

*Resilience
Starts at Home*



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RESILIENCE WITHOUT ELECTRICITY: DESIGNING THE CLIMATE-READY HOME

Dr. Sudipta Tripathi

Assistant Professor, School of Environment and Disaster Management, RKMVERI

Imagine a summer afternoon when temperatures soar beyond 40°C, a cyclone approaches the coast, or intense rainfall floods neighbourhoods and disrupts electricity for several days. Fans stop working, refrigerators become unusable, mobile phones lose power, and indoor temperatures begin to rise. For many households, such situations are more than temporary inconveniences; they can become serious threats to health, safety, and survival. As climate change intensifies extreme weather events, designing homes that remain habitable without electricity is becoming an essential component of disaster risk reduction. A climate-ready home should not depend entirely on mechanical cooling, artificial lighting, or electrically powered equipment to provide basic comfort.

Passive Designing for Thermal Comfort

The most effective strategy begins with the building itself. Passive design principles can reduce heat entering a house and improve its ability to remain comfortable during extreme weather. Building orientation, external shading, roof insulation, reflective roofing materials, and appropriately positioned windows can substantially reduce solar heat gain. Deep verandas, courtyards, shaded openings, and trees around buildings can provide additional protection from direct sunlight. In hot and humid regions, including much of eastern India, cross-ventilation can help remove accumulated indoor heat when outdoor conditions permit. Windows and openings on opposite sides of a building can encourage airflow without mechanical assistance. However, during extreme heat, when outdoor air is hotter than indoor air, opening windows indiscriminately may increase heat exposure. Climate-responsive design must therefore consider local temperature, humidity, wind direction, security, and outdoor air quality. Roof design deserves particular attention because roofs receive intense solar radiation.



Materials That Support Resilience

Construction materials influence how quickly indoor temperatures change. High thermal mass can delay heat transfer, but its benefits depend on nighttime cooling and local climate. Insulation, reflective coatings, ventilated cavities, and shaded walls can help maintain more stable indoor temperatures. Locally available, durable, and repairable materials may also reduce maintenance costs. Climate-ready housing does not necessarily require expensive technology. Traditional architectural features—such as courtyards, verandas, shaded entrances, lime-based finishes, and ventilated roof structures—offer valuable lessons when adapted to contemporary climatic conditions. Combining traditional knowledge with modern building science can support affordable and context-sensitive solutions. Water security without electricity can be achieved through rain water harvesting followed by gravity-fed distribution with electricity using manual pump.

Preparing Households for Emergency

Building design must be complemented by household preparedness. Every family should maintain an emergency kit containing drinking water, essential medicines, a first-aid kit, battery-powered or hand-crank lighting, a power bank, and important documents stored in waterproof packaging. Safe food storage, emergency communication arrangements, and knowledge of nearby shelters are equally important. During heatwaves, households should identify the coolest available room and understand the symptoms of heat exhaustion and heatstroke. Infants, older adults, people with disabilities, and individuals with chronic health conditions may require additional support.

From Individual Homes to Community Resilience

A climate-ready home is not an isolated structure. Shaded streets, urban trees, community water points, accessible emergency shelters, and reliable disaster communication networks strengthen household resilience. Housing policies should encourage passive design, climate-sensitive building regulations, affordable retrofitting, and support for low-income families who are often most exposed to extreme heat and disasters. Ultimately, resilience without electricity is not about rejecting modern energy systems. It is about ensuring that essential protection does not disappear when those systems fail. By integrating passive cooling, thoughtful architecture, safe materials, and household preparedness, we can create homes that protect lives during climate emergencies.

THE DISASTER-READY HOME OF 2030: CAN TECHNOLOGY MAKE HOUSEHOLDS RESILIENT?

Dr. Sumanta Das, Assistant Professor, School of Environment and Disaster Management, RKMVERI

Imagine a home that receives a flood warning before the streets become inundated, switches off its electricity automatically when water enters the building, and helps family members contact emergency services even when mobile networks fail. By 2030, such features may become increasingly common as climate change, urbanisation and environmental degradation expose households to more frequent and severe disasters. However, the critical question is whether technology alone can make our homes resilient.

The disaster-ready home of 2030 will depend on the integration of smart technologies, safer construction, reliable information and household preparedness. Internet-connected sensors could detect rising water levels, smoke, gas leaks and unusual structural movements. Artificial intelligence (AI), combined with weather forecasts and local hazard maps, could translate complex risk information into timely, location-specific alerts. Smart electrical systems could isolate power during flooding, while automated ventilation and fire-detection systems could reduce certain household hazards. Solar panels, battery storage and rainwater harvesting could help families maintain essential services during prolonged disruptions. Technology could also change how households prepare for disasters. Mobile applications may provide evacuation routes, emergency contacts, first-aid guidance and information about nearby shelters. Satellite observations, geographic information systems (GIS) and community-based reporting could help identify vulnerable neighbourhoods and improve local risk assessments. For older people, children and persons with disabilities, accessible warning systems, voice assistants and automated emergency notifications could provide additional support when every minute matters.

Yet, a technologically advanced home is not necessarily a disaster-resilient one. Smart devices may fail during power cuts, internet disruptions or extreme weather. Sensors require maintenance, batteries need replacement, and automated systems can generate false alarms. Cybersecurity and data privacy are also concerns when household devices continuously collect information. Most importantly, expensive technologies may remain beyond the reach of low-income families, informal settlements and rural communities that often face the greatest disaster risks. The Indian context makes this challenge particularly relevant. Floods, cyclones, heatwaves, landslides and earthquakes require different preparedness measures. A flood-prone household in the Sundarbans needs different protective features from a home exposed to extreme heat in Rajasthan or an earthquake-prone settlement in the Himalayas. Local building practices, drainage conditions, household income and access to emergency services must guide technological choices.

Therefore, the disaster-ready home of 2030 should combine affordable technology with practical risk reduction. Raised electrical connections, secure roofs, adequate drainage, fire extinguishers, emergency supplies and clearly planned evacuation routes remain essential. Families must know how to respond when digital systems stop working. Governments, researchers, housing developers and local communities should work together to make reliable technologies accessible and ensure that building standards account for changing hazards. While technology can help households anticipate danger, reduce losses and recover faster, resilience is built through preparation, inclusive planning and informed decisions. The home of 2030 will be disaster-ready when technology supports people rather than replaces their judgement, and when safety is treated as a basic necessity rather than a luxury.

CAN DIGITAL TWINS MAKE HOMES DISASTER-READY?

Dr. Malini Roy Choudhury, Assistant Professor, School of Environment and Disaster Management

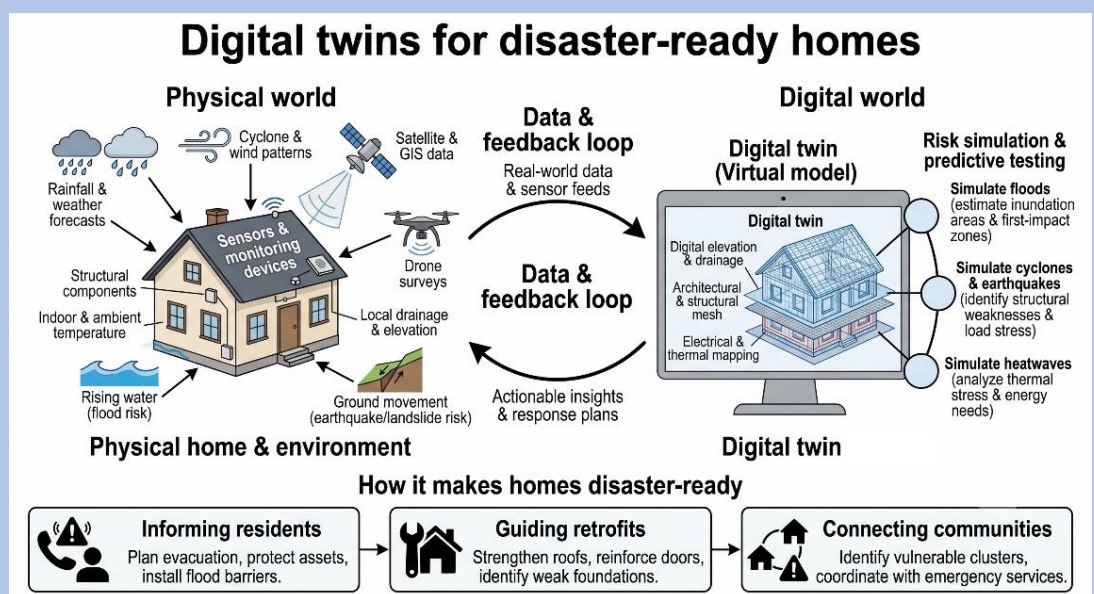
A home is often considered a place of safety, yet floods, cyclones, earthquakes, heatwaves and landslides can turn it into a site of serious risk. Climate change, rapid urbanisation and unplanned construction are increasing the pressure on residential areas, particularly in vulnerable regions. In this context, digital twins offer a promising way to rethink how homes are designed, monitored and protected against disasters. A digital twin is a virtual representation of a physical object or system that can be updated using real-world data. For a home, this may include its architectural design, structural characteristics, electrical systems, drainage, indoor temperature, and surrounding environmental conditions. Data from sensors, weather forecasts, satellite imagery, drones and geographic information systems (GIS) can help the digital model reflect changing conditions around the property. Unlike a conventional 3D model, an advanced digital twin can support simulations, monitor emerging risks and help residents understand what might happen before a disaster strikes.

Consider a house in a flood-prone neighbourhood. A digital twin linked to rainfall forecasts, drainage information and local elevation data could estimate which parts of the property are likely to flood first. Residents could use these insights to protect electrical equipment,

move essential belongings, install flood barriers or plan evacuation routes. In cyclone-prone areas, simulations could help assess wind exposure, roof vulnerability and the potential benefits of strengthening doors, windows and structural connections. In earthquake-prone regions, structural models could help engineers identify weaknesses and compare possible retrofitting measures.

Digital twins could also improve preparedness for less visible threats. By combining building data with temperature and energy models, they may help identify rooms vulnerable to extreme heat, estimate cooling requirements and support more energy-efficient designs. At the neighbourhood scale, connected building models could help authorities identify clusters of vulnerable homes and prioritise emergency support. However, digital twins are not a substitute for sound construction, building regulations or effective disaster management. Their reliability depends on accurate data, regular updates and appropriate modelling. Sensors may fail, internet connectivity may be disrupted, and simulations may underestimate unusual events. High installation and maintenance costs could also prevent low-income households from benefiting. Privacy deserves attention, particularly when continuous monitoring reveals household routines or personal behaviour.

Making digital twins useful therefore requires an inclusive approach. Affordable systems, open data standards, reliable local hazard maps and community participation should be central to their development. For India, integrating digital twins with local disaster management plans could be especially useful in flood-prone settlements, coastal communities and rapidly expanding cities.



THE HEAT-RESILIENT HOME: DISASTER RISK REDUCTION BEGINS WITH THERMAL SAFETY

Dr. Mahadev Bera

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Extreme heat is no longer merely a seasonal discomfort; it is a growing disaster-risk challenge. Unlike floods, cyclones, and earthquakes, heatwaves may leave little visible destruction, yet their impacts can be deadly. The World Health Organization estimates that approximately 489,000 heat-related deaths occurred annually worldwide between 2000 and 2019, with 45% occurring in Asia. Heat-related mortality among people aged over 65 increased by approximately 85% between 2000–2004 and 2017–2021 (WHO, 2026). These figures highlight the urgent need to recognise thermal safety as a fundamental component of disaster risk reduction. The home is the first line of defence against extreme heat. However, poorly ventilated rooms, heat-absorbing roofs, inadequate shading and overcrowded living conditions can turn homes into hazardous environments. A heat-resilient home is therefore more than a shelter; it is a protective system that limits indoor heat gain and supports human health during heatwaves.

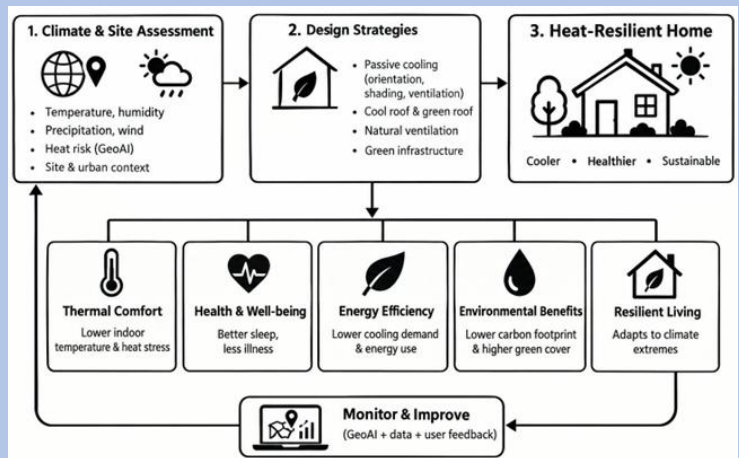
Climate-responsive housing begins with passive cooling. Building orientation, cross-ventilation, shaded windows, reflective roofs, roof insulation and locally appropriate construction materials can reduce heat accumulation. Existing homes can benefit from affordable improvements, including cool-roof coatings, external shading and better ventilation. These measures are particularly important for low-income households that cannot depend on continuous air-conditioning. According

to the United Nations Environment Programme, global cooling demand could more than triple by 2050 under a business-as-usual scenario, increasing pressure on electricity systems and contributing to greenhouse gas emissions (UNEP, 2025). Passive cooling can help reduce this dependence while improving indoor comfort.

