park is also protected from visitors. Culturally, Hawaii has suffered as well as benefited from tourism as it has sometimes eroded traditional employment, such as fishing, in favour of seasonal, low paid casual work in tourism. Many locals feel that whilst Hawaii supports the needs of the tourist it sacrifices the well-being of its own people. The very landscape of vulnerability, which draws tourists in, needs careful management in order for the industry to be sustainable. Perhaps your students can search the internet or view travel brochures to find evidence of tourism that is sensitive to the local environment and culture.

Slide 11: Cultural Understanding and Diversity

In order to prepare for hazards and manage emergencies it is important to be aware of local conditions, traditions and circumstances. A failure to appreciate the way a local society works may significantly hamper evacuation and recovery. Could your class explore the signs that traditional communities have used to identify impending tectonic events and what responses they have historically taken. In planning for hazards it is necessary to be aware of the needs of local people if plans are to be effective. At Mount Merapi in the wake of an expected eruption, many residents defied evacuation orders instead returning home to tend to livestock and crops, their only means of livelihood. Could your students choose a hazardous tectonic region and consider some of the difficulties that might be encountered because of local circumstances? They could choose different times of the day and of the year to model temporal and seasonal variation. **You will find a student worksheet on this topic downloadable from this page.**

Slide 12: Pulling the threads together

Looking at tectonic hazards necessarily draws together a broad range of geographical phenomena. Not only does a hazard in itself need to be managed, but there is an array of economic, social, cultural and political dimensions that need to be negotiated. The study of hazards therefore brings students face to face with the reality of those facing disaster in different countries and challenges students to empathise with people from other cultures facing very difficult situations. The topic also reminds students of the way that places are connected with each other, structurally through continental plate boundaries, but also politically when aid is involved. With a little creative thinking there is much in the study of hazards to engage all students in the class.