WHAT'S A HAZARD?

Hazard: *the potential for damage to health and possessions – the risk.*
Disaster: *If the hazard actually occurs, then this is a* **disaster.**
Disasters are beyond our control. Every hazard is different, and they are difficult to compare.

There are four types of hazard: ★geophysical (earthquakes, volcanoes), ★atmospheric (storms), ★hydrological (floods) and ★meteorological (heatwaves).

We perceive hazards differently – between countries and within countries – based on **economic** *reasons (employment, cost–benefit analysis, cost of moving),* **cultural** *reasons (fatalism / religious beliefs) and* **personal** *reasons (prior experience, age, gender, education and wealth.*

The wealth/development of a country is also a factor in determining the effects of a disaster, e.g. through **mitigation** *(reducing the effects of a hazard),* **planning** *(preparing for the event),* **resilience** *(rebuilding afterwards) and* **prediction** *(forecasting when or where it will occur). Sometimes, the risk can be* **shared**.

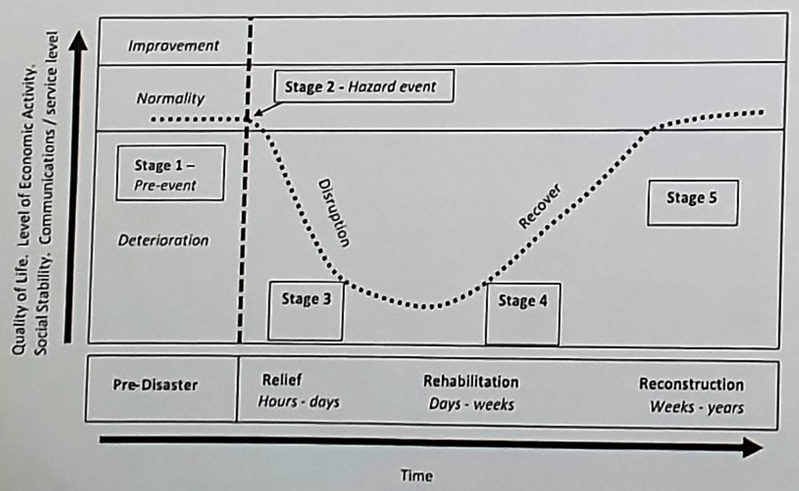
Factors which determine the scale of a disaster include: *the scale (magnitude), the intensity (how quickly the event occurs, where it occurs – remote area or near large city), the geology, the time of day / day of the week, and the frequency with which the events occur.*

The effects of a disaster can be primary (direct effects, caused as the disaster is playing out), or secondary (resulting from the primary effects and occur afterwards.

We can divide the effects into social (affecting people), economic (affecting money and businesses – the economy), environmental (affecting the natural world), and political (affecting governments).

THE PARK MODEL

- **The Park model shows** *how the quality of life is affected by a disaster and how recovery takes place afterwards.*
- *The model shows the resilience of a country or area.*
- **Sometimes, the quality of life** *improves beyond the pre-disaster level. This might occur if the disaster has a very rapid onset. But if the onset is very slow, then recovery might not restore the quality of life back to pre-disaster level.*
- *There are five stages to the model, from preserving life, to the emergency provision of aid, and return to normal, including reconstruction of infrastructure and buildings.*



THE HAZARD MANAGEMENT CYCLE

- *This is a continuous cycle – both before and after a disaster – which includes assessing the risk, and putting measures in place to prepare for and reduce the effects of a hazard.*
- *It includes the response to a disaster – for example, warnings and the immediate responses, through to long-term recovery.*
- *New information is provided into the cycle, allowing improvements to be made.*

Natural Hazards

PLATE TECTONICS

The Earth is divided up into different layers. Each has a different temperature and thickness. The hottest layer is the inner core at 6,000 °C, and the crust is coolest.

The **heat** *was generated as the Earth was formed (primordial heat), and through radioactive decay of elements.*

The Earth's crust is divided up into different **tectonic plates**. *The plates are either continental or oceanic (different type of crust, from land or ocean – oceanic are denser and thinner). Alfred Wegener proposed the theory of plate tectonics (continental drift), based on the fit of continents, geology and fossil evidence. Later, magnetic striping of the sea floor was discovered.*

Plates move due to several processes, including convection currents (plumes of hotter material slowly rise within the mantle), gravitational sliding (ridge push) (where gravity pushes down at ocean ridges), and slab pull (pulled down by subduction at destructive plate margins).