Thermal safety also extends beyond individual buildings. Dense construction, limited vegetation and extensive paved surfaces can intensify urban heat. Trees, shaded streets, green corridors, rain gardens and protected water bodies can help moderate local temperatures while providing environmental and social benefits. Integrating nature-based solutions into neighbourhood planning can therefore strengthen both climate adaptation and disaster resilience. Water security is equally important. Reliable access to safe drinking water, community cooling spaces and public health services can reduce heat-related risks. Rainwater harvesting, water conservation and the protection of urban water bodies should complement Heat Action Plans. Preparedness must extend beyond emergency responses to address the underlying conditions that make communities vulnerable.

Heat resilience must also be socially inclusive. Older adults, children, people with disabilities, outdoor workers and residents of informal settlements may face disproportionate exposure. Geospatial technologies, satellite observations and artificial intelligence can help identify urban heat hotspots and combine temperature patterns with housing conditions and social vulnerability. Such assessments can guide targeted investment towards communities that need protection most.

The way forward requires climate-responsive building standards, affordable housing retrofits, public awareness and stronger coordination among urban planners, health services and disaster-management authorities. Local governments should prioritise passive cooling, accessible drinking water, green infrastructure and early-warning systems, with particular attention to vulnerable households. Ultimately, disaster risk reduction must begin before the heatwave arrives. A home that remains safer and more comfortable during extreme temperatures protects health, supports livelihoods and reduces pressure on energy and emergency services. Building heat resilience is not simply an architectural choice; it is an investment in public health, social equity and safer cities.



AI AT HOME BEFORE DISASTER STRIKES

Abhijit Pal

Background

Multi-hazard disasters, such as floods, cyclones, heatwaves, landslides, earthquakes, and extreme rainfall, can put households at sudden risk, where there is not enough time for them to take protective measures. Forecast and early-warning systems have led to an increase in the detection and communication of hazards but warnings are frequently at the regional and administrative level. The households might then still wonder how bad the risk is, when to take action, what to protect and if they should evacuate. This gap points to the need for localized, understandable and actionable information about disaster risk.

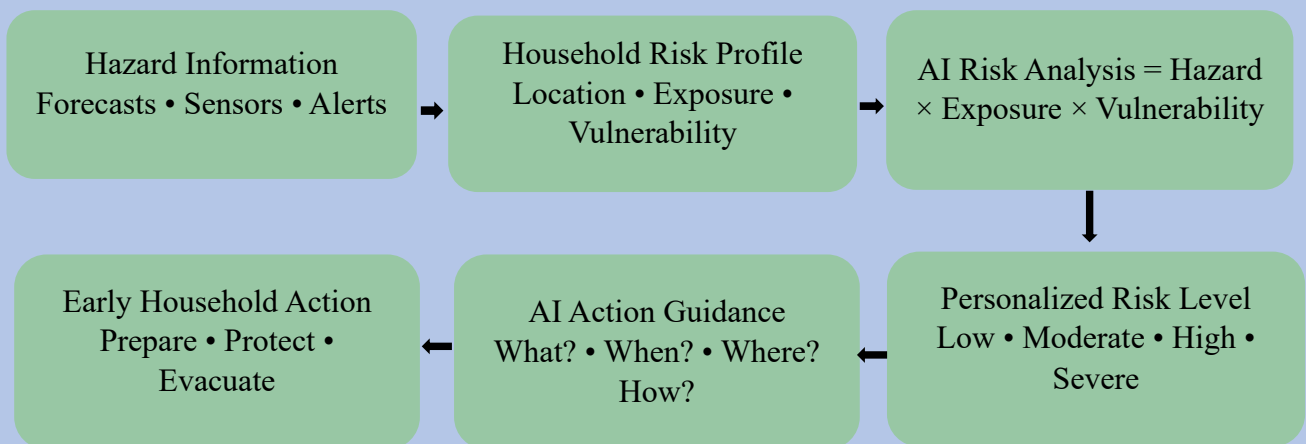
Core Concept

“AI at Home Before Disaster Strikes” suggests a human-centred AI decision-support framework that transforms hazard information and makes it actionable at the household level. The system would combine forecasts, sensor observations, and official alerts with households' characteristics, including their location, exposure, housing condition, age, disability, mobility and resources. AI would use these inputs to assess risk and give clear and timely recommendations for preparation, protection and evacuation.

Existing Digital Warning Systems and Recent Relevance

Digital warning and hazard-information systems are playing an important role in disaster preparedness by predicting, observing and warning. Windy is a weather visualization tool for real-time weather, MAUSAM for weather forecasting and warning, SACHET for geo-targeted multi-hazard alerts, Damini for Lightning Risk Awareness and Sagar Vani for Ocean and Coastal information. Flood monitoring platforms, like Google Flood Hub, further enhance hazard awareness. But most systems are mainly used for monitoring, forecasting, and dissemination of warnings; the action advice targeted to individual households is limited. The 26 August 2026 Nepal flash flood demonstrated the speed of change in hazards and the need for rapid response. This underscores the need for location-specific, timely and personalised household actions based on warnings through AI-supported systems.

Proposed Framework



The hazard information and the household vulnerability are analysed and then the AI is used to provide personalized risk levels and action guidance as illustrated in the framework. The system translates risk information into understandable household choices for timely preparation, protection or evacuation.

Expected Contribution

The system proposed would link early-warning systems and household decision-making by changing from “hazard detected” to “action recommended.” It could enable action to be taken earlier, fewer avoidable losses, and greater household and community resilience, if it had reliable data, privacy safeguards, uncertainty that was clearly stated, and was coordinated with the authorities who manage disasters.

YOUR SMARTPHONE AS A DISASTER-RESILIENCE DEVICE

Sujan Mandal

Resilience may begin at home, but in the digital age, it can be held in the palm of our hand.

Imagine a family at home asleep as a raging storm builds inside them. The electricity suddenly fails. The youngest child is jolted awake in terror, an elderly parent asks if it is raining again, and the ground outside begins to sink. No TV, no operative streetlight, and little idea what next. And then there is a light on the screen of the phone. Bad condition emergency alert: A map shows the nearest safe shelter. The message gets to one relative: "We are safe. We are leaving now." At that point, a smartphone is not just a phone anymore. It turns into an information source, a connecting point, and a place to return for reassurance.

The smartphone has come a very long way since it was first introduced as simply a communication device. With GPS, cameras, sensors, and an internet connection, together with real data, it can be a small disaster-resilience tool. As seen in various use cases such as receiving timely alerts, finding routes for evacuation, and contacting emergency services, it proves especially useful when traditional infrastructure is not available.

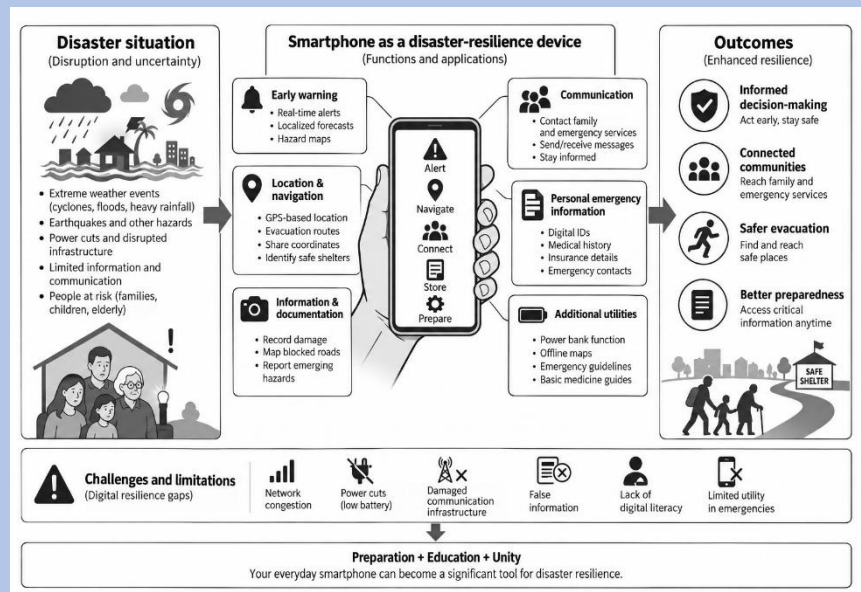
The first layer of resilience is early warning. Warnings for cyclones, floods, earthquakes, extreme rainfall, and more can be sent directly to individuals via mobile networks and emergency-alert systems. Weather and disaster-management applications are designed to provide localized forecasts, hazard maps, and alerts so that individuals can make decisions before conditions are life-threatening. Yet, technology can only work when people appreciate the warnings it produces and act accordingly.

Location and communication become critical resources during a disaster. Smartphones with GPS functionality can assist people in pinpointing their location, guide them safely towards a better place, and also share their exact coordinates with family members or rescuers. Furthermore, digital maps can aid in evacuation and route planning even if the roads are not familiar or they aren't visible. It can also be used to record damaged infrastructure, blocked roads, or newly emerging hazards, creating an effective visual record for responders and authorities by using a smartphone camera.

Your device can serve as your personal emergency information hub. Digital copies of IDs, emergency contacts, medical history and care details, insurance policies, and details of what these documents cover could provide access where the physical documents have been lost or become inaccessible. The phone will also be able to serve as a power bank, view offline maps, downloaded emergency guidelines, and basic medicine guides, even when there is no electricity or the Internet.

However, digital resilience comes with flaws. Smartphones can have limited utility in emergencies due to network congestion, power cuts, damaged comms infrastructure, dissemination of false information, low battery capacity, and lack of digital literacy. Thus, resilience cannot rely on technology at all. Make sure critical information is offline, the most important contacts are stored locally, and households have an alternative means to communicate.

Overall, disaster resilience is all about preparation, education, and unity. The phone is not a disaster prevention tool, and cannot serve as an alternative to resilient infrastructure or trained emergency services. Yet, when incorporated as part of household-scale preparedness, it can turn your everyday device that you know intimately into a significant tool that yields alerts and warnings, a communication platform, navigation support, documentation, and decision-making.



The Last Mile Begins at Home

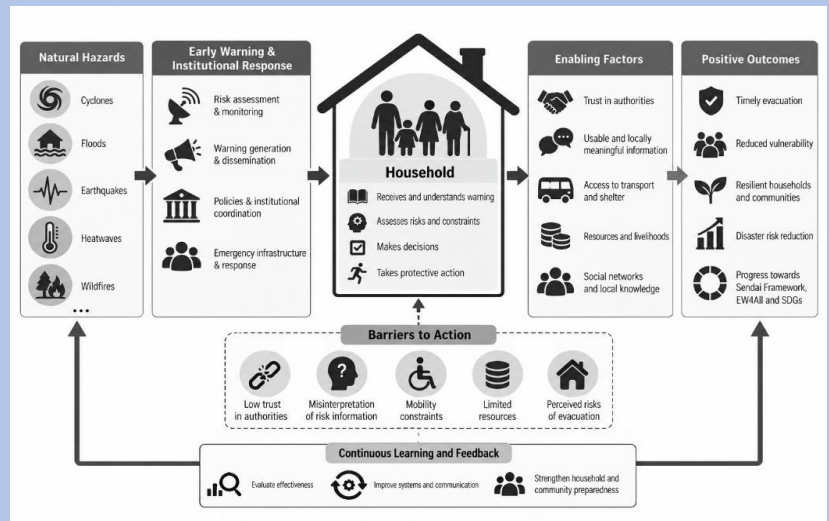
Suchismita Roy

“A warning is only a message in the air until a prepared household turns it into care.”

Disaster risk management is often conceptualised through laws, institutions, systems, and processes that are heavily oriented to preparedness and response by the government and relief for the victims. Ultimately, the efficacy of disaster management frameworks and systems is tested at the household level, where a warning has to become a decision, preparedness becomes action, and institutional capacity translates into individual survival. Disasters, whether cyclones, floods, earthquakes, heatwaves, or wildfires, repeatedly show that the “last mile” isn’t just the last link in a chain of warnings. It is the social and behavioural interface of risk information and protective action. In this sense, the last mile does not start at the emergency shelter, but rather at home.

The Sendai Framework for Disaster Risk Reduction and Sustainable Development Goals highlight the common thread of risk understanding, inclusive preparedness, resilience and locally accessible warning systems. However, warning coverage alone does not guarantee risk reduction. A technically accurate warning may not lead to protective behaviour because of low trust in authorities, difficulty interpreting probabilistic information, mobility constraints, limited resources, or because evacuation is perceived as more threatening than staying at home. But the real dilemma is not about whether a warning goes to a household or not, but whether that household has the capacity, push, and resources needed to act on it.

Households are key micro-level institutions of disaster governance. They continuously negotiate risk on a continual basis in decisions around housing, savings, livelihoods, communications, caregiving, mobility, and evacuation. Thus, preparedness is not an isolated intervention, but rather a cumulative process in which households transform knowledge into anticipatory capacity. A warning may reach a household in advance, but if there is no opportunity for members to leave livestock, secure livelihoods, help elderly or children, find transport or shelter, then the household remains vulnerable. So, the last mile has both a technical aspect, delivering information to people in a usable form, and a governance aspect enabling people to act on it.



