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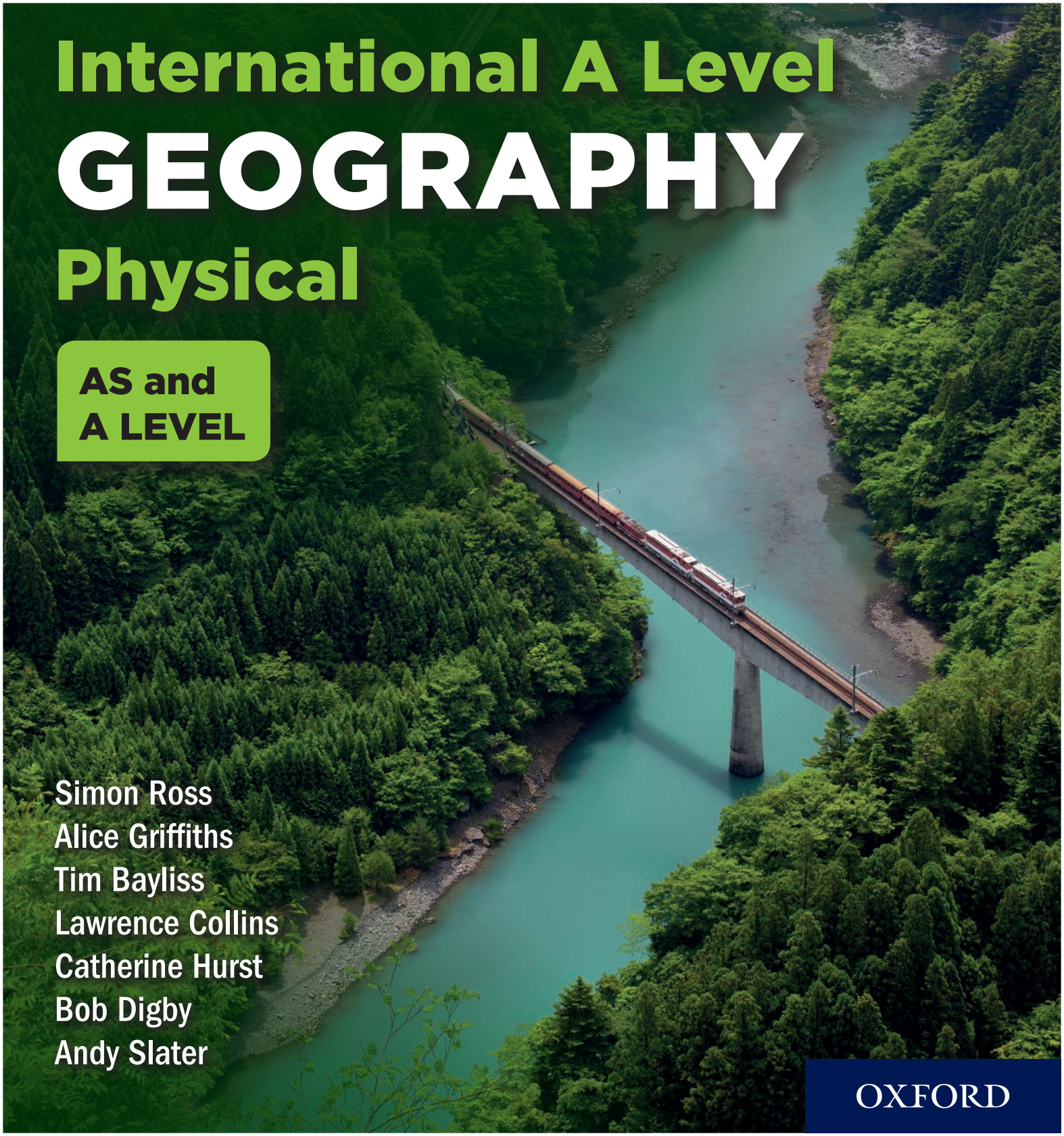
OXFORD INTERNATIONAL
AQA EXAMINATIONS