There are four main types of plate margin (a.k.a. boundary).

Constructive *– two plates move apart (usually oceanic) forming new land – and ocean ridges. On land, rift valleys form. Shield volcanoes form.*

Destructive *– oceanic and continental plates collide and the denser oceanic plate is subducted. Form deep-sea trenches, composite volcanoes and island arcs.*

Conservative *– two plates move in opposite directions (or in the same direction at different speeds). Form visible fault lines.*

Collision *boundaries form young fold mountains – two continental plates collide – there is uplift and very little subduction.*

SYNOPTIC GEOGRAPHY

Water and carbon cycles: *what are feedback cycles? – tropical storms.*
Global systems: *inequalities and vulnerability – why are places vulnerable?*
Population and the environment: *are people forced to live in hazardous areas? Environmental refugees.*
Resources: Do we need geothermal energy?

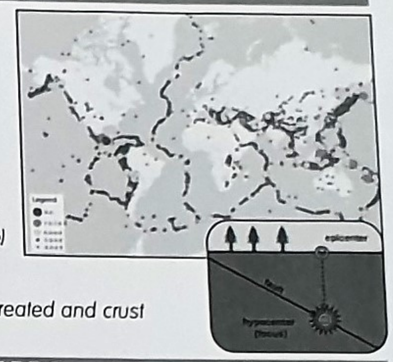
SEISMIC HAZARDS

EARTHQUAKES

Shaking of the ground as built-up pressure is released, plates move – along plate margins and old fault lines.

Occur at:

- **constructive** *margins (plates move apart and tension is released)*
- **destructive** *margins (friction at the Benioff zone means that the plates don't move fluidly – they stick together and move suddenly, releasing pressure)*
- **conservative** *margins (pressure released as friction is overcome)*
- **collision** *margins (as mountains are created and crust is pushed upwards)*



HAZARDS

Primary *effects occur as the ground shakes and the ground cracks open – buildings and infrastructure are destroyed.*
Secondary *effects are caused by the primary effects – liquefaction is where the ground acts as a liquid – buildings collapse and flooding can occur. Avalanches and landslides can also occur. Secondary effects also include impacts resulting from loss of power, services and communications, and fires from broken gas pipes. Tsunami occur when the epicentre is under the sea – the waves travel several kilometres inland and cause massive damage.*

Earthquakes release several types of **waves** *– primary waves (P waves) are compressions and expansions, secondary waves (S waves) move up and down, and surface waves are love waves (move side to side) and Rayleigh waves (roll like ocean waves).*

MAGNITUDE

We measure earthquakes based on energy released and the effects.

- *The* **moment magnitude scale** *is a logarithmic scale of energy, measured by seismometers.*
- *The* **modified Mercalli scale** *is based on the damage caused and how the earthquake was felt.*

PREDICTABILITY

Earthquakes are almost impossible to predict. Sometimes there are warning signs – foreshocks. We continually monitor for earthquakes using seismographs and scientific equipment.

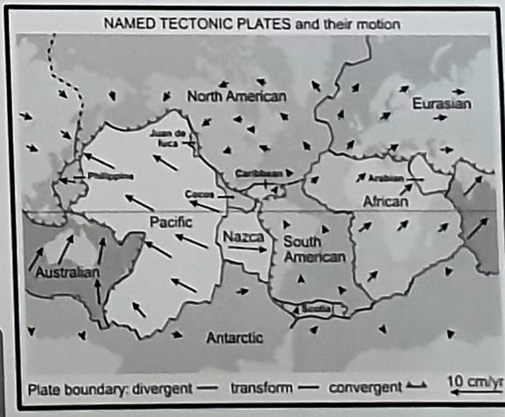
RESPONSES

Short-term *– planning, emergency evacuation (e.g. tsunami warning) and shelter, search and rescue, supplies of aid – immediately after the earthquake*
Long-term *– restoring, rebuilding, planning for future events, land-use zoning, etc.*

PREPARING AND RISK MANAGEMENT

We can prepare by training and testing plans, by holding drills in schools, by setting up shelters and supplies, and through public education. Buildings can be made more earthquake-resistant (both new and retrofitting old ones).

Local people can adapt their way of life, secure their homes, and prepare for the eventuality.



e.g.
Haiti, 7.1 Mw (2010)
Japan, 9.0 Mw (2011)
Nepal, 7.9 Mw (2015)

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