This view questions the idea that communities are passive recipients of institutional disaster management. Households have local knowledge of hazards, their own social networks and adaptive strategies designed to enhance resilience, which can complement formal systems. The same hazard may be experienced by women, caregivers, persons with disabilities, older people, children and other livelihood-dependent populations through fundamentally different constraints. Consequently, an effective last-mile strategy has to evolve from generic warning messaging towards locally meaningful, socially equitable and action-oriented risk communication.

Thus, the household is not the end point of disaster governance; instead, it is its operational beginning. Institutional preparedness only matters when it alters what people can do before, during, and immediately after a hazard. To reinforce the last mile, it needs much more than technical coverage. This calls for integrating early warning with household preparedness, trustworthy local institutions, participatory decision-making, accessible evacuation measures, and resilient livelihoods and community engagement. To achieve the best results in disaster risk governance, the last mile should be designed from the home outwards, not from institutions downwards. DM Plans should both begin and culminate with Household DM Plans for building resilience to disasters.

RESILIENT HOMES IN AN ERA OF COMPOUND DISASTERS

Md Hasanujjaman

Introduction: Climate change has increased the complexity of disasters, where communities are increasingly exposed to multiple hazards occurring together or in sequence. Cyclones, floods, riverbank erosion, landslides, extreme rainfall, and coastal hazards are creating greater risks for human settlements. In this context, resilient homes are essential not only to resist individual disasters but also to provide continuous protection, adaptability, and recovery capacity through climate-responsive design, durable construction and locally appropriate solutions.

Resilient Homes in an Era of Compound Disasters: The emergence of compound disasters has transformed the concept of resilient housing. A single-hazard design may fail when communities face overlapping impacts such as cyclone-induced flooding, storm surges, or rainfall-triggered landslides. Therefore, resilient homes should function as adaptive systems that combine structural strength, climate responsiveness, affordability, and community needs.

In cyclone- and flood-prone coastal areas, resilient homes require elevated foundations, wind-resistant structures, and flood-adaptive designs. Research on post-Cyclone SIDR housing in Bangladesh highlights the importance of raised plinths to reduce floodwater entry and compact building forms to minimise wind pressure. These houses also include ventilation, separate rooms, kitchen facilities, verandas and sanitation systems to ensure safe and comfortable living. Amphibious and elevated housing approaches provide additional protection in areas exposed to repeated flooding. For areas affected by heavy rainfall and landslides, resilient homes require stable foundations, proper drainage systems, suitable site selection, and lightweight materials. Integrating traditional construction knowledge with modern engineering approaches can improve climate adaptation, particularly in vulnerable mountainous regions. In riverbank erosion-prone communities, housing resilience depends on flexibility and rapid reconstruction. Since erosion can cause displacement, lightweight, affordable, and easily movable houses are more suitable. The use of bamboo and locally available materials, combined with modular construction techniques, allows communities to rebuild quickly after environmental shocks.

Overall, resilient homes should not be viewed as completely disaster-proof structures but as adaptive living environments. Effective housing solutions combine hazard resistance, affordability, local materials, community participation, and climate-sensitive design to ensure safety, comfort and recovery after repeated environmental shocks.

Conclusion: The increasing occurrence of compound disasters requires a new approach to housing design. Resilient homes must move beyond single-hazard protection and integrate multiple adaptation strategies to address complex climate risks. By combining engineering innovation, local knowledge, affordable materials, and community needs, future housing can provide safer and more sustainable living environments. Such homes will play a vital role in strengthening resilience in vulnerable communities facing an uncertain climate future.

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THE 72-HOUR HOUSEHOLD: IS EMERGENCY PREPAREDNESS STILL ENOUGH?

Saurabh Kole

The concept of the “**72-hour household**” has long been central to emergency preparedness. The principle is straightforward: following a disaster, households should be capable of surviving independently for at least three days before external assistance becomes available. Emergency kits containing drinking water, food, medicines, flashlights, batteries, first-aid supplies, important documents and communication devices are therefore routinely recommended. However, the changing nature of disasters raises an important question: **is 72-hour preparedness still sufficient?**

Traditionally, the 72-hour concept was associated with relatively short-duration emergencies such as earthquakes, floods, cyclones, fires and infrastructure failures. It assumed that emergency services and government systems would progressively restore essential services within a few days. Contemporary emergencies, however, are increasingly characterized by **complexity, cascading impacts and prolonged disruption**. Climate-related disasters, pandemics, extreme heat, urban flooding, cyber disruptions and supply-chain failures can overwhelm health and emergency systems for considerably longer than 72 hours.

The **COVID-19 pandemic** exposed the limitations of a purely short-term preparedness model. Households faced weeks or months of disruption involving healthcare access, medicines, food supplies, employment, education, mobility and social interaction. Similarly, major cyclones and floods can disrupt electricity, telecommunications, transportation and drinking-water systems for several days or weeks. A household possessing a three-day emergency kit may therefore remain vulnerable during prolonged crises.

From a **public-health and health-system perspective**, preparedness must extend beyond stockpiling supplies. A resilient household should be able to maintain essential health functions during prolonged disruption. This includes maintaining regular medications, securing prescriptions and medical records, understanding basic first aid and CPR, knowing emergency contacts and healthcare facilities, and having specific plans for children, older adults and people with disabilities or chronic illnesses. During infectious disease emergencies, preparedness should also include vaccination, hygiene, respiratory protection, isolation practices and access to reliable health information.

Risk communication is another critical component. During disasters, misinformation can spread rapidly. Households therefore need the ability to distinguish verified information from rumours and social-media misinformation and should know which official communication channels to trust.

Preparedness must also be viewed through the lens of **social vulnerability**. Low-income households, people living in informal settlements, migrants, elderly individuals living alone and daily-wage workers may have limited capacity to maintain emergency stocks. Individual preparedness must therefore be complemented by resilient communities, primary healthcare systems, local governments and emergency-response infrastructure.

A more appropriate contemporary framework may be “**72 hours and beyond.**” The first 72 hours remain essential for immediate life safety and basic survival, but preparedness planning should also consider **7 days, 14 days or longer**, depending on the hazard and local vulnerability. This should encompass continuity of healthcare, water, food, power, communication, financial access and psychosocial support.

For disaster and pandemic preparedness research, this evolution has important implications. Preparedness should not be measured simply by the presence of an emergency kit. Future assessments should examine **knowledge, behavioural readiness, continuity of essential health services, communication resilience, social support and adaptive capacity**.

Ultimately, 72 hours should be viewed as the **starting point—not the endpoint—of preparedness**. In an era of complex and prolonged emergencies, resilient households must be prepared not only to survive the first three days, but also to adapt, recover and protect health until essential systems are restored.

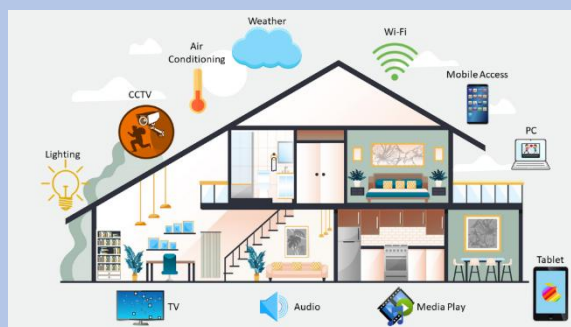
FROM SMART HOMES TO SAFE HOMES: THE NEXT FRONTIER OF DISASTER RISK REDUCTION

Soumitra Maity

Disasters are becoming increasingly complex. Floods, cyclones, heatwaves, earthquakes, and extreme rainfall can disrupt homes, livelihoods, communication, and essential services within a short time. At the same time, technology is rapidly changing the way we live. Smart homes equipped with sensors, connected devices, automated systems, and digital services are becoming more common. The next challenge is to ensure that these homes are not only smart and comfortable, but also safe and resilient.

A smart home can do much more than control lights or appliances. With the help of sensors and connected devices, it can monitor temperature, humidity, smoke, water leakage, electricity use, and other potential hazards. Early-warning systems can alert residents when dangerous conditions are detected. For example, a water-level sensor can provide an early warning of flooding, while smoke and heat sensors can help identify a fire before it spreads.

Technology can also support families during power failures and communication disruptions. Solar panels, battery storage, emergency lighting, and efficient energy-management systems can help maintain essential services during emergencies. Smart electrical systems can automatically disconnect selected circuits when flooding or electrical faults are detected, reducing the risk of fire and electrocution.



However, technology alone cannot make a home disaster resilient. A house filled with smart devices can still be vulnerable if it is poorly constructed or located in a high-risk area. Building design, construction quality, drainage, land-use planning, and access to safe roads and essential services remain fundamental. A truly resilient home must combine smart technology with sound construction and risk-sensitive planning.

Another important aspect is accessibility. Advanced technologies may be expensive and may not be affordable for every household. Disaster risk reduction should therefore not become a privilege available only to wealthier families. Low-cost solutions such as rainwater harvesting, raised electrical outlets, improved ventilation, emergency communication plans, strong roofing, community warning systems, and locally appropriate building practices can provide significant benefits.

Smart homes should also be connected to smart communities. During a disaster, information from individual homes can help communities and emergency agencies understand where assistance is needed most. Connected neighbourhoods can share warnings, identify vulnerable residents, coordinate evacuation, and support rescue and recovery efforts. In this way, technology can strengthen not only individual households but also the wider social network.

Privacy and reliability must also be considered. Connected devices collect information and depend on electricity, internet services, and functioning communication networks. If these systems fail, residents should still be able to access essential functions manually. Disaster-resilient technology must therefore include backup systems and simple alternatives.

The future of disaster risk reduction is not simply about making homes more digital. It is about making them safer, more adaptable, and better prepared for uncertainty.

The transition from smart homes to safe homes requires a balance between technology, good design, community cooperation, and preparedness. A truly smart home is not one that simply responds automatically—it is one that helps protect the people living inside it when the unexpected happens.

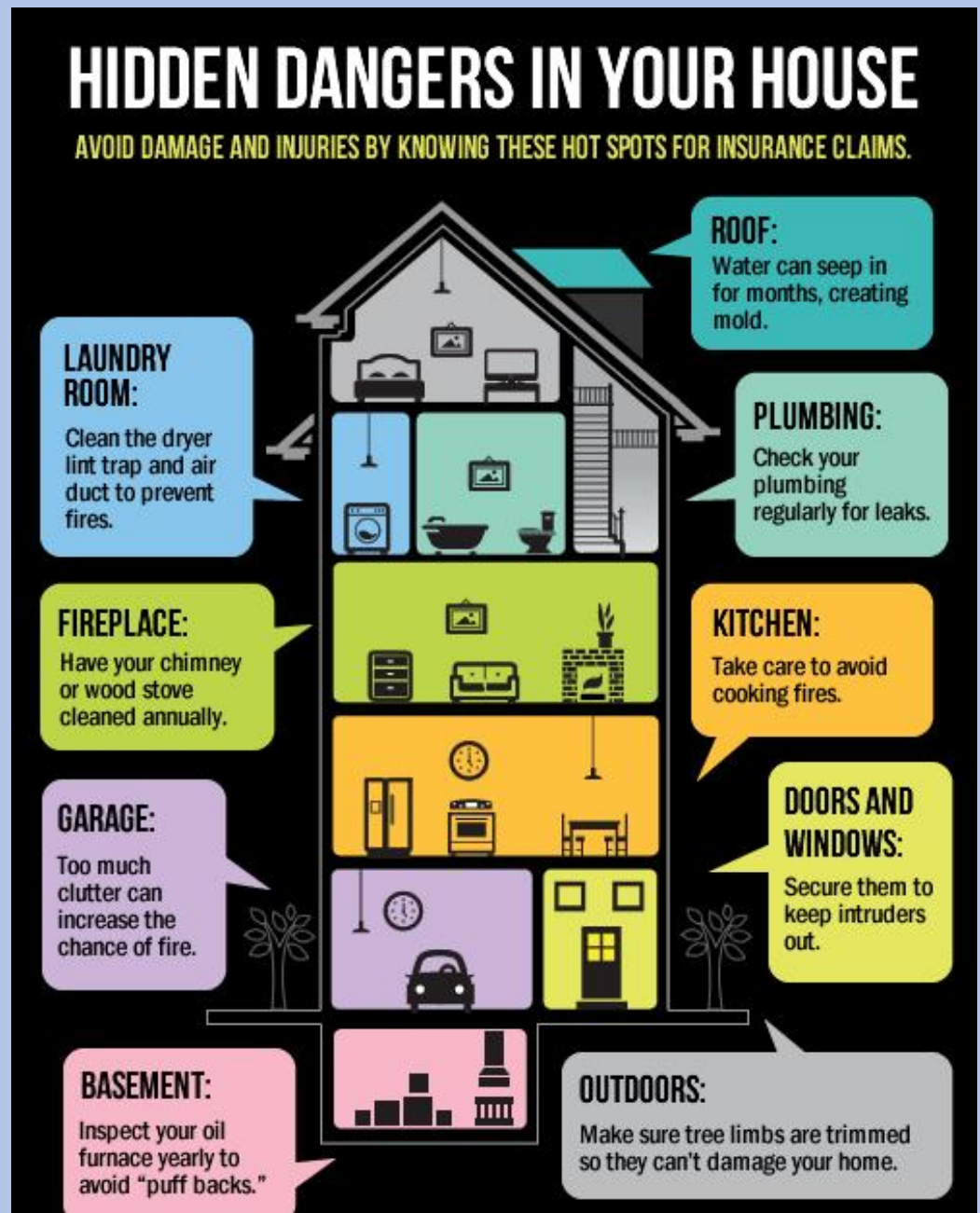
THE HIDDEN DISASTER RISK INSIDE OUR HOMES

Trisha Ghosh

A silent emergency exists within the walls of residential homes across the world. According to UN-Habitat, globally, more than 1.2 billion people live in inadequate housing. The World Bank estimates that by 2030, 60% of urban dwellers in low-income countries will live in informal settlements where building standards are least enforced. The Global Assessment Report on Disaster Risk Reduction consistently identifies non-engineered housing as the principal determinant of disaster mortality (UNDRR, 2022). The Federal Emergency Management Agency (FEMA) notes that nearly 25% of flood insurance claims come from areas outside official flood zones. The National Disaster Management Authority reports that over 90% of housing in some disaster-prone districts is non-engineered. In Nepal, the earthquake killed nearly 9,000 people due to poor housing quality.

