

Vulnerability

The concept of vulnerability encompasses not only the physical effects of a natural hazard but also the status of people and property in the affected area. Many factors can increase one's vulnerability to natural hazards, especially catastrophic events. Aside from the simple fact of living in a hazardous area, vulnerability depends on:

- **population density:** many rapidly growing cities are in hazardous areas; large urban areas such as New Orleans are especially vulnerable to natural hazards
- **understanding of the area:** recent migrants into shanty towns may be unaware of some of the natural hazards posed by that environment
- **public education:** educational programmes in Japan have helped reduce the number of deaths in earthquakes
- **awareness of hazards:** the 2004 tsunami in South Asia alerted many people to the dangers of tsunamis
- **the existence of an early-warning system:** the number of deaths from hurricanes in the USA is usually low partly because of an effective early-warning system
- **effectiveness of lines of communication:** the earthquake in Sichuan (China) in 2008 brought a swift response from the government, which mobilized 100 000 troops and allowed overseas aid into the country
- **availability and readiness of emergency personnel:** there were many deaths following Cyclone Nargis in Burma due to a shortage of trained personnel

Vulnerability – the conditions that increase the susceptibility of a community to a hazard or to the impacts of a hazard event.

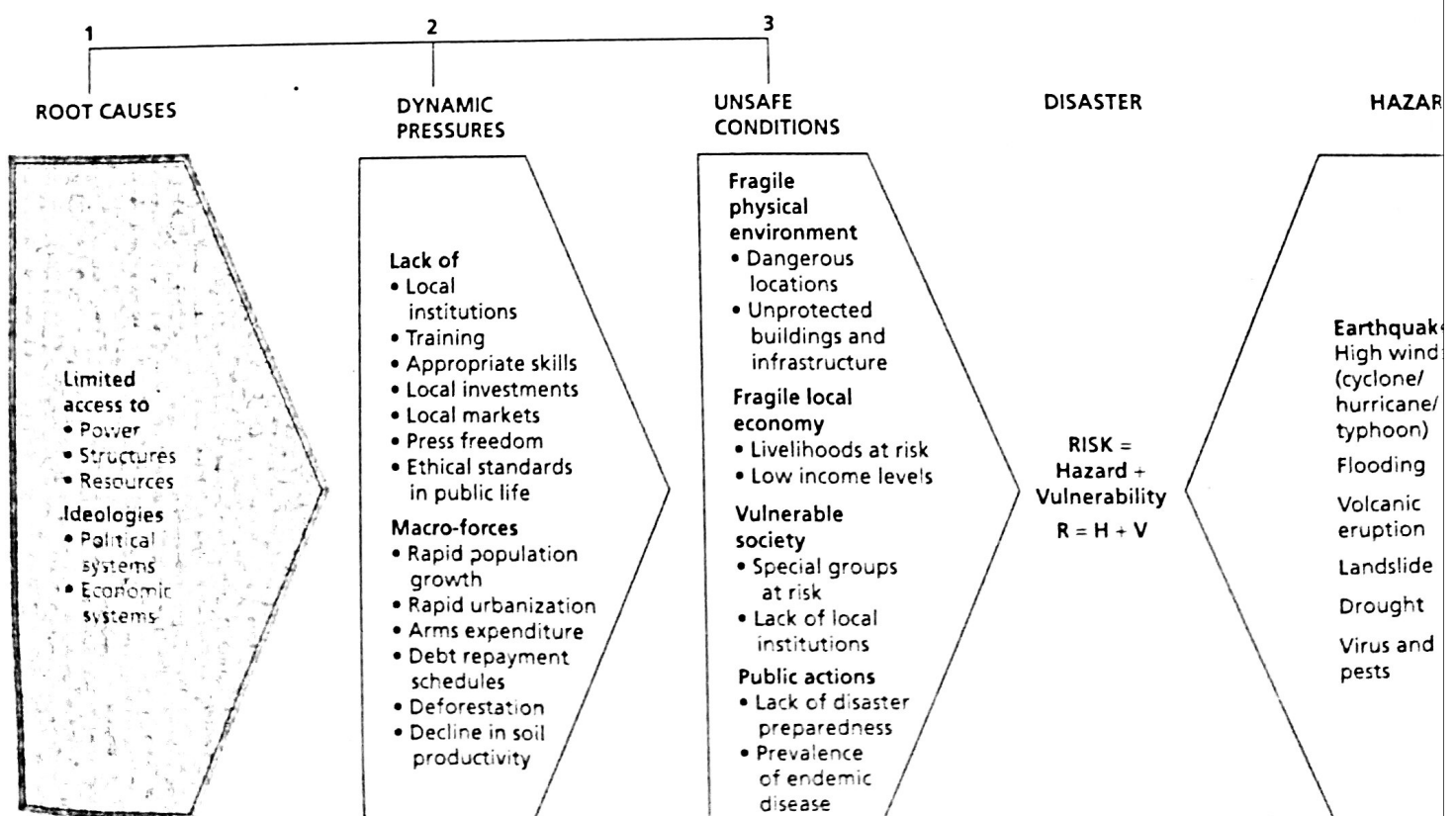


Figure 8.14 The progression of vulnerability

- **insurance cover:** generally it is the poor who have no insurance cover and they are most likely to be affected in a natural hazard as their housing quality is poor
- **construction styles and building codes:** there was criticism during the Sichuan earthquake that many schools were destroyed (by implication, poorly built), whereas government buildings remained standing
- **the nature of society:** the failure of the Burmese government to allow aid to the victims of Cyclone Nargis in 2008 increased the number of deaths from disease and malnutrition
- **cultural factors:** some of the cultural factors that influence public response to warnings are: the extent of trust in government, scientists or other authority figures; the extent and success of social networks; the amount of control or autonomy a community feels it has; and perceived hazard level.