International A Level GEOGRAPHY

Physical

AS and
A LEVEL



Simon Ross
Alice Griffiths
Tim Bayliss
Lawrence Collins
Catherine Hurst
Bob Digby
Andy Slater

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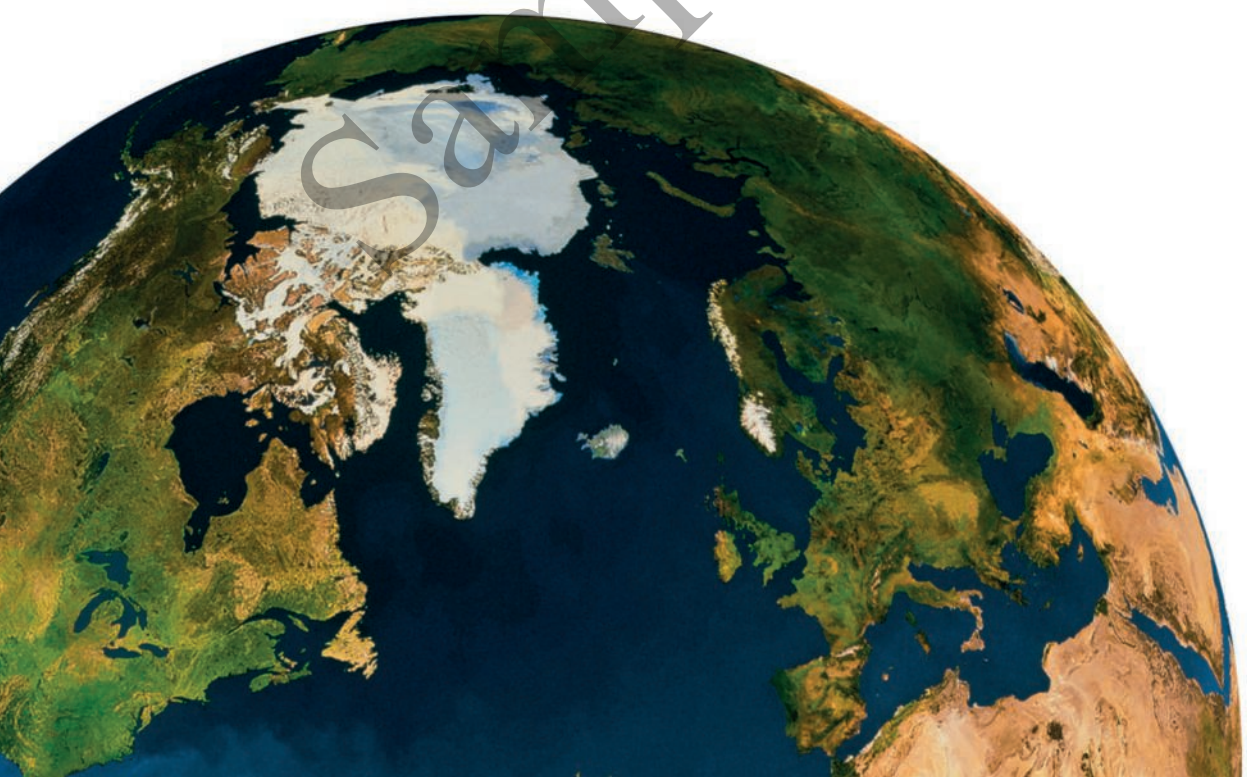