Empirical data from the United Nations Office for Disaster Risk Reduction (UNDRR) indicate that structural failure of housing constitutes the predominant proximate cause of disaster-related mortality and displacement worldwide (UNDRR, 2022).

International planning initiatives should include an explicit component that aims to reduce vulnerability. Risk reduction has to be actively integrated, and a constant, ongoing commitment to active collaboration between communities and stakeholders working in disaster-related issues and planning has to be achieved. This does not mean to overstate the role of planning, but to emphasise its current, somewhat marginal role, and the need to change current practices and concepts in order to improve its out-of-mode performance, as well as to promote its risk reduction potential, especially in terms of addressing the issues of informal settlements. Based on this outcome, ways in which risk reduction can be mainstreamed within the fields of urban planning and governance need to be discussed.



THE WATER-RESILIENT HOUSEHOLD IN A CLIMATE-UNCERTAIN FUTURE

Diksha Kar

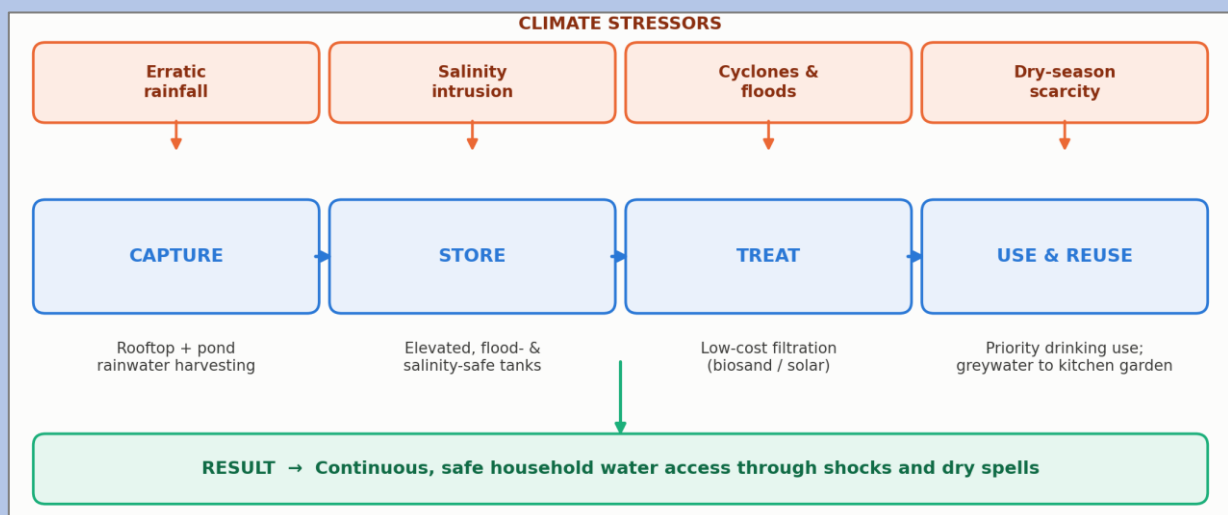
Water has gradually become the most intimate battle ground for climate change; no longer being fought over glaciers, ocean currents but over taps in kitchens, wells in courtyards, rooftop tanks. With climate change making rainfall uncertain, pushing saline boundaries deeper into the delta coast, and making cyclones and droughts unpredictable and unexpected, the battleground for water security has shifted from reservoirs and canals to households.

While water planning in the past few decades has focused on large scale infrastructures like dams, canals, water supply pipes, all of which have been important, yet they have proved to be fragile at the last mile. The household that cannot use its water due to cracking of its water-storing pots, a salty pond due to the rising tides, or collection from long distances due to failure of water sources nearby has been made vulnerable by climatic uncertainty much more quickly than infrastructures can ever be replaced, especially those who have little to cushion themselves from this challenge.

Water shock-proofing households is a design approach in which the house becomes capable of cushioning itself against such shocks, as opposed to hoping to somehow avoid them. There are four practical elements of such a shock-proof design approach. The first element is diversification in water harvesting through rooftop collection and pond systems, which limit reliance on one water source that has become more unpredictable by the day. The second element is decentralized storage in raised tanks to avoid loss of stored water in one wave of flooding, as well as tanks that prevent intrusion of salt into the water supply. The third element is low-cost domestic water treatment using bio-sand and solar methods, which render the locally collected water safe without having to rely on the slow development of central systems.

Nothing here is exotic (Figure 1). Every pillar already exists in fragments in vulnerable areas. The missing piece is not the transformation of them from coping techniques into a single household system but also the transformation of the household water system as something that households have to pay for out of their pocket into public infrastructure to be subsidized, insured, and connected to early warnings so that water tanks are full ahead of a storm rather than depleted by it. The fifth pillar connects everything above: simple water budgeting inside households, which means accounting for what goes in and out of those water storage facilities.

Under conditions of uncertain climatic change, rain and salinity patterns will continue to change unpredictably. Big infrastructure will stay relevant, yet insufficient. Resilience, therefore, will need to be pieced together household by household – on roofs, in water tanks, and in household water use decisions.



The four core pillars of household-level water resilience under climate stress

BATTERY RESILIENCE: WHY ENERGY STORAGE MAY BECOME A HOUSEHOLD LIFELINE

Saswati Ghosh

Imagine a hot summer evening when the electricity suddenly goes out. The fan stops, the lights go dark, the refrigerator falls silent, and mobile phones begin running low on battery. What starts as a minor inconvenience can quickly become a serious problem when an outage lasts for several hours or even days. This is where battery energy storage could become an important part of our everyday lives.

Electricity has become essential to almost everything we do. We depend on it for cooling, communication, food preservation, education, work, healthcare and security. As electricity demand increases and extreme weather events place additional pressure on power systems, having access to backup electricity is becoming increasingly important.

Battery energy storage systems provide a simple but powerful solution: **store electricity when it is available and use it when it is needed**. When combined with rooftop solar, a household can generate electricity during the day, store surplus power in a battery and use it later. During a power outage, a properly designed system can keep essential appliances such as lights, fans, refrigerators, communication devices and selected medical equipment operating.

The International Energy Agency (IEA) identifies battery storage as one of the fastest-growing energy technologies and highlights its importance for electricity-system flexibility and security. The National Renewable Energy Laboratory (NREL) has also examined how solar-plus-storage systems can improve household and community resilience during power interruptions.

For countries such as India, this development has particular significance. Rising electricity consumption, increasing use of air conditioning and the expansion of renewable energy are changing the way electricity is produced and consumed. India's Ministry of New and Renewable Energy recognizes energy storage as an important tool for integrating renewable energy and maintaining grid stability.

However, batteries are not a magic solution. Their capacity is limited, they require investment, and their environmental impact, including the need for responsible battery recycling must be considered. The key is therefore not necessarily to make every home completely independent from the electricity grid, but to give households greater resilience when the grid is unavailable.

The future home may increasingly become more than an electricity consumer. With solar panels, batteries and smart energy-management systems, it could generate, store and manage some of its own electricity.

Ultimately, the value of a household battery is not simply measured in kilowatt-hours. During a blackout, it can mean a working fan during a heatwave, a charged phone when communication matters, or a refrigerator keeping food safe.

A battery may be small, but when the lights go out, the security it provides can be enormous.

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THE RISE OF PERSONAL EARLY WARNING SYSTEMS

Chetana Tunga

Early warning systems have traditionally been **institution-centred**, with governments and disaster-management agencies detecting hazards and communicating warnings through sirens, radio, television and public announcements. The rapid expansion of **smartphones, GPS, satellite technology, IoT sensors, artificial intelligence and mobile networks** is transforming this model into increasingly **personal and location-specific early warning**. The emphasis is shifting from simply *warning a population* to **providing the right warning to the right person at the right time, together with an appropriate protective action**.

A personal early warning system (PEWS) integrates hazard monitoring, real-time data, geographic location and digital communication to deliver an alert directly to an individual's device. Such systems can provide information such as the type of hazard, expected arrival time, severity and recommended action. This is particularly valuable for rapid-onset hazards where even a few seconds or minutes can reduce exposure.

A strong real-world example is **California's Earthquake Early Warning system**. Through the **MyShake app, Android Earthquake Alerts and Wireless Emergency Alerts**, people can receive warnings before strong shaking reaches their location. In the 2022 Bay Area earthquake, more than **2.2 million people received warnings, in some locations up to 19 seconds before strong shaking**. More recently, in June 2026, the system alerted more than **one million people** during an earthquake in Northern California, demonstrating how personal mobile alerts can translate scientific monitoring into immediate individual action such as *Drop, Cover and Hold On*.

India is also moving rapidly toward this model. In 2026, the **NDMA–C-DOT Integrated Alert System (SACHET)** expanded the use of **cell-broadcast technology** for geo-targeted disaster warnings. Unlike conventional SMS, cell broadcast can simultaneously alert mobile phones within a defined geographic area. The system integrates warning agencies including **IMD, Central Water Commission, INCOIS, DGRE and Forest Survey of India**, enabling warnings for cyclones, flash floods, lightning, heavy rainfall, tsunamis and other hazards.

The significance of personal early warning therefore lies not merely in technological advancement but in **reducing the last-mile gap between hazard detection and human action**. However, its effectiveness depends on network availability, smartphone access, digital literacy, accurate location information, trust in warnings and clear, culturally appropriate communication. Thus, the future of early warning is likely to be **people-centred, personalized, multi-hazard and increasingly integrated into everyday digital devices**, complementing rather than replacing community-based and institutional warning systems.

Personal Early Warning Systems are evolving from conventional mass alerts into **predictive, personalized, location-specific, and action-oriented systems**. Integrating AI, GIS, satellite data, IoT, GPS, and cell-broadcast technologies can improve the speed and precision of warnings. Future PEWS should also ensure **inclusive, multilingual, accessible, and low-connectivity communication**, while maintaining human oversight of AI-based decisions. Two-way communication can further strengthen systems by incorporating observations from affected people and communities. Ultimately, the advancement of PEWS should focus not only on **delivering faster warnings but on enabling timely, informed, and life-saving action**, while complementing existing institutional and community-based early warning systems.

SOLAR POWER AS DISASTER RESILIENCE: CAN ROOFTOPS KEEP HOMES ALIVE?

Abhijit Paul

Research demonstrates that integrating decentralised photovoltaic systems with energy storage allows residential blocks to maintain power and mitigate extended grid downtime during blackouts. Community resilience is gaining attention as climate change brings more frequent catastrophic weather events and improved technology strengthens people's ability to respond. Distributed energy resources, such as rooftop solar and storage, are gaining commercial traction and could mitigate the impact of catastrophic events by generating and managing energy locally when the centralised grid is out of service. Public entities are studying the combined sustainability and resilience benefits of microgrids, which are a group of interconnected loads and distributed energy resources that can connect and disconnect to the main grid. India's central ministries and implementing agencies have emphasised rooftop solar as a pillar of national renewable expansion. The Ministry of New and Renewable Energy (MNRE) pursues the Grid Connected Rooftop Solar Programme with an aspirational cumulative target (Phase II of the programme) aiming to achieve large-scale rooftop installations by March 2026 and beyond. The Ministry's dashboard reports that grid-connected rooftop solar is an important and growing share of India's solar portfolio. In 2024, the Government launched the PM Surya Ghar: Muft Bijli Yojana (Pradhan Mantri Surya Ghar) — a major residential rooftop scheme — targeting the installation of rooftop solar systems in one crore (10 million) households with central financial support and consumer outreach mechanisms to expand household access to solar generation and free units of electricity for eligible households. In a country of over 166 million people, Bangladesh's unstable coal-, gas-, and oil-driven on-grid electricity network barely reaches every remote area and island. In rural areas where grid extension is too expensive, SHS provide an appealing electrification option. In line with Sustainable Development Goal 7, many nations have committed to expanding and disseminating clean energy sources, which accounted for just 11% of total global energy sources in 2020. The COVID-19 pandemic has introduced opportunities for more research in resilience, as cities globally experienced lockdowns, causing changes to conventional energy consumption patterns, especially in the residential sector. The solar potential in Hong Kong is significant. It is estimated that Hong Kong could offer 54 km² of suitable rooftop area for potential solar systems, making up to 5.97 GWp capacity and capable of producing 5981 GWh annually. The government also offers financial incentives via a feed-in tariff scheme. The scheme's objective is to enable renewable energy system owners to recover the installation costs. Solar energy can be a valuable component of disaster preparedness plans. In the event of a disaster, power outages are common and can last for days or even weeks. Having a reliable source of power is critical for ensuring access to critical services such as hospitals, communication networks, and emergency response systems. In addition, using solar energy as a primary source of power can help mitigate the impact of climate change, which is driving more frequent and severe weather events. By reducing our dependence on fossil fuels, we can help reduce greenhouse gas emissions and slow the pace of climate change, making disasters less frequent and less severe.