Many of these factors help explain the fact that less developed countries are much more vulnerable to natural hazards than industrialized countries.

To research

To find out more, visit <http://webra.cas.sc.edu/hvri/>, the Hazards and Vulnerability Research Institute from the University of South Carolina. The site includes the social vulnerability index (SOVI).

Describe the distribution of social vulnerability to natural hazards in the USA.

<http://webra.cas.sc.edu/hvri/docs/SoVIRecipe.pdf> gives an outline of the factors considered in determining social vulnerability.

Suggest reasons why these factors are considered to be important.

To research

Visit the publications page of the resources section at www.fhrc.mdx.ac.uk for free downloads on flooding and impacts/responses.

To do:

- Define the term “vulnerability”.
- Outline the factors that contribute to vulnerability.

Case study: Social vulnerability and Hurricane Katrina

Hurricane Katrina (see also page 206) was a particular threat to New Orleans, which is built on land below sea level. When Katrina made landfall, it flooded the streets, wrecked the power grid, tore roofs and walls off historic buildings and brought down many trees. Many homes in New Orleans were submerged by the surge of floodwater brought on by the storm. New Orleans’ levées gave way under the pressure of the storm surge. Most of the city went under water, with some sections as deep as 6 metres. One of the areas worst affected was the Ninth Ward, a poor district to the east of the city’s famous French Quarter.

The floods brought with them poisonous snakes, waterborne diseases, carcasses of livestock and abandoned pets and grotesquely swollen human corpses. This was a shocking sight for an MEDC society like the USA. There were also health dangers arising from fallen power lines and sewage-tainted water. The

floodwaters in New Orleans became 10 times more toxic than is considered safe.

People with cars were able to evacuate the city before Katrina hit, but others were left stranded. Of the more than 1,800 people killed and 800 000 made homeless, the great majority were from the poorer ethnic minorities. The rescue operation was criticized for not doing enough to help the poorest members of the population. Most of those left without help were from the poor neighbourhoods, which were the worst hit by the hurricane. The disproportionate impact of the disaster on the poor, mainly black sections of the population served to highlight and exacerbate existing racial and class inequalities within the USA.

Impact and social status of damage

- Median household income in the most devastated neighbourhood was \$32,000, or \$10,000 less than the national average.

- In the disaster area 20% of households had no car, compared with 10% nationwide.
- Nearly 25% of those living in the hardest-hit areas were below the poverty line, double the national average.
- About 60% of the 700 000 people in the 36 neighbourhoods affected (in the states of Louisiana, Mississippi and Alabama) were from an ethnic minority. Nationwide, about one in three US citizens is from a racial minority.

To research

Visit <http://www.youtube.com> for You Tube video clips on Katrina.

<http://dsc.discovery.com/convergence/katrina/facts/facts.html> has some basic information on Katrina.

Case study: Vulnerability to tropical storms in Haiti

Haiti is a Caribbean country characterized by poverty, environmental degradation, corruption and violence. Since 2000 more than \$4 billion has gone to rebuild communities and infrastructure devastated by hurricanes, floods and landslides.

Haiti has long been vulnerable to tropical storms and hurricanes; in recent years, the country has been afflicted by a significant increase in severe natural disasters. Loss of human life from tropical storms in Haiti is due primarily to severe flash floods in eroded watersheds that wash down on poor riverine and coastal floodplain communities. Haiti's disastrous floods of 2004 in Gonaïves and other areas serve as a warning of major threats to densely populated districts of Port-au-Prince and other major coastal cities.

Haiti has a youthful and rapidly growing population that is increasingly clustered in urban areas. Like other countries in the region, Haiti is experiencing rapid urban growth. Haiti's overall rate of urban population growth is 3.63% compared to 0.92% in rural areas. Port-au-Prince alone is growing by 5% annually, and 40% of Haiti's population lives in urban settlements, including shanty towns in coastal floodplains such as Cité Soleil in Port-au-Prince, Raboteau in Gonaïves, and La Faucette in Cap-Haitien. The Port-au-Prince metropolitan area now comprises a quarter of Haiti's entire population. Given the sheer scale of settlement in coastal floodplains, predicted deaths due to catastrophic flooding in Port-au-Prince would far surpass all other disasters in Haiti's meteorological record.

The high rate of population growth and rapid urban expansion do not allow aquifers and floodplains to function as natural storage and filters, particularly during flood conditions. Due to unplanned urbanization, hard surfaces caused by anarchic construction methods prevent the infiltration of surface water required to recharge the country's most important aquifers, located in the major plains of Cul-de-Sac, Gonaïves, Léogane, Les Cayes and Cap-Haitien. There is virtually no chance of diminishing Haiti's vulnerability to severe flooding without mitigation efforts that target densely populated urban neighbourhoods.

As the earthquake of 2010 demonstrated (see page 222), the root causes of environmental disaster in Haiti are acute poverty, rapid population growth and unplanned urbanization. The earthquake itself was shallow and severe, registering 7.0 on the Richter scale, but what made it so devastating was that its epicentre was close to the capital, Port-au-Prince, where a million people live in densely built housing that is not earthquake resistant. Prospects for reduced vulnerability to natural disaster in Haiti are very limited in the absence of broad-based economic development.

To research

Visit <http://www.cnn.com/SPECIALS/2010/haiti.quake/> for a CNN special on Haiti.

sk and risk relationships

ery year, natural hazards cause thousands of deaths, hundreds of usands of injuries, and billions of dollars in economic losses. asters appear to be increasing in frequency, and they represent a or source of risk for the poor, wiping out development gains and umulated wealth in developing countries. A hazard's destructive

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www.oxfordsecondary.co.uk/ibgeography
Vulnerability and the Guatemala earthquake