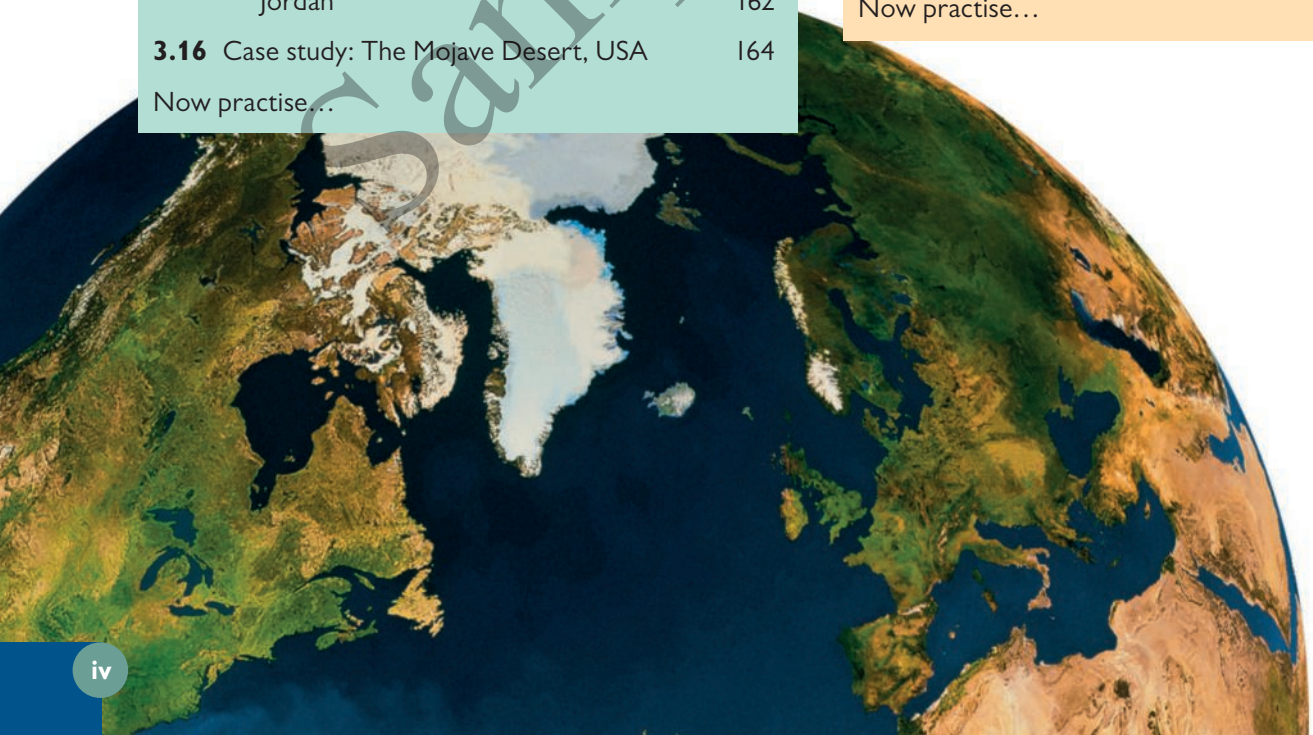

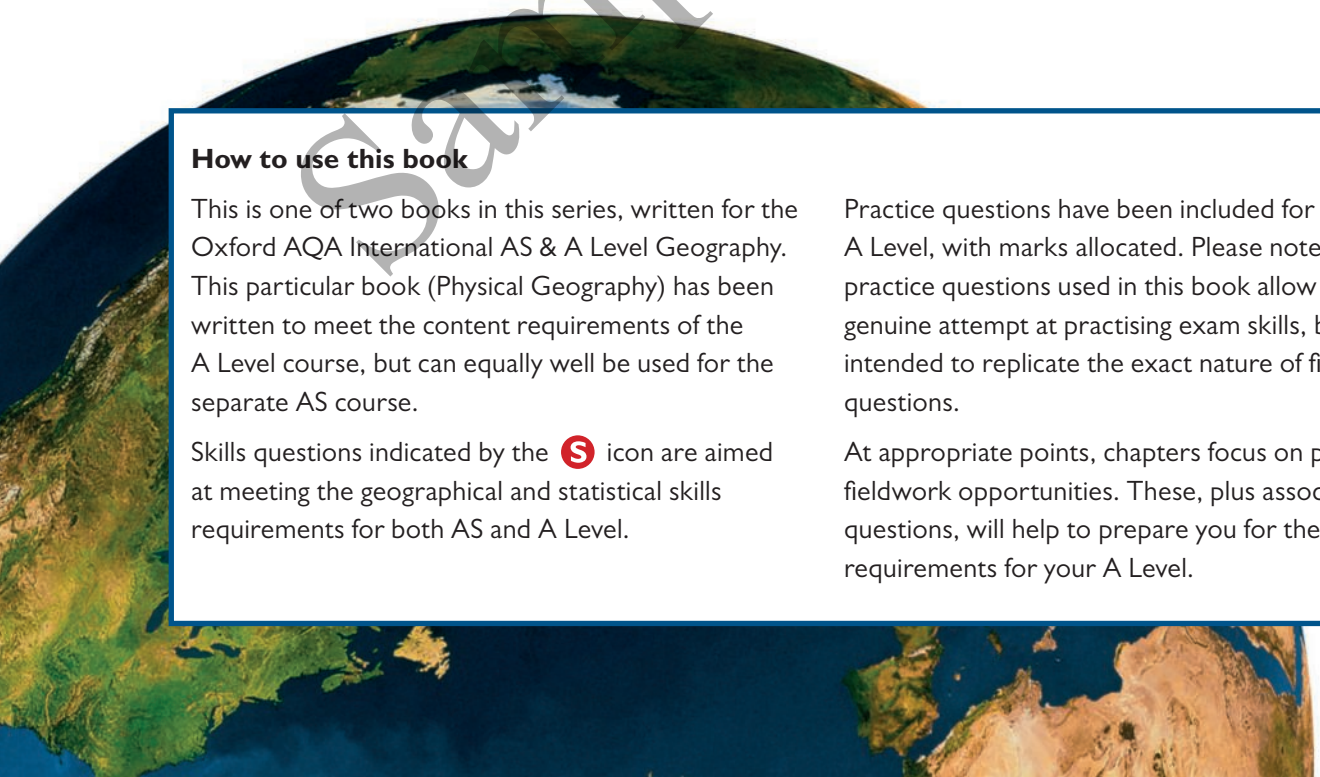

How to use this book

This is one of two books in this series, written for the Oxford AQA International AS & A Level Geography. This particular book (Physical Geography) has been written to meet the content requirements of the A Level course, but can equally well be used for the separate AS course.

Skills questions indicated by the S icon are aimed at meeting the geographical and statistical skills requirements for both AS and A Level.

Practice questions have been included for both AS and A Level, with marks allocated. Please note that the practice questions used in this book allow students a genuine attempt at practising exam skills, but are not intended to replicate the exact nature of final exam questions.

At appropriate points, chapters focus on providing fieldwork opportunities. These, plus associated questions, will help to prepare you for the fieldwork requirements for your A Level.

1.1 Hazards in a geographical context

In this section you will learn about hazards in a geographical context

What is a hazard?

'Loss of property from natural hazards is rising in most regions of the earth, and loss of life is continuing or increasing among many of the poor nations of this world.'
(Burton, Kates and White, 1978)

This was written almost 40 years ago, yet is still relevant today. Even though the overall death rate has fallen, more people have been affected by natural hazards. This is because of the increase in population and the wide-reaching effects of events such as earthquakes, volcanic eruptions, tropical storms, floods, wildfires and droughts (Figure **1**).

A hazard is the threat of substantial loss of life, substantial impact upon life or damage to property that can be caused by an event. These events can be caused by human actions (explosions, chemical release into the atmosphere, nuclear incidents) or are natural (earthquakes, storms, volcanoes, wildfires), although natural events can be a consequence of human actions (wildfires can be ignited by human carelessness, floods can be brought about by poor land-use management).

A disaster occurs as a result of a hazard. For example, living on or near a fault line is a hazard, whereas an earthquake on the fault line that has enormous impacts on people and property is a disaster.

What are the potential impacts of natural hazards?

The impacts of natural hazards depend on a number of general factors, such as the location of the hazard relative to areas of population and the **magnitude** and extent of the hazard. Each type of hazard has its own determining factors that affect the impacts, for example, the type and explosivity of a volcano, the nature of the continental shelf and shoreline for tsunamis or the availability of vegetation to fuel wildfires.

There are three main types of hazard, although each hazard has different driving forces, some of which overlap. For example, volcanoes can have impacts on the atmosphere, which affects weather patterns.