Solar energy can be an excellent option for disaster recovery, as it is a reliable and renewable source of power that can operate independently of the electrical grid. Overall, incorporating solar energy into disaster preparedness plans can help improve resilience and ensure that critical services remain operational during and after a disaster. It's an important step towards building a more sustainable and resilient future.

"Solar power, wind power, the way forward is to collaborate with nature - it's the only way we are going to get to the other end of the 21st century." — Björk.

HOUSEHOLD NATURE-BASED SOLUTIONS FOR DISASTER RISK REDUCTION

Ananya Basak

Nature-based solutions are a promising approach to protecting, sustainably managing and restoring ecosystems; disaster risk reduction is being increasingly adopted day by day. The primary reason for this is that a healthy and resilient ecosystem can absorb the shocks of natural disasters much better and can reduce the intensity, duration, or frequency of disasters. NbS is also being implemented to address other societal challenges such as mitigating and adapting to the impacts of climate change, halting biodiversity loss and ensuring human health and well-being. According to the definition universally adopted by the United Nations Environment Assembly (UNEA) in resolution UNEP/EA.5/L.9/REV.1, Nature-based Solutions is: The comprehensive definition and details regarding Nature-based Solutions can be reviewed directly at the UNDP Website and further explored via the document. These frameworks emphasize actions that manage ecosystems to address socioeconomic and environmental challenges while enhancing biodiversity and human well-being.

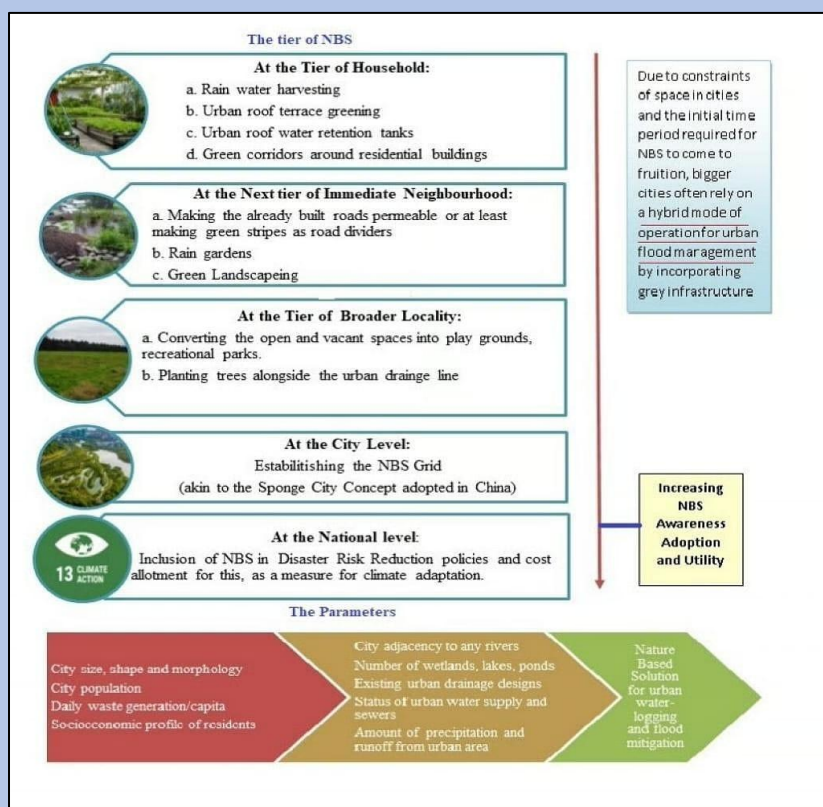
An analysis of DRR-NbS (Nature-based Solutions for Disaster Risk Reduction) projects or interventions implemented in a specific geographical area is provided below. This analysis is based on (1) the approach applied; (2) the natural disasters mitigated; (3) the ecosystem services provided for DRR; (4) the geographical and biophysical site conditions; and (5) the measures and strategies used.

Quantitative benefit assessments are not always necessary or desirable—local or national stakeholders may favor alternative types of information to guide decisions—they constitute an important component of economic and financial instruments, which are typically based on comparative evaluations of the effectiveness of nature-based solutions.

The importance of Nature-based Solutions is steadily growing worldwide due to their multidimensional co-benefits for the environment, society and the economy.

Although NbS primarily focus on Disaster Risk Reduction (DRR), their associated co-benefits directly support the goals of the Sustainable Development Goals (SDGs), the Paris Climate Agreement, and the Convention on Biological Diversity (CBD). This alignment of NbS is a crucial step toward achieving the objectives of these global frameworks. However, to fully understand the actual contribution of NbS to these global frameworks, it is essential to quantify both their positive co-benefits and their negative impacts or disbenefits. Only through the accurate measurement of these impacts can evidence-based conclusions or arguments be made regarding the true impact of NbS on the aforementioned global frameworks.

Examples of NbS in action: Raising revenue from water tariffs for resilient NbS, recognizing NbS as infrastructure at the state level, a national fund for climate disasters, a pay-for-success model for urban green infrastructure.



REMOTE SENSING FOR HOUSEHOLD RESILIENCE

Ananya Das

Resilience at the household level is described as the ability of people and their families to cope with stresses and shocks through preparation, resistance, adaptation, and recovery processes. Some of the shocks and stresses include floods, cyclones, droughts, heatwaves, and other environmental shocks. In this regard, remote sensing has become a critical geospatial technology in studying household resilience. Satellite-based earth observation offers continuous spatial data that can supplement traditional household surveys and field observations.

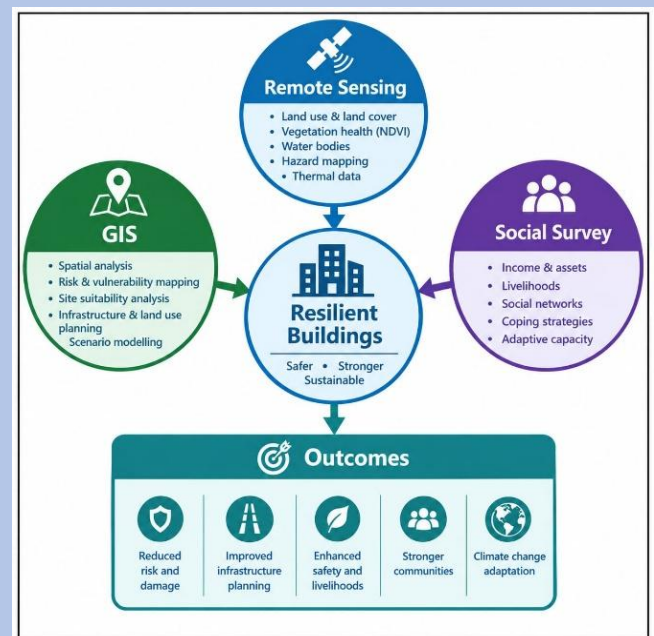
Remote sensing enables household resilience through the identification of exposure to hazards, environmental conditions, and changes in the built environment. Optical satellite imagery allows the mapping of land use, vegetation, the built environment, and water bodies, but SAR data can be very helpful in the mapping of floods due to the fact that this kind of data can provide information regardless of the weather conditions. Thermal remote sensing can be helpful in identifying the locations that are exposed to extreme heat, whereas vegetation indices like the NDVI can be helpful in assessing the health status of vegetation and drought-related problems.

An important application is the integration of remote sensing with household survey and socioeconomic data. For example, satellite-derived flood maps can be spatially linked with household GPS locations to estimate the frequency and intensity of flood exposure. Recent World Bank work demonstrates this approach by combining remotely sensed flood information with household survey data to assess household exposure to historical flooding. Such integration provides a more comprehensive understanding of resilience because remote sensing describes the physical environment, while surveys capture income, assets, livelihoods, social networks, coping strategies and adaptive capacity.

Remote sensing is also increasingly useful for assessing post-disaster recovery. Sequential satellite images can reveal changes in buildings, roads, agricultural land and vegetation before and after a disaster. Changes in built-up structures and land cover can therefore serve as proxies for damage and recovery. However, research emphasizes that many household-resilience characteristics cannot be directly observed from satellites and must instead be inferred through appropriate spatial proxies.

In spite of its strengths, there are some weaknesses of remote sensing. The resolution might be low to identify the distinct characteristics of each household; cloudy weather will hinder optical observations; and socio-economic aspects of resilience cannot be assessed using imagery alone. In addition, resilience is multi-dimensional, and new studies suggest a combination of social, economic, and environmental factors.

In summary, remote sensing is an important source of evidence for analysing and enhancing household resilience, especially when it is combined with socioeconomic surveys and GIS analyses. Its ability to make periodic and geographically explicit observations is useful in disaster risk assessments, early warnings, recovery assessments, and climate change adaptations. Therefore, the future of household-resilience analysis does not lie in the replacement of traditional surveys by remote sensing; it lies in developing geospatial frameworks that link environmental exposure and household resilience.



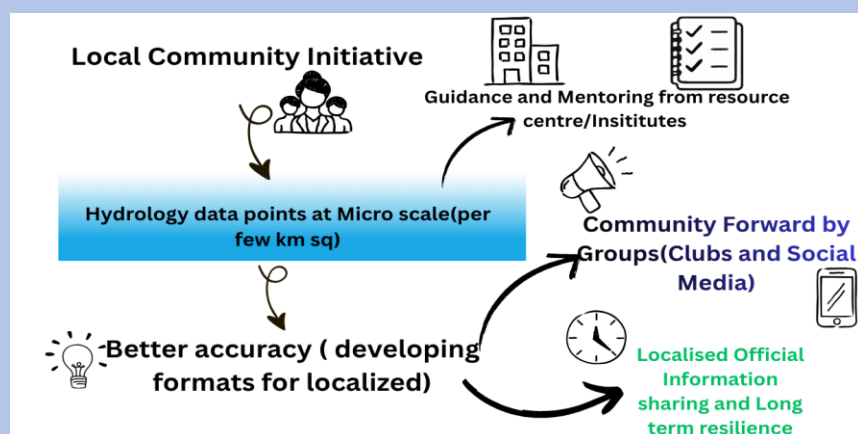
DISASTER RESILIENCE AND THE ARCHITECTURE OF EVERYDAY LIFE

Bidhan Mondal

Resilience with respect to disaster management does not only relate to how communities manage disasters such as earthquakes, floods, cyclones, landslides, and others but also to the architecture of everyday life that relates to the way in which people build their houses, streets, places of work, and social interactions with the aim to resist disruption. The design of the architecture of everyday life is very important in determining whether a hazard turns into a disaster. For instance, well built houses made from the right materials, with safe foundations, drainage, ventilation, and safe escape routes, will minimize loss of lives and properties. The same case applies to the construction of streets, bridges, schools, hospitals, electric and water supplies, and means of communication. This can be illustrated by Japan where earthquake-resistant architecture has been incorporated into the daily lives of people within the urban environment. Japan often experiences earthquakes, but its tight building codes, flexible structure systems, shock absorbing mechanisms, emergency communication channels, and drills for disasters have made it possible to mitigate the effects of the earthquakes. This was evident during the 2011 Great East Japan Earthquake. While the earthquake was highly destructive and the tsunami that followed resulted in many casualties and destruction, many new buildings in the urban areas stayed safe since they were built with earthquake-resistant structures. Another interesting illustration would be Bangladesh where people residing in coastal regions that often experience cyclones have increasingly adopted cyclone shelters, raised houses, and early warning systems. In 2020 during Cyclone Amphan, early warnings and evacuations helped prevent many casualties as opposed to historical cyclones. This is an indication that resilience can not only be achieved through large infrastructure, but also through practice, local knowledge, social networks, and participation of the community. In the case of rural areas, the traditional designs of housing, the use of elevated constructions, the use of locally available building materials, and local knowledge about hazards can help significantly in the enhancement of resilience. On the level of households, keeping of emergency items, knowledge of evacuation pathways, keeping of contact with neighbours, and warning signals are basic components of disaster preparedness. In conclusion, the architecture of everyday life should be considered from the perspective of not only the physical but also the social system. The architecture of everyday life involves connection of infrastructures with people's behaviours, livelihoods, governance, cultures, and interactions within the community. Therefore, a resilient community is not that which totally eliminates the possibility of disasters, but rather, it is able to anticipate hazards, absorb shocks, keep functions, adapt and recover after learning from past experiences. A recent example of the significance of disaster resilience in the real world can be seen in Nepal in 2026. In August 2026, a disastrous flood occurred in the Himalayan area, following a glacier collapse and the subsequent movement of rocks, ice and other debris material, resulting in severe destruction of settlement areas around the Trishuli River valley of Nepal. It was seen that entire villages and infrastructure suffered badly, whereas roadways, hydro power plants, educational institutes and residential areas suffered heavily due to this devastating flood. Thus, it is clear that disaster resilience does not only mean building resilient structures, but also involves many other aspects, such as location of settlements and proper drainage and evacuation systems. Thus, in case of the 2026 Nepal catastrophe, it becomes obvious that disaster risks should be incorporated in the structure of everyday living through hazard-informed land-use planning, resilient schools and hospitals, resilient buildings, evacuation facilities, early warning and preparation processes. Traditional knowledge can become an addition to advanced engineering here. The example of Nepal proves that resilience should be created prior to the disaster and incorporated into ordinary social and physical infrastructures. From this perspective, disaster resilience architecture involves not only creating of structures which would not collapse under the pressure of hazards but allowing people to live, communicate, study, work and recover despite the disruptions of their environment caused by the hazard

Biprorshi Ghosh

In community-based approach to inform people and the surroundings for short term to predict cases of long term imminent area specific disaster yet to be able, the role of hyper-local practices especially in standard policies is not yet implemented always due to the absence in Global practices and norm based Framework directives. Local group based and various organizations can operate and able to volunteer people using participatory initiatives. In that regard, various researchers, policymakers and state level officials are leaning and using albeit in the new dimensions of being informed about community recommendation as to apply the newly added participation approaches to inform about forecasting methods in smaller chunks of lands and getting better combined participation and even cases where hazards management and mitigation are suitably implemented before formal forecasts alerts in this regard ,while helping and informing people whom are more prone in risk affected zones to quickly make decisions to safeguard household level crisis by accessing to emergency shelters and quick response before hazard occurrence can likely be extremely above on-ground preparedness and capacity systems implemented and standardized by infrastructure, social and emergency service systems in healthcare, equipment and response task forces being active to be send within the “Golden Hour” for quick and effective procedures communicated from designated Command centres.



