



The Power of Impact Forecasting Platform in Disaster Management

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The super cyclone of Gujarat in 1999 took 9k+ lives, Cyclone Phailin, Kolkata in 2013 took 40+ lives, and Cyclone Amphan, Odisha and Andhra Pradesh took 80+ lives. Though all these disasters led to a tragic loss of life, there was an enormous number of lives taken in the Gujarat cyclone than the other two having similar strength. Imagine if a system had existed to predict that event, offering the chance to mitigate its devastating impact and save lives; the long-term impact it left on humans and infrastructure would have been much less.

Effective disaster planning and an early warning system led to a much lower death toll when similar-strength cyclones hit India.

Today, disaster management solutions have the potential to do just that—save lives and reduce economic losses in the face of natural disasters. As climate change amplifies the frequency and intensity of natural hazards like cyclones, floods, droughts, catastrophic wildfires, and rising sea levels, the importance of robust disaster management solutions has never been clearer, solutions that can predict and mitigate the growing needs of society.

A Lifeline in the Face of Climate Change

As part of disaster management planning, early warning systems have become essential for safeguarding lives and livelihoods.

The Sendai Framework for Disaster Risk Reduction 2015-2030 recognizes the importance of multi-hazard early-warning systems (MHEWS) in supporting disaster risk reduction efforts.

In particular, it includes commitments to investing in MHEWS, disaster risk communication mechanisms, and hazard-monitoring telecommunications systems. Specifically, Target G of the Sendai Framework aims to "substantially increase the availability of and access to multi-hazard early-warning systems and disaster risk information and assessments to the people by 2030".

While many governments worldwide have implemented early warning systems to protect lives, the economic impact of disasters often remains high. Impact forecasting platforms extend beyond basic early warnings by offering detailed insights into potential hazard events. These platforms provide actionable data that allow communities, businesses, and governments to anticipate and prepare for natural disasters, making infrastructure more resilient - a core goal of the Sendai Framework for Disaster Risk Reduction.

Impact forecasting is a critical component of disaster management. By accurately predicting the potential consequences of hazards, we can reduce their impact and build more resilient communities and infrastructure.

Why is the Impact so Significant?

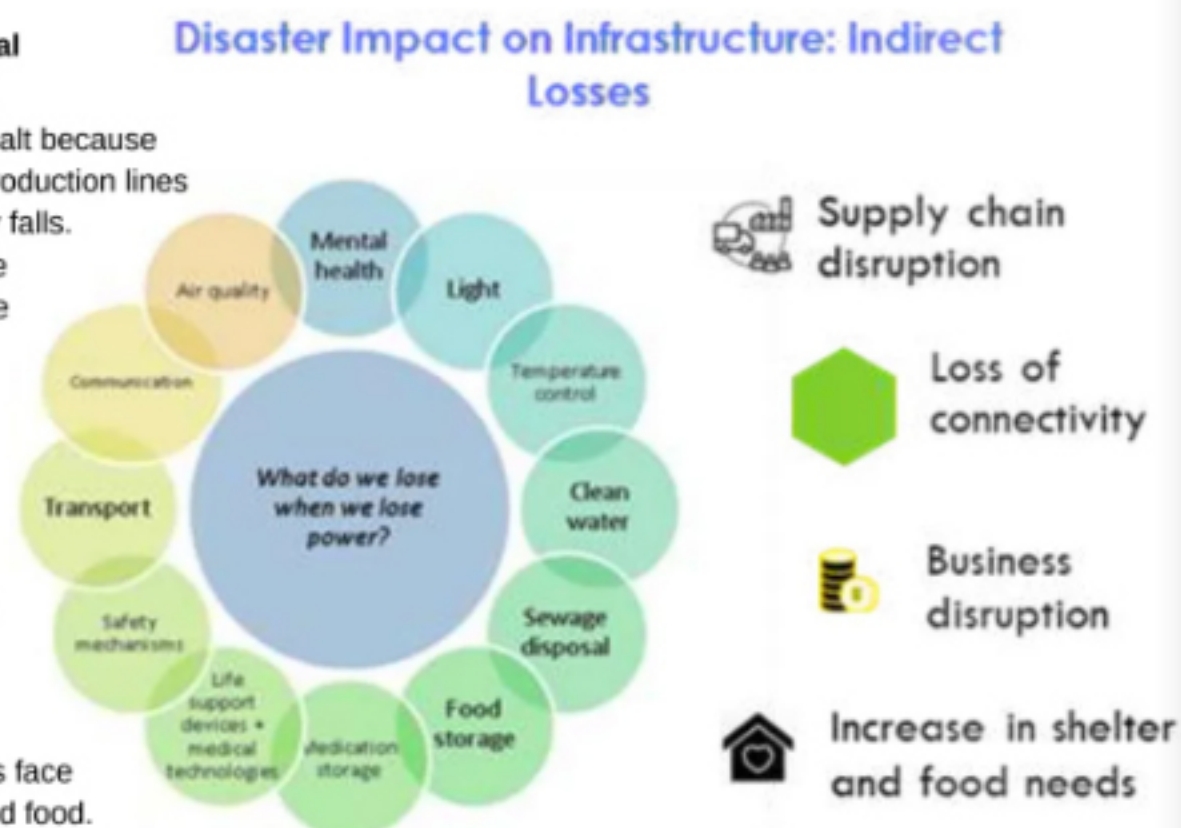
The impact of infrastructure failures during disasters can be devastating. When one essential element, like electricity, is disrupted, it can have a ripple effect on the entire economy. For example, power outages following natural disasters can cause widespread transportation, communication, healthcare, and other vital service disruptions. This domino effect can lead to significant economic losses for entire communities and industries. Let us see how it happens.