- **Geophysical** – driven by the Earth's own internal energy sources, for example, plate tectonics, volcanoes, seismic activity.
- **Atmospheric** – driven by processes at work in the atmosphere, for example, tropical storms, droughts.
- **Hydrological** – driven by water bodies, mainly the oceans, for example, floods, storm surges, tsunamis.

Impacts can be primary and secondary. Primary impacts are those that have an immediate effect on the affected area, such as destruction of infrastructure and buildings. Secondary impacts happen after the disaster has occurred, such as disease, economic recession and contamination of water supplies.

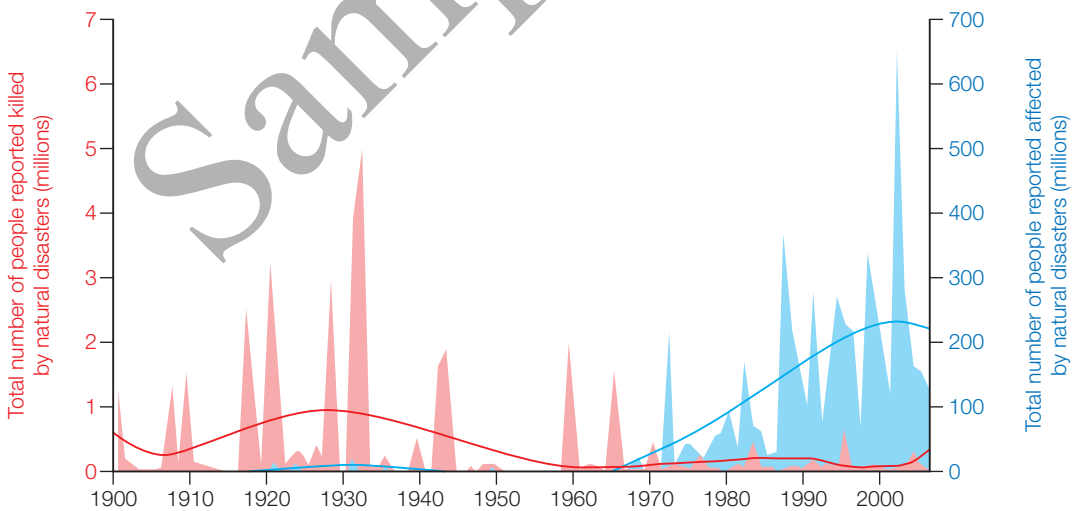

Figure 1 *Impacts of natural disasters 1900–2006; the line graph shows the smoothed trends for number of fatalities and number affected*

Hazard perception

How we perceive a hazard is determined by the effect that it may have on our lives. This increases if people have direct experience of a particular hazard and also how long term the impact of this experience has been.

It is only the presence of people that makes a natural event become a hazard. The pressure of an increasing population and subsequent demand for land has resulted in building in areas that are at increased risk. Population expansion itself can increase the threat of a hazard, for example, increasing population at the peripheries of large urban areas may increase the risk of wildfires (see 1.16).

The advantages of living with the threat of hazards sometimes outweigh the risk. Making use of fertile soils on flood plains or in the vicinity of a volcano can be considered a risk worth taking and living with the threat is accepted as a part of everyday life (Figure **2**).

Figure 2 *Flooded agricultural land, Thailand*

A natural disaster can have catastrophic effects on an economy, not just in the countries that are directly affected, but also globally. In high-income countries (HICs) these effects tend to do little long-term damage to the economy – there is enough wealth and potential for redevelopment to be able to rebuild infrastructure and support those that are directly affected. Low-income countries (LICs) are much more reliant on support and aid, both in the immediate aftermath of an event and also in the long term, as they try to repair the damage physically, socially and economically.

Despite living in what we perceive as an obviously hazardous area, many still underestimate the risk of hazards.
In 1971, Robert Kates found that of those people who had experiences of storm damage to their property on the east coast of USA, most of them did not expect such damage to occur again. Age, social status and religious beliefs can be determining factors in an evacuation when it comes to leaving behind all that has been worked for in a lifetime.

Human responses

The natural human response to a hazard is to reduce risk to life and equity. At a local level this involves saving possessions and safeguarding property; globally this means coordinating rescue and humanitarian aid. The **intensity** and **magnitude** of the event as well as the original state of the infrastructure (and how badly it has been damaged) affects the speed of the international response (see 1.14).

