Disaster-resilient Architecture: How Architecture Can Reduce risks.**Over the last decades, natural disasters have been growing in strength and frequency as a result of climate change. The number of weather-related disasters has tripled over the previous Furthermore, among the 20,000 earthquakes that shake the world every year, about 16 are in the magnitude of seven or higher.**

- These disasters take thousands of lives, cost trillions of dollars in damage, and often result in humanitarian crises that last years. However, pre-disaster mitigation, a significant part of which is disaster-resilient architecture, can minimize destruction in hazard-prone areas. It can also ensure the impacts of a disaster are manageable and short-lived.
- According to the US National Institute of Building Sciences' Multihazard Mitigation Council, disaster mitigation efforts save up to USD 13 for every dollar invested. Following are some ways disaster-resilient architecture can meaningfully contribute to this investment:

Disaster-sensitive Building Materials

The roof plays an important role in disaster-resilient architecture.

- The World Health Organization (WHO) includes earthquakes, tsunamis, volcanic eruptions, landslides, hurricanes, floods, wildfires, heatwaves, and droughts as natural disasters — and each have unique impacts on wherever they take place.
- Depending on the risk profile of an area, disaster-sensitive building materials can include anything from bamboo to vinyl. However, it's important to note that there's not a single material that's a good fit for all hazards. For instance, research shows that lightweight and natural elements can remarkably increase the resiliency of buildings against some natural disasters, particularly earthquakes. But they might not be the optimal choice for flooding – e.g., raw wood swells in water.
- In August 2018, a series of earthquakes destroyed more than 32,000 homes in the Indonesian island of Lombok. Remarkably, many of the traditional wooden houses stood unharmed. It was the cultural wisdom of building with light and flexible materials aligned with nature that saved these homes.
- On the other hand, traditional wooden houses might not exhibit the same resilience against different types of natural disasters, such as floods or typhoons, as well as wildfires. In flood-prone areas, architecture can reduce disaster risks by employing materials highly resistant to floodwater damage, including damage caused by moving water. These can include a combination of concrete, latex, and vinyl on the floor, and bricks and metals on the walls and ceilings.

Curvy Designs To Reduce Extreme Weather Risks

- Aerodynamic exteriors can help against hurricane damage

Many modern buildings have hard edges, with 90-degree angles and sharp corners. But unconventional building designs such as those with curved facades or domes can mitigate some risks of extreme weather.

- Especially when building in locations where hurricanes and wind-related disasters can be a concern, aerodynamic exteriors are becoming increasingly popular architectural solutions. There's evidence that hexagonal and octagonal home and roof shapes can resist extreme wind better.
- Similarly, hip roofs, which slope upward from all sides of a structure without vertical ends, are more aerodynamic and more resistant to the uplifting forces of high wind.
- That said, disaster-resilient architecture design must be symmetrical and of regular shape. According to the Global Shelter Cluster, asymmetrical buildings, such as those shaped like T or U might increase the adverse effects of natural disasters. Similarly, imbalanced shapes, such as very long and thin buildings, also typically have a higher risk profile for most kinds of natural disasters.

Reinforced Building Structures

- New-built buildings should ideally be built with a disaster-resilient architecture plan in mind.
- Ideally, all structures should be erected with a disaster-resilient architecture plan in the first place. However, especially for older buildings, this isn't always possible. Such buildings in disaster-prone zones can benefit structural reinforcements to mitigate risks.
- Take seismic retrofitting, which protects against earthquake damage. Depending on the building's vulnerabilities, the process can include reinforcing foundations by casting extra concrete, replacing columns or beams, or bolstering the structure from the outside using auxiliary struts.
- In regions with high seismic activities, planners often embrace these reinforcements as architectural features. In Japan, a country facing 1,500 earthquakes a year, a reinforcement technique known as "The Strand Rod", which uses a web of carbon fibers to protect a building from tremors and tsunamis. The carbon fibers are not only aesthetically pleasing, but also contributes to a more robust structure.
- No architectural feature alone can guarantee that a building will be disaster-proof in every situation. Nor can a building be resilient against rising sea levels. Nevertheless, the right architecture of a building can undoubtedly save lives.