The Domino Effect of Power Loss in Natural Disasters: A Chain Reaction of Disruption

Imagine a manufacturing plant grinding to a halt because machinery can't operate without electricity. Production lines stop, safety mechanisms fail, and productivity falls.

For the pharmaceutical sector, the stakes are even higher—power outages can compromise the storage of temperature-sensitive medications, disrupt life-saving equipment, and halt critical medical processes, putting lives at risk. In telecommunications, the impact is equally severe. Networks that millions rely on for communication and data transfer can be severely impaired, cutting off connectivity when needed most.

But it doesn't stop there—businesses close, supply chains are disrupted, and communities face increased demands for emergency shelter and food.



The cascading effects highlight a critical truth: saving just one infrastructure component can prevent a chain of losses.

This is where impact forecasting platforms come into play. By delivering timely alerts and predictive insights, these platforms allow industries to act proactively—switching to backup power, safeguarding critical supplies, or maintaining network stability. The ability to foresee and prepare for these disruptions can mean the difference between a temporary setback and a full-blown crisis, ultimately safeguarding lives, livelihoods, and the economy.

The Value of Impact Forecasting Platforms during Disasters

The platforms offer invaluable benefits across various industries, such as telecommunications, manufacturing, pharmaceuticals, FMCG, steel, e-commerce, and airports. By providing early warnings of potential hazard events and detailed weather parameters, these platforms enable companies to plan and mitigate risks proactively:

- **Telecommunications:** Companies can identify areas prone to extreme weather events, allowing them to prioritize network hardening and redundancy to maintain service during disasters.
- **Manufacturing:** Businesses can anticipate supply chain disruptions, identify vulnerable assets, and implement effective risk management strategies.
- **Pharmaceuticals:** Impact forecasting helps ensure the security of temperature-sensitive products, safeguarding them against weather-related risks.

- **FMCG:** Companies can optimize inventory management and maintain delivery schedules, minimizing disruptions in their distribution networks.
- **Steel Industry:** Forecasting helps assess potential weather impacts on operations, including mining and transportation, ensuring continuity and safety.
- **E-commerce:** Platforms enhance disaster response planning, protecting critical infrastructure like warehouses and ensuring service continuity.
- **Airports:** Enhanced weather monitoring capabilities improve runway operations and passenger safety during adverse conditions.

With a 2-3 days lead time, businesses can implement timely mitigation measures to reduce disruptions and protect assets. Integrating early warning systems with impact forecasting platforms can mitigate indirect losses, such as power outages, which can disrupt production lines, jeopardize medication storage, and impair communication networks, especially during natural calamities.

Impact Forecasting: A Multi-Faceted Approach

The Impact Forecasting Platform utilizes a sophisticated blend of advanced technologies and innovative methodologies to deliver precise and timely insights into potential disaster risks. This cutting-edge approach leverages the power of artificial intelligence, big data analytics, cloud computing, blockchain, and IoT to transform disaster preparedness and response. Here's how:

1. Numerical Model Integration: Leveraging high-performance computing and artificial intelligence, numerical models simulate various natural disaster scenarios with unprecedented accuracy. The platform can predict potential impacts on lives, property, and economies by integrating these models with GIS data, vulnerability assessments, and big data analytics. This fusion of technologies enables a more detailed and dynamic evaluation of disaster risks.

2. IoT Integration: The platform employs IoT devices and sensors to collect real-time environmental data, creating a vast network of information streams. These sensors, strategically placed in high-risk areas, continuously monitor environmental conditions and detect emerging threats. When combined with cloud computing and blockchain for secure data storage and transmission, this data offers critical insights for early warning systems, enhancing situational awareness and response capabilities.



Figure 1: Screen snap from 'Global Disaster Impact Forecasting' platform.

3. GIS Technology Integration: Utilizing advanced GIS technology, the platform analyzes spatial data to visualize and model disaster scenarios. Integrating weather data, population density, and infrastructure details provides a comprehensive view of vulnerable areas. This high-tech approach, powered by big data analytics, enables precise risk assessments and the development of targeted early warning systems.

4. Alert Dissemination Mechanism: The platform's alert dissemination mechanism leverages multiple communication channels, including SMS, email, social media, and public address systems, to ensure timely and effective outreach. By integrating GIS data with real-time population analytics and utilizing AI-driven algorithms, alerts are tailored to reach the most vulnerable areas swiftly. This ensures that the right information reaches the right people at the right time, optimizing disaster response efforts.

RMSI's Impact Forecasting Platform

RMSI has developed a 'Cyclone Impact Forecasting Platform' for NDMA and IMD to provide reliable and timely impact forecasts.

Due to the sharp increase in flood risk in India over the last decade, it is imperative to develop an EWS for floods along the same lines. RMSI has worked closely with various state governments and successfully developed flood early warning systems for 17 river basins nationwide.

To make the private sector more disaster resilient, RMSI has also developed a 'Global Disaster Impact Forecasting' platform that provides up to 3 days advance alerts for floods, cyclones, landslides, avalanches, lightning, fog, heatwave and coldwaves.