In the context of India few prime initiatives can be identified in this case, rather in the successful case study after the devastating 2018 Kerela Floods, in the Chalakudy and Periyar river basin systems the initiative of local Community-Sourced Impact-based Flood Forecast and Early Warning System (**CoS-it-FloWS**) , started by a local NGO and voluntary Community Resource centre (CRC) of Ernakulum

system, where nearly 100 rain gauges are used later it predicted great success in the 2021 landslide preparedness as stated in various articles published in ‘DownToEarth’(In September 30,2024) and ‘Montabay’ (in December 6,2024) where the correspondent mentioned that nearly 170 rain gauges and 13 river gauges are being monitored solely by local initiative and forwarded in Whatsapp groups ;in collaboration as by the Ernakulum District Collectorate.

The prediction rate in local systems reached a prediction rate of above 70%, as stated by with the **Advanced Centre for Atmospheric Radar Research** at CUSAT, Cochin whom has a partner status for guidance and mentoring role in analysis collection. At this level, the Emergency Operation Centre(EOC),Ernakulum of Kerala recently have adopted the data monitoring to be available within official streamlining. Even many residents have been benefited in their preparedness and mitigation decisions in household level and slowly decisions are being made for preparation and evacuation plans, like in the case of 2021 Wayanad Landslide, by the local Chalakudy River Protection Forum(CRPF),their role is being involved in their guidance, residents of panchayats such as Pariyaram, Meloor, Karukutti, Parakkadavu, Puthenvelikkara, and the Chalakudy municipality have established a people’s flood monitoring system. (Reported by K.A Shaji in December 6,2024 in Montabay).This unique case is alonging with the latest development of Community Capacity Co-design (C3) preparation (as per Cull et al.,2026),with relied more on outside development focused in greater psychological and methods to reduce decision based biasness in later stages for a more inclusive path for resilience.

CAN GENERATIVE AI BECOME YOUR HOUSEHOLD DISASTER ADVISER?

Debanjana Das

Every household absorbs risk differently. A flat in a floodplain, a tin-roofed home in a cyclone corridor, a hillside cottage prone to landslides — each carries its own hazard signature, yet most families rely on the same generic advisories broadcast to an entire district. This is precisely the gap generative AI is beginning to fill. Tools built on large language models can now take a family's address, house type, and local hazard data, and translate dense meteorological bulletins or district disaster management plans into a few plain sentences: what is coming, when it may arrive, and what to do in the next hour.

This is not far-fetched. Generative AI already powers multilingual chatbots that convert cyclone or flood warnings into regional languages within seconds, and conversational assistants that answer a worried resident's question — "Should I evacuate tonight?" — by cross-referencing live advisories with the person's location. Layered with satellite-based early warning systems and IoT sensors, an AI adviser could, in principle, sit inside a home almost like a smoke detector for compound hazards: quietly reading incoming data and speaking up only when a household's specific situation demands action.

"A timely warning is the difference between an evacuation and a tragedy."— António Guterres, UN Secretary-General, during the Dialogue on Early Warnings for All at the World Artificial Intelligence Conference Meteorological Forum in Shanghai.

Still, a home advisor is as reliable as the ground truth behind it. Generative models are prone to confident-sounding errors, and a hallucinated evacuation route or an outdated shelter address is far more dangerous than silence. Reliable deployment depends on the AI being tightly grounded in verified, real-time sources — India's own Common Alerting Protocol feeds, IMD bulletins, and local disaster management authority data — rather than open-ended generation from memory. Connectivity gaps, patchy smartphone access, and language or literacy barriers in the very households most exposed to hazards also mean AI advice cannot replace, only extend, community-level warning systems, wardens, and radio broadcasts.

The technology, when used properly, may even serve to reinforce the first and most private line of defence against disaster – the house. An advisory system powered by generative AI technology that assists families in creating their own evacuation plan, understanding an unfamiliar hazard map, or even just asking What should I do now in their native language is not an alternative to institutional planning and preparedness, rather, it is a bridge between government alerts and quick decision-making at the family level. If resilience does begin at home, then giving each home a reliable voice during times of crisis through the use of generative AI could well be one of the most quietly revolutionary applications of the technology yet imagined.



RESILIENCE BY DESIGN: WHY EVERY NEW HOME SHOULD BE A DISASTER-READY HOME

Manaswita Guha

Let's visualize a home that not just merely provides shelter to its occupants but also anticipates the storms, the quakes, the floods whilst emerging stronger. In an era where the rules of human habitation are rewritten by climate extremes, resilience can no longer remain an afterthought bolted onto conventional architecture; rather should be considered as the foundational grammar of every new dwelling. So, "Resilience by Design" is not just a slogan but the only rational response to a planet whose risk landscape has been permanently shifted as disasters today are no longer are a rare black-swan events. According to data from IPCC AR6 and CRED, shows that weather related disasters have shown a striking rise of nearly fivefold since the 1970s. In India alone, the National Disaster Management Authority (NDMA) records that more than 70% of the geographical area is vulnerable to multiple hazards. Therefore, when a house collapses or floods, the loss is not limited to the structures; it abruptly impacts savings, health, education, and dignity. Building code compliance after the impact is expensive. Designing resilience from the first sketch is exponentially cheaper and infinitely more humane.

Every year, we build millions of new homes as if the climate were still predictable, so we designed it for sunlight, aesthetics and comfort, but too often we forget to design for the day when nature becomes extreme and this assumption is becoming dangerously expensive. In the 21st century, a home can no longer be just a place to live in, rather, it must also be a place capable of living through.

The idea of a disaster-resilient home begins when we start thinking that resilience should not be an emergency upgrade but an architectural default. Homes should be made in a way that they can withstand local hazard landscapes such as elevated foundations in flood-prone regions, wind-resistant roofs in cyclone corridors, seismic reinforcement in earthquake zones and fire-resistant materials in wildfire-prone landscapes. Therefore, A house designed without understanding its environment is not architecture; it is optimism cast in concrete.

Disaster-ready homes should be able to absorb shocks without being the victims of the disaster, for which flexible structural systems, reinforced connections, flood-resistant materials, shaded and ventilated interiors, rainwater harvesting and decentralized solar power are crucial to transform a house from a vulnerable shelter into a protective system. True resilience is not just the ability to remain standing; rather, it is the ability to return to function quickly. Homes with modular components, accessible utilities, backup water sources and energy systems and easily repairable materials can reduce the long and unequal aftermath of disasters. Nevertheless, resilience is not synonymous with building stronger walls. A luxury bunker may survive a cyclone while the surrounding community collapses but this is survival not resilience. A true disaster-ready home must be connected to resilient neighbourhoods that consist of well-functioning drainage, green spaces, evacuation routes, community shelters along with reliable early warning

So, as the climate change intensifies floods, heatwaves, cyclones and wildfires, the question is no longer whether disasters will influence architecture, as they already are influencing. But the real question is whether we will continue building homes for the climate of yesterday or start designing for the uncertainties of tomorrow. Therefore, the future home shouldn't be judged only by how beautiful it looks on a bright sunny day, perhaps its greatest design achievement will be to not become a part of disaster when disaster arrives.

THE RESILIENT HOUSEHOLD IN THE ERA OF CLIMATE MIGRATION

Nabanita Kundu

Climate change is gradually changing the way people live, work and make decisions about their homes. Rising temperatures, floods, droughts, cyclones, sea-level rise and changing rainfall patterns are putting pressure on livelihoods and forcing some families to move. Climate migration is therefore not only a movement of people; it is also a household-level struggle to protect income, safety and well-being. A resilient household is one that can prepare for these changes, adapt when possible and move safely when staying is no longer a viable option.

The main features of a resilient household include:

- i) Safe and adaptive housing** – Houses with better drainage, ventilation, heat protection and disaster-resistant construction can reduce the damage caused by floods, storms and extreme heat.
- ii) Secure and diversified livelihoods** – Depending on a single climate-sensitive source of income can increase vulnerability. Alternative employment, small businesses, skills and remittances can provide families with greater financial security.
- iii) Access to essential services** – Clean water, sanitation, electricity, healthcare, education and communication are important for maintaining household well-being during and after climate-related disasters.
- iv) Knowledge, preparedness and social support** – Early-warning information, evacuation plans, savings and strong relationships with neighbours and community organisations can help families respond more effectively to sudden shocks.

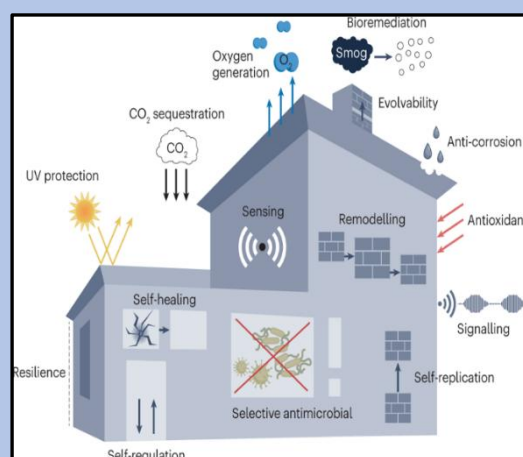
Climate Migration: A Growing Reality

The scale of this issue is significant. The World Bank estimates that **up to 216 million people could become internal climate migrants across six regions by 2050** under a pessimistic scenario. **South Asia alone could account for around 40 million people**, making the region particularly important in discussions about climate resilience. However, strong climate action and inclusive development could reduce projected internal climate migration by **as much as 80%**.

Asia is already experiencing intense climate pressure. According to the World Meteorological Organization, **Asia is warming nearly twice as fast as the global average**. In 2024, its average temperature was approximately **1.04°C above the 1991–2020**

average, while floods, droughts, heatwaves and sea-level rise continued to threaten communities and livelihoods. Migration, however, should not always be viewed as a failure. For some households, moving can become an **adaptation strategy**. Migration may provide access to employment, new skills, better services and additional income. IOM studies have found that migration can strengthen household resilience through livelihood diversification and improved preparedness, although poorly planned movement can also create new vulnerabilities. A resilient household, therefore, is not simply one that remains in the same place. It has **choices**—the ability to adapt where it lives, recover after a disaster, or move with safety and dignity when necessary.

In the era of climate migration, resilience begins at home—but its success depends on the strength of the community and the support of wider society.



CHILDREN AS RESILIENCE MULTIPLIERS: WHY DISASTER EDUCATION SHOULD BEGIN AT HOME

Samima Khatun

"A child who knows how to stay safe is the support a family can have during a storm. They do not just learn to survive; they show us how to get ready"

When people think about any disaster, they often imagine children as the ones who are most in danger, weak, needing help, and scared. A new way of thinking is changing how we see the youngest people in our society. Children are not just people who get hurt. They are people who help make families stronger.

When it comes to preparing for disasters, the important learning starts at home. The home is where children learn about safety, about routines, and about feeling safe. When families work together on disaster education, it makes being ready a part of life instead of something that makes people scared.

The Trickle-Up Effect

We usually think that adults teach children. The truth is that children can teach adults too. A child who learns how to pack a bag for emergencies or how to find an exit becomes a strong voice for safety. They will keep reminding parents to change smoke detector batteries, check the food in the emergency box, and practice what to do during an earthquake.

When children are part of the preparation the whole family becomes stronger. The energy and willingness of children to follow rules can help adults who might not take dangers seriously.

Building Emotional Strength

Starting disaster education at home helps build strength. The way people feel during a crisis is very important. Fear grows when people do not know what to do. When parents talk calmly about dangers like a hurricane or a flood and work together to plan what to do, it makes the dangers feel less scary.

Children move from feeling helpless to feeling strong. They know where the emergency supplies are, who to call, and where to meet. This makes them feel in control. This kind of knowledge helps stop fear during a disaster.

