Hazard types, perception, response & models
3.1.5.1 Hazards

What you need to know
How natural hazards are categorised
How hazard perception is affected by economic and cultural factors
That there are different types of human response
How human response is related to a range of factors
How models help countries in the organisation of their human response

How natural hazards are categorised:

Geophysical – natural hazards where the causal factor is a geological or geomorphological process. Examples include earthquakes, volcanoes & landslides.

Atmospheric – natural hazards where the causal factor is an atmospheric process. Examples include tropical storms, tornadoes and droughts.

Hydrological – natural hazards where the causal factor is a water process. Examples include flash floods and avalanches.

How hazard perception is affected by economic and cultural factors:
People react to hazards in different ways, because of the difference in the way in which we receive, process and filter the information we receive.

When we are warned of a potential risk people go through several stages, which shape their perceptions and behaviour, i.e. hear, confirm, understand, believe, personalise, respond. Each stage is affected by age, gender, and level of education, the nature of the information and how many times they receive the warning. The perception of hazards falls into three groups. These can overlap at times.

- **Acceptance**: include fatalistic tendencies. This perception relates to people seeing hazards as being natural events which are a part of life, or result from 'acts of God', which can't be controlled by humans. Events are random, and we can only respond to them. Loss of life and belongings are to be expected.
- **Domination**: the perception here is that hazards are extreme events. They are predictable, and their magnitude can be predicted. People can understand them better by carrying out scientific research. Control of hazards is also possible through engineering or use of technology.
- **Adaptation**: the perception here is a mixture of domination and acceptance. The belief is that natural hazards will happen, and they are influenced by both natural and human factors. Their magnitude and frequency may be estimated based on previous experiences of the hazard. There is a need to adjust systems, respond flexibly to the hazard and research new technology to help mitigate the hazard.

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Hazard perception in a developed country is more likely to be around "domination" due to the available money, technology and skilled personnel. In less developed countries, acceptance or adaptation are more likely. The culture within a country is also crucial in determining the perception; with traditional religious countries having a perception of "acceptance" in comparison to a westernised secular society.

Human response:

Fatalism:
This where people accept that there will be a risk but choose to do little about it prior to the event. The response after the event will be reactive but the hazard event will often lead to large loss of life due to there being limited organisational capacity. This type of response is more likely in developing countries.

Prediction:
For some hazards, predicting their occurrence is helpful in preparing places for their impact. An example of this is a hurricane. Tracking of hurricanes and predicting the likely area of landfall can give city authorities time to organise evacuation plans and get home and business owners to secure windows etc. This isn't a perfect science, however, with hurricanes changing direction; nevertheless, it's better to give warnings than none. Some hazards, however, can't be predicted in the same way – earthquakes for example can be partly predicted should a major quake be preceded by foreshocks; however, this isn't always the case.

Prediction is more likely in developed counties due to the availability of monitoring technology and qualified experts who can identify patterns, trends and give more reliable forecasts.

Adjustment/adaptation:
For places which experience regular hazards a response is often to adapt or adjust their behaviour to be able to cope with future events better. Again, it is more likely for developed counties to adapt due to the cost needed to provide the relevant adaptation strategies. For instance, homes in 'tornado alley' in central USA often have tornado shelters dug into the ground into which a family can be evacuated.

Mitigation:
Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards. As hazards can occur at the same place over time - for example, earthquakes - mitigation strategies can help an area to be prepared for the impacts and lessen the impacts when the hazards occur. Retro-engineering older buildings is an example of mitigating the danger from collapsing masonry and reducing the chance of fire breaking out in the event of an earthquake.

Management:
Identifying the possible risks to human life and to properties and allocating appropriate resources to tackle the hazard. Again, this will be better organised in developed countries.

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Risk sharing:
The UNs International Strategy for Disaster Reduction (ISDR) sets out national and international responsibilities in preparing for disasters. Sharing knowledge and human response strategies will enable all countries to prepare for a hazard event in a better way.

Magnitude and intensity of hazards can be reduced depending upon the implementation of mitigation strategies and how countries adopt adaptation strategies.

Hazard models
A model is a simplification of reality but attempts to represent the key components, processes, links and consequences of an event. It enables different variables to be examined to see how they have a bearing on related elements of the model.

The Park Model:

The model is also known as the disaster response curve. Its aim is to show the effects of a hazard on quality of life over a sequence of time. There are five stages.

- Stage 1 occurs prior to the event and shows that quality of life is at its normal equilibrium level.
- Stage 2 is where the hazard occurs and, again, at this point quality of life is at normal level.
- Stage 3 is where the event has happened and search and rescue is underway. Quality of life drops at this stage and stays low for several hours up to several days depending on the severity of the hazard and the level of development of the region/country.
- Stage 4 is where relief strategies are underway and there is an organised programme of help. It can take a variable amount of time, from hours and days to weeks and months to reach this stage, but quality of life improves at this time.
- Stage 5 refers to long term human response; rebuilding and restoring normality. Quality of life returns to normal and in some cases can be higher than it was originally; especially if the repairs improve on the old infrastructure etc.

The Hazard Management Cycle:

This model takes into account preparedness, response, recovery and mitigation.

The disaster cycle or the disaster life cycle consists of the steps that emergency managers take in planning for, and responding to, disasters. Each step in the disaster cycle correlates to part of the ongoing cycle that is emergency management. This disaster cycle is used throughout the emergency management community, from the local to the national and international levels

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Preparedness strategies focus on ensuring that emergency services and people at risk are aware of how to react during an event. After the hazard happens response then happens.

The ***response*** section of the hazard cycle is focused on the immediate needs of the population, such as the protection of life and property and includes firefighting, emergency medical response, evacuation and transportation, decontamination, and the provision of food, water and shelter to victims.

Recovery is the equivalent to long-term responses and is where the city authorities focus on clean-up and rebuilding. This can take months or even years.

Finally, ***mitigation*** involves authorities looking at the impact of the hazard and rebuilding in a better way to reduce similar impacts from a future hazard. This can involve the building of earthquake proof buildings for example. Recovery and mitigation take place at the same time. After the cycle is complete, emergency planners will revisit the cycle and ***review and amend*** the aspect of preparedness in light of the success of the responses in the recent hazard.