

Disaster resilience in the Built Environment for Coastal Cities

Introduction

The catastrophic flooding in Derna, Libya this year, was caused by a combination of factors. These included the storm Daniel, climate change, aging infrastructure, dam failure and inadequate warnings. This exposed the antiquated and inadequate infrastructure of coastal cities. Derna might be a unique incident, with locally specific factors contributing to the catastrophe. However, it is a lesson for most coastal cities on what needs to be done to avoid such catastrophes in the future. It highlights the need for better infrastructure, better planning, and better disaster responsiveness.

Disaster resilience in the built environment for coastal cities increasingly needs better understanding of the vulnerability of coastal infrastructure to climate change impacts, such as intense cyclones and severe floods. It requires effective disaster preparedness and response mechanisms, including early warning systems and evacuation strategies. Legal regulations, such as the Coastal Regulation Zone (CRZ) Notification in India, play a crucial role in managing coastal regions.

Emphasis should be placed on fostering climate-resilient development and making new infrastructure in coastal cities climate-resilient. Urban planners can reduce hazard risk through settlement design and land-use plans. Overall, building disaster resilience in coastal cities is a complex and multifaceted problem. Protection of these vulnerable regions needs newer approaches with better focus.

Some key points regarding disaster resilience in coastal regions

Vulnerability of coastal infrastructure: Coastal regions, particularly in India, have become more vulnerable to multiple risks related to climate change. Intense and more frequent cyclones and severe floods have caused massive devastation to the country's coastal states.

Disaster preparedness: Many coastal states have upgraded their disaster preparedness and response mechanisms. They have also instituted effective early warning systems and well-planned evacuation strategies. However, significant challenges remain in rebuilding the critical infrastructure lost and damaged, and in recovering from the disruptions caused by disasters.

Coastal regulations and laws: In India, Ministry of Environment and Forest (MOEFCC), Government of India, gazetted the first Coastal Regulation Zone (CRZ) Notification in 1991, using the powers conferred under the Environmental Protection Act, 1986. The judiciary has played a significant role in developing and incorporating legal principles based on international legal developments.

Climate-resilient development: There are recommendations for fostering climate-resilient development at multiple levels of decision-making. This includes making the newly developed infrastructure in coastal cities climate resilient.

Settlement design and land use plans: Planners play a crucial role in reducing hazard risk through settlement design, land-use plans, and legislation.

Building disaster resilience into built environment for coastal cities involves a multi-faceted approach. Here are some potential solutions:

Climate resilient infrastructure: Upgrading infrastructure to be climate resilient is crucial. This includes making new infrastructure in coastal cities capable of withstanding the impacts of climate change.

Smart city frameworks: The use of smart city technologies such as the Internet of Things (IoT) and crisis informatics can significantly aid in managing coastal disaster risks.

Restoration projects: Investing in restoration projects to preserve coastal lands is critical. Converting built environments in coastal lands to natural or nature-based environments, such as dunes, wetlands, sea grass beds, and oyster reefs, can help mitigate the impact of disasters. Creation of “bio-shields” to reduce the impact of tsunamis, and erosion of coastal land might be a viable solution.

Relocation: In some cases, timely reallocation of people, buildings, and/or infrastructure that face significant risk and that are willing and able to be moved, might become necessary.

Improved building practices: Enhancements to community resilience will require well-thought-out strategies by policymakers, urban planners and engineers, involving a mix of land use policies, incentives, improved building practices, and targeted public and private investments in the built environment.

Adaptation interventions: Governments and policymakers can promote and scale up a range of adaptation interventions to respond to various climate change impacts. This can be integrated into policies and regulations for the built environment.

Every coastal city has its own unique features. A resilient coastal city needs localized interventions backed by central policies. A combination of the solutions mentioned above can be considered to create a robust design and plan for safe and sustainable coastal regions. Select a region in India and design a holistic disaster resilience plan, which will help mitigate the impacts of climate change and natural disasters.