Practical Ideas for Families

Teaching disaster safety does not need to be scary. It can only be part of life:

Make it fun: Turn evacuation drills into a race against the clock

Pretend to be in a crisis: Create situations where children can practice calling for help and saying their address,

Give them a job: Let children have tasks like being in charge of the flashlight or taking care of the pet during an emergency.

When we teach about disaster safety in the home, we are doing more than making a house safer. When we teach children, we make the whole community stronger. We help make sure that people are ready, and the confidence of the people leads the way.

WOMEN AT THE CENTRE OF HOUSEHOLD DISASTER RESILIENCE

Sanchari Sarkar

Women are recognised not just as vulnerable groups in disasters, but they also play a central role in household disaster resilience by storing food, water, childcare and taking care of elderly or sick family members. They are the first who pack emergency kits for any emergency condition, also recognised them as the last person to leave flooded houses and rebuild daily life long after aid agencies move on with their care.

Their contributions to household disaster resilience –

- **Local knowledge & preparedness:** Women have detailed knowledge of local water sources, seasonal hazards, food preservation and household coping mechanisms. They undertake disaster preparedness by storing food, water, medicines, important documents and other emergency supplies. They receive early warnings through neighbours and inform their family members.
- **Care responsibilities & social networks:** During and after disasters, women take primary responsibility for dependants. They perform unpaid care work globally. Women play a crucial role in disaster resilience by taking care of sustaining children, elders, and sick members in the house. In society, women maintain stronger connections and neighbourhood ties, which is very important for communication. They act as key information brokers within families and communities. Women's Self-Help Groups (SHGs) and neighbourhood networks can become important channels for disaster resilience.
- **Economic resilience:** Women's savings groups, microfinance activities, small businesses and diversified livelihoods can provide families with alternative sources of income for recovery support after a disaster. Women in every household save money that is needed during and after a disaster. Sometimes women's informal or secondary income (handicrafts, petty trade) becomes the main income source when a disaster affects primary (often male) work.

So, placing women at the centre of household disaster resilience means actively involving women as leaders and decision-makers in disaster preparedness and response. It means investing in women's skills, credit, and livelihood options so households can absorb shocks without falling into poverty and also means recognising women's care burden through social protection, childcare, and basic services like water, food, and health. They frequently make household decisions for food, water, healthcare, children and elderly members' safety during & post disaster time. Women should not be considered as a victim only in a disaster also they are recognised as decision makers, first responder of household in disaster resilience. But sometimes they face some challenges, like women often lacking land ownership and formal bank accounts. They take on extra unpaid care work for children and the elderly during crises. Also, formal disaster plans rarely include women in leadership or decision-making roles. They have unequal access.

As an example, we can say in a flood disaster, women act like – at first they receive early warning & inform family – then store food, water, medicines, save money – secure documents/valuables – switch off electricity – prepare emergency kit – evacuate children, elderly & sick members – access relief – at the end they support household recovery.

CAN A RESILIENT HOUSEHOLD REDUCE THE CARBON FOOTPRINT OF DISASTERS?

Sanku Mondal

A resilient household is a household that has the capacity to prepare for, withstand, adapt to, and recover from a disaster or climate-related shock while minimizing damage and disruption. And the answer is “potentially yes”, because household resilience can reduce both the severity of damage and the resources required for emergency response and recovery.

Pre-disaster phase

The pre-disaster phase is the period when households prepare for hazards and reduce their vulnerability before an event occurs. Resilience strategies such as stronger housing, flood-proofing, energy-efficient appliances, solar power, water storage, and emergency planning can reduce the expected damage and future demand for emergency resources. By preventing or minimizing damage, households can also avoid unnecessary fuel consumption, transportation, material use, and replacement of household assets. Example: A flood-prone household raises electrical equipment and installs solar-battery backup, reducing the risk of damage and the need for diesel power after a flood.

During-disaster phase

The during-disaster phase is when the hazard is occurring, and households need to maintain essential services while protecting lives and property. A resilient household can use backup renewable energy, stored food and water, emergency communication, and planned evacuation to reduce disruption and dependence on external emergency support. Consequently, the household may require less diesel fuel, emergency transportation, bottled water, and other carbon-intensive resources. Example: During a cyclone, a household uses a solar-battery system for lighting and communication instead of continuously using a diesel generator.

Post-disaster phase

The post-disaster phase covers recovery, repair, reconstruction, and restoration after the hazard. Household resilience can reduce CO₂ in this stage mainly by reducing the amount of rebuilding and replacement required. A house that suffers less damage can be repaired, and materials can be reused, avoiding the production and transportation of new cement, steel, bricks, furniture, and appliances. Therefore, lower physical damage can translate into lower embodied carbon, construction emissions, and waste. Example: After a flood, a raised and flood-resistant house requires repair rather than demolition and complete reconstruction, reducing the carbon footprint of recovery.

Urban and Rural Household Phenomena

The effect of household resilience on disaster-related CO₂ emissions can differ between urban and rural areas because their housing, infrastructure, energy systems, livelihoods, services, and access to resources are different.

In urban areas, resilient households can reduce disaster-related CO₂ by using energy-efficient buildings, solar-battery systems, water storage, and flood protection. These measures reduce reliance on diesel generators, emergency transport, and replacing damaged household assets. Example: During an urban flood, a solar-battery-equipped apartment continues to have essential electricity without a diesel generator, directly reducing fuel use and CO₂ emissions.

In rural areas, resilience can depend on local resources, solar energy, rainwater harvesting, community support, and repair or reuse of materials. These strategies can reduce dependence on long-distance relief transport, diesel fuel, and new construction materials after a disaster. Example: After a village flood, a household repairs its raised house using locally available materials instead of rebuilding with transported materials, reducing reconstruction-related CO₂.

THE RESILIENCE GAP: WHY SOME HOMES RECOVER FASTER THAN OTHERS

Sinjini Lahiri

When a flood, cyclone, earthquake, or any other disaster strikes, the damage may appear similar from the outside. However, once the immediate danger has passed, a **resilience gap** often becomes visible. Some families are able to rebuild their lives and return to normal within a relatively short time, while others may struggle for years to recover.

This difference in the ability of households to withstand a disaster, recover from its impacts, and rebuild their lives is known as the **resilience gap**. It reflects the unequal capacity of families and communities to cope with disasters and recover afterwards.

A home's ability to recover is not determined only by the strength of its walls or the severity of the hazard. **Resilience begins even before a disaster occurs.** The quality of construction, location of the house, access to basic services, household income, savings, insurance, and awareness of disaster risks can all influence how severely a family is affected. A well-built house in a relatively safe location may experience less damage, while a poorly constructed home in a hazard-prone area can turn the same disaster into a major humanitarian and financial crisis.

The economic condition of a family also plays an important role in recovery. Families with stable incomes and savings may be able to meet their immediate needs, repair their homes, replace lost belongings, and restore their livelihoods more quickly. In contrast, low-income households often struggle to meet even their basic needs after a disaster. For them, the loss of a home, livelihood, livestock, tools, or essential household items can have long-lasting consequences. A single disaster can push vulnerable families deeper into poverty, making it even more difficult for them to recover when another disaster occurs.

This is why government agencies, local institutions, and community organisations have an important role to play in reducing the resilience gap. Financial assistance, temporary shelter, healthcare, livelihood support, and emotional support can help affected families recover with greater dignity and confidence.

Access to insurance, affordable loans, government assistance, health services, transportation, communication, and other support networks can also determine how quickly a household recovers. However, these resources are not equally accessible to everyone. People living in remote areas or socially and economically disadvantaged communities may face additional barriers. In many cases, families may not even be aware of the government schemes and support systems available to them, despite the efforts of different agencies to provide assistance.

Therefore, closing the resilience gap requires more than simply replacing what has been lost. Recovery should also create safer and more secure conditions for the future. **Building disaster-resilient homes, strengthening community preparedness, encouraging active participation, improving land-use planning, protecting essential services, and strengthening local institutions** can help reduce inequalities in disaster recovery.

Disaster resilience is not only about surviving a hazard. It is about having the resources, knowledge, support, and opportunities needed to recover with dignity and become better prepared for the next challenge.

Disasters may be natural, but unequal recovery is not inevitable. Understanding the resilience gap helps us recognise the social, economic, and environmental conditions that determine who can recover quickly and who may be left behind. Building resilient communities means ensuring that every family has a fair opportunity to recover, rebuild, and stand stronger after a disaster.

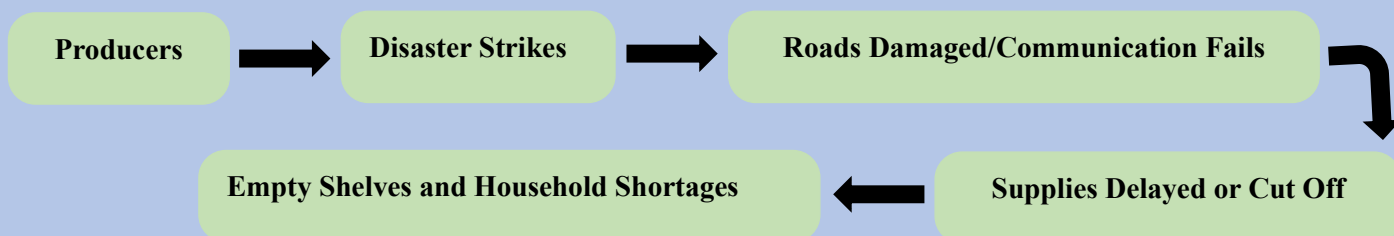
WHEN THE SUPPLY CHAIN STOPS AT YOUR DOORSTEP DURING DISASTER

Sneha Saha

“The greatness of a community is most accurately measured by the compassionate actions of its members.” — Coretta Scott King.

Imagine a cyclone has just passed through our town. The sky is finally clear, but the roads are covered with fallen trees and water. There is no electricity, your phone network is weak, and the nearby grocery shop has almost nothing left on its shelves. You need drinking water, food, and perhaps medicine for someone at home, but the delivery trucks are not coming. The disaster may have ended outside, yet a new crisis has quietly arrived at your doorstep.

We often take the availability of everyday things for granted. Rice comes to the kitchen, the milk comes to the nearest shop, medicines are in the pharmacy, and petrol is at petrol stations. Behind these familiar scenes is a long and involved process known as the supply chain. Producers, manufacturers, transporters, warehouses, traders, and many others constitute the supply chain. We do not see these processes: we only know about them when something goes wrong. A disaster may entail that some elements of the supply chain will be closed: floods may cover roads and bridges, and cyclones may destroy warehouses, power lines, and communication nodes. Landslides can isolate entire villages in the ranges. Earthquakes can destroy routes, railroads, and markets within a short time. Even if food and medicine are available just a few kilometres away, damaged infrastructure can prevent them from reaching the people who need them. The effects are felt almost immediately inside homes. Families start to worry if their food will last. Shelves in stores are empty when new supplies can't come in. Water might become a problem, and those who have a consistent medicine supply are looking at an absolutely horrifying prospect. Panic buying can exacerbate the issue when people buy more than they need, and others have nothing. For children, elderly people and those with disabilities, families who have to go through a long period of supply chain disruption are facing survival. The disruption often follows a simple path:



This is why disaster preparedness cannot be focused solely on the rescues after the fact. We have to plan for the days that follow. Governments can keep emergency stockpiles of food and medicines, but also find alternate routes of transportation and ways of storing things locally in places where disaster is likely to strike. Local farmers, shops, volunteers, and other community groups can be important assets in areas where the main supply routes are severed. GIS technologies, satellite information and real-time communication can be used to find alternate ways or work around damaged infrastructure. At the same time, disaster preparedness can also start in the home. Having a small stockpile of drinking water, dry food, medicines, batteries, and other necessities can get a family through the difficult early days of a disaster without panicking. A supply chain seems like something for business, but it can also be a lifeline during a disaster. A packet of rice can mean a family eats that night. A bottle of clean water can prevent illness. A box of medicine can save a life. When the supply chain ends at our doorstep, we learn that these everyday goods are not just products but connect different people, communities and even help us survive. The real goal, therefore, is not just to rebuild roads after a disaster. It is to build a system strong enough to find another road when the first one fails. And in times of disaster, this journey of essential supplies from one community to the other is a journey of hope until it reaches the doorstep where it is needed most.

THE INVISIBLE LIFELINES OF A DISASTER-RESILIENT HOME

Soumik Mukherjee

A disaster-resilient home is not a simple concept of a house that remains standing during an earthquake, cyclone, flood, heatwave, or other disaster. It provides the dwelling, household, and service network designed to protect people, maintain essential functions during disruption, and recover within an acceptable time period. A resilient home therefore combines safe construction with access to water, sanitation, energy, food, healthcare, communication and social support. Its success rate should be measured not only by whether the structure survives, but also by whether people can remain safe, healthy and connected before, during and after a disaster.

The concept of disaster resilience depends on several invisible lifelines that support the physical house. First is safe ground and a structure that fails slowly. Houses should be located away from floodways, unstable slopes and drainage channels, while their design should respond to local hazards through raised plinths, secure roofs, strong connections and appropriate materials. Second is water security. A resilient home should have more than one safe water source, such as rainwater harvesting, protected storage, groundwater or community supplies, so that failure of one source does not leave households without drinking water.

Third, sanitation and hygiene must remain functional during disasters. Toilets, drains and waste systems should not become sources of contamination, particularly during floods. Fourth is energy and thermal comfort. Passive cooling through shading, ventilation, reflective roofs and insulation should reduce dependence on electricity, while a small solar-battery system can provide essential lighting, communication, fans and water pumping when the grid fails.



Fifth, food and livelihood security are essential because recovery cannot occur if families lose their food, income, tools or productive assets. Protected food and seed storage, kitchen gardens and community grain banks can provide affordable forms of resilience. Sixth, warning and communication systems must ensure that disaster information reaches everyone, including people without smartphones and vulnerable residents. Local volunteers, multiple communication channels and regular evacuation drills can turn warnings into effective action. Seventh, health and care systems should provide first aid, essential medicines, hygiene supplies and assistance for older people, children and those requiring continuous care.

For developing countries such as India, resilience must be affordable, locally appropriate and community-based. Instead of expensive high-technology houses, governments can promote hazard-specific designs using tested local materials and trained local masons. Implementation can occur at three levels: the household, with safe structures, water storage, sanitation and emergency energy; the community cluster, with shared water treatment, solar power, first aid and communication facilities; and the settlement, with reliable roads, drainage, evacuation routes, healthcare and maintained public infrastructure.

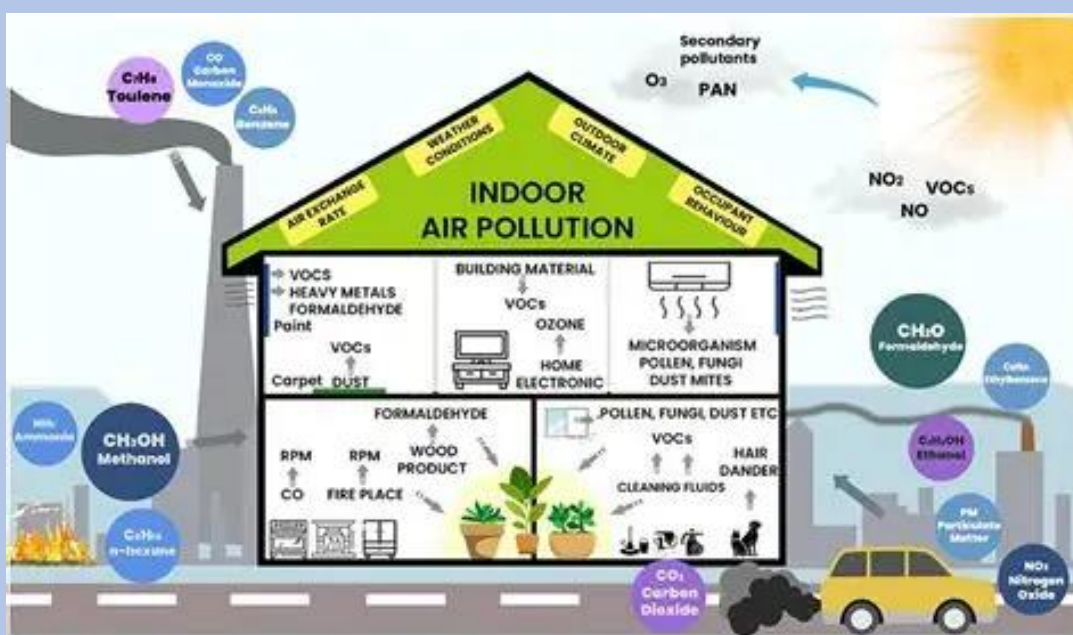
Ultimately, disaster-resilient housing should follow the principle of “redundancy without waste”: multiple safe options for water, energy, communication and repair without unnecessary expenditure. For India and other developing nations, the most effective approach is therefore not simply to build stronger houses, but to create interconnected homes and communities capable of resisting hazards, maintaining essential services and recovering quickly.

INDOOR AIR QUALITY AS A DISASTER FRONTIER

Soumita Biswas

Indoor air quality has developed as a vital yet relatively overlooked dimension of environmental risk and disaster management. Disasters are usually associated with sudden and visible events such as floods, cyclones, earthquakes, and landslides, while prolonged exposure to environmental hazards often receives far less attention. Poor indoor air quality represents one such hidden risk because its impacts develop gradually and frequently remain unnoticed until they begin to affect human health and wellbeing. Since people spend a substantial proportion of their daily lives inside homes, educational institutions, offices, hospitals and other enclosed spaces, the quality of indoor air has a direct connection with everyday exposure and vulnerability. Indoor environments can accumulate a wide range of pollutants originating from both internal and external sources. Cooking emissions, tobacco smoke, dust, particulate matter, mould, cleaning products, building materials, and inadequate ventilation can significantly influence indoor air conditions. Outdoor pollution can also enter buildings through windows, doors and ventilation systems, while poorly maintained indoor spaces may further increase pollutant concentrations. In densely occupied buildings, insufficient ventilation can contribute to the accumulation of carbon dioxide and other airborne contaminants, making ventilation an

important factor in maintaining a healthy indoor environment. From a disaster management perspective, indoor air pollution deserves greater attention because it demonstrates how a hazard can remain invisible while continuously increasing human vulnerability. The absence of immediate and visible destruction does not



mean that the risk is insignificant. Repeated exposure to polluted indoor air can contribute to respiratory and cardiovascular problems, irritation, fatigue and reduced productivity, while vulnerable groups such as children, older adults and people with existing health conditions may experience greater impacts. This makes indoor air quality not merely a public health concern, but also a component of risk assessment, vulnerability reduction and sustainable environmental management. The COVID 19 pandemic further demonstrated the importance of indoor environmental conditions, particularly ventilation and air circulation, in reducing exposure to airborne hazards. It highlighted the need to consider buildings as part of the broader disaster risk environment rather than treating them only as physical structures. Consequently, disaster preparedness should include measures such as adequate ventilation, regular monitoring of indoor pollutants, control of moisture and mould, cleaner household energy use and improved building maintenance. Recognising indoor air quality as a disaster frontier therefore expands the conventional understanding of disaster risk. It shifts attention from disasters that are immediately visible to hazards that operate silently within everyday environments. Addressing this hidden dimension of risk can contribute to healthier buildings, stronger community resilience and a more comprehensive approach to environmental disaster management.

Indoor air quality must be recognised as an emerging disaster frontier because its risks are continuous, often invisible and deeply connected to human vulnerability. Integrating indoor environmental safety into disaster risk reduction can strengthen public health protection, improve resilience and promote safer living environments in an increasingly urbanised and environmentally stressed world.

WHEN COMMUNICATION GOES DOWN: BUILDING DIGITAL RESILIENCE AT HOME

Sumi Roy

Today, we depend on digital communication for almost everything, including study, work, banking, transport and emergency assistance. However, a power cut, heavy rain, flood or cyclone can disrupt mobile networks and internet services at any time. A family that depends on only one internet connection can quickly become disconnected. Digital resilience means being prepared to communicate and access important information even when normal networks are not available.

The first step is power backup. Without power, most digital devices become useless. Every household should keep at least one fully charged power bank, preferably around 20,000 mAh, along with a small UPS for the Wi-Fi router and a battery or solar torch. Before a storm or other emergency, try to keep mobile phones sufficiently charged and learn how to use the ultra power-saving mode. These simple steps can help a phone remain usable for several additional hours.

The second step is connectivity backup. Families should not depend on only one internet or mobile network. A second SIM from another service provider with a small data pack can provide an alternative when the main network fails. Offline maps should also be downloaded in advance so that basic navigation remains possible without the internet. A small FM radio or hand-crank radio can provide access to official information when mobile services are unavailable. In some remote and flood-prone areas, low-power communication technologies such as LoRa-based devices can also provide short-range messaging without depending on a mobile tower. Some newer phones and communication systems also provide satellite-based emergency messaging where the service is available. These technologies are not necessary for every household, but having at least one alternative communication channel can be valuable.

The third step is information backup. In a digital world, we often forget the importance of paper records. If a phone is lost, damaged or out of battery, how will family members contact relatives or doctors? Important telephone numbers, addresses, blood groups and emergency contacts should be written on paper and kept in an easily accessible place. Important documents, such as identity records, medical prescriptions and insurance papers, can be stored securely both online and on an offline device such as a pen drive. A small emergency diary containing essential information and some cash can also be useful.

The most important step is a family communication plan. Technology alone cannot make a household resilient if family members do not know what to do during an emergency. Families should decide on a meeting place inside the home, another safe place outside the home, and one relative living in another location who can act as a common contact. They can also agree on simple rules, such as returning home by a fixed time if communication fails or using SMS when voice calls are difficult. Power banks, emergency numbers and offline documents should be checked regularly.

Special arrangements should also be made for children and older people. Older family members can keep important numbers on a simple phone with large buttons, while children can carry a small card containing parents' contact details. Schools can also conduct simple communication drills to help children understand how to respond when internet services are unavailable. During emergencies, families should avoid forwarding rumours and should verify information through reliable official sources before sharing it.

Digital resilience is therefore not only about buying expensive technology. It is about creating a simple backup system based on power, alternative connectivity, offline information and a family communication plan. Families need to be prepared, but public institutions also have an important role in strengthening communication infrastructure, community power backup and emergency communication systems. When normal networks go down, a resilient household should still have a way to receive information, contact others and make safe decisions.

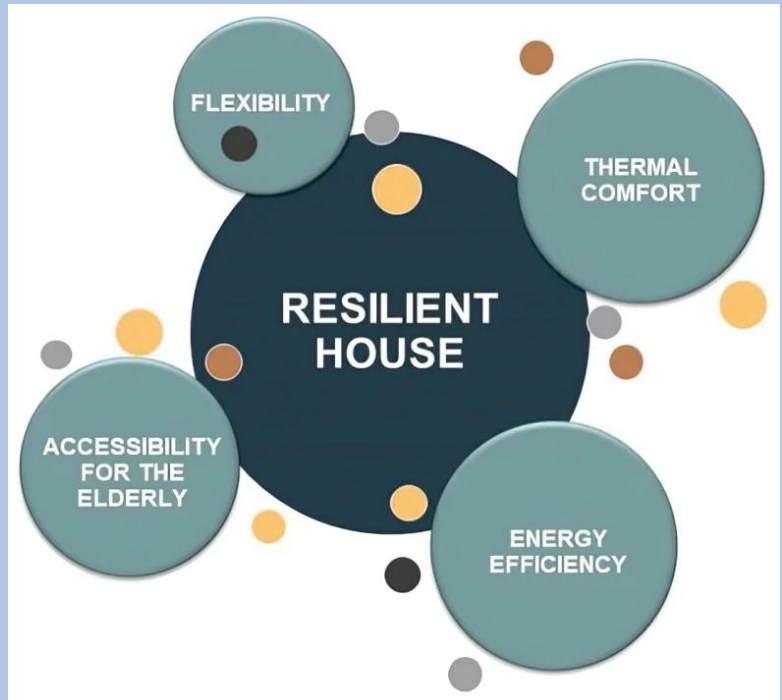
THE RESILIENT OFFICE HOME: PROTECTING WORK DURING DISASTERS

Suvarun Nag

The modern workplace is no longer limited to a conventional office building. With remote and hybrid work becoming increasingly common, the home has also become an important workplace. However, when disasters such as floods, cyclones, earthquakes, heatwaves, power failures or other emergencies occur, working from home can become difficult or even impossible. A resilient office home is therefore not simply a comfortable workspace, but one that can continue to support essential work during unexpected disruptions.

Disaster resilience at home begins with understanding the risks of the surrounding area. People living in flood prone locations may need to protect electrical equipment and important documents from water damage, while those in areas exposed to cyclones or earthquakes should secure furniture, windows and other potentially hazardous objects. Keeping essential work materials in safe and accessible locations can reduce disruption when an emergency occurs.

Technology plays a major role in maintaining work continuity. A reliable internet connection, backup power through an inverter or UPS, charged power banks and alternative communication methods can help people remain connected when electricity or telecommunications services are interrupted. Important files should also be backed up using secure cloud storage or external storage devices so that the loss of a computer or other equipment does not result in the loss of critical information.



Physical and mental wellbeing are equally important during disasters. A home workspace should provide adequate ventilation, lighting and ergonomic support, while emergency supplies such as drinking water, medicines, first aid materials, flashlights and basic food should be readily available. During prolonged emergencies, maintaining communication with colleagues and taking regular breaks can reduce stress and help people make better decisions.

The concept of a resilient office home reflects a broader change in disaster management. Resilience is not only about recovering after a disaster; it is also about preparing in advance and maintaining essential functions during disruption. By combining risk awareness, safe infrastructure, digital preparedness and personal wellbeing, homes can become more capable of supporting work even under difficult circumstances.

As climate related hazards and extreme events become increasingly disruptive, building resilience into everyday working environments is becoming essential. A prepared home office can help protect livelihoods, maintain communication and ensure continuity when conventional workplaces are affected. In this way, resilience begins not only in offices and institutions, but also within the homes where an increasing part of modern work takes place.

HOUSEHOLD DATA AS DISASTER INFRASTRUCTURE

Tanushree Bag

Disasters such as floods, cyclones, earthquakes, landslides, heatwaves, and pandemics can cause widespread loss of life, property, livelihoods, and essential services. Disaster management often focuses on physical infrastructure such as roads, embankments, shelters, hospitals, communication systems, and early-warning technologies.