Response times have been reduced by the development of the Automatic Disaster Analysis and Mapping system (ADAM), a database that pools information from the US Geological Survey, World Bank and World Food Programme. This allows almost immediate access to such information as the scale of the disaster, what supplies are available locally and local infrastructure. Previously a manual search of several databases took hours, rather than minutes.

Fatalism

Doing nothing can be seen as a defeatist attitude to take but **fatalism** is an acceptance that hazards are natural events that we can do little to control and losses have to be accepted. In fact, interference with the natural processes can have a detrimental effect on ecosystems.

'Command-and-control attitudes towards fire have become pervasive, to the detriment of ecological communities.'
(School of Ecosystem and Forest Sciences, University of Melbourne)

The point being made here is that while fires can be hazardous to human activity, they are also a natural regenerative process within forest ecosystems and should be allowed – in certain circumstances – to take their course.

Prediction

As technology increases, the methods of predicting hazardous events becomes more sophisticated. Remote sensing and seismic monitoring give clues to activity that may lead to a disaster and need to be acted upon (Figure **3**). Advances in communications mean that information from all parts of the world can be shared and analysed quickly. Warnings can be communicated promptly and reach a greater number of those at risk.

Adjustment and adaption

Once we accept that natural events are inevitable, we can adapt our behaviour accordingly so that losses can be kept to a minimum. This is the most realistic option for many people and proves to be effective and cost-effective for governments (see 1.14).

The hazard management cycle

For areas at risk there is a cycle that manages both the pre- and post-event situations (Figure **4**):

- *Preparedness* – large-scale events can rarely be prevented from happening, but education and raising public awareness can reduce the human causes and adjust behaviour to minimise the likely impact of the hazard. Knowing what to do in the immediate aftermath of an event can speed up the recovery process. In areas of high risk, the level of preparedness will be greater than in areas where such events are rare.
- *Response* – the speed of response will depend on the effectiveness of the emergency plan that has been put in place. Immediate responses focus on saving lives and coordinating medical assistance. Damage assessment helps plan for recovery.
- *Recovery* – restoring the affected area to something approaching normality. In the short term this will be restoration of services so that longer-term planning and reconstruction to the pre-event levels can begin.
- ***Mitigation*** – actions aimed at reducing the severity of an event and lessening its impacts. This can involve direct intervention, such as building design that can withstand earthquakes or hurricanes (see 1.10), or preparing barriers or defensible zones that may slow down or even halt the advance of wildfires (see 1.16). Most desirable is the long-term protection of natural barriers such as coral reefs, which protect the shore against storm surges (see 5.10). Support after a disaster in the form of aid and insurance can reduce the long-term impacts. However, insurance may not be available at all in high-risk areas, even in HICs, and is something that may not be available at all in LICs, which are often those that need it most.

Figure 3 *Volcano monitoring station at Mount Etna, Sicily*

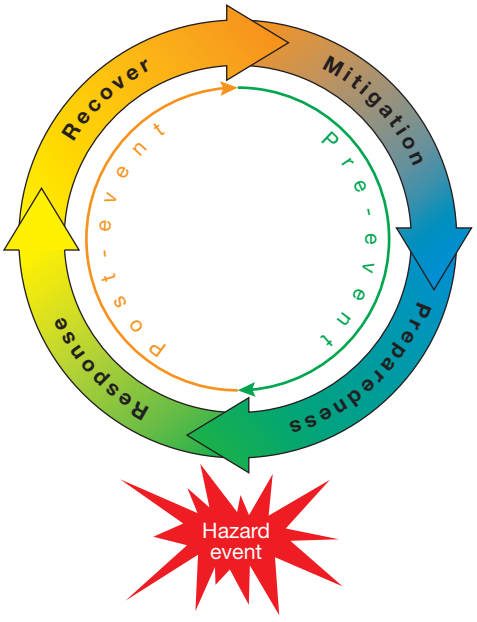

Figure 4 *The hazard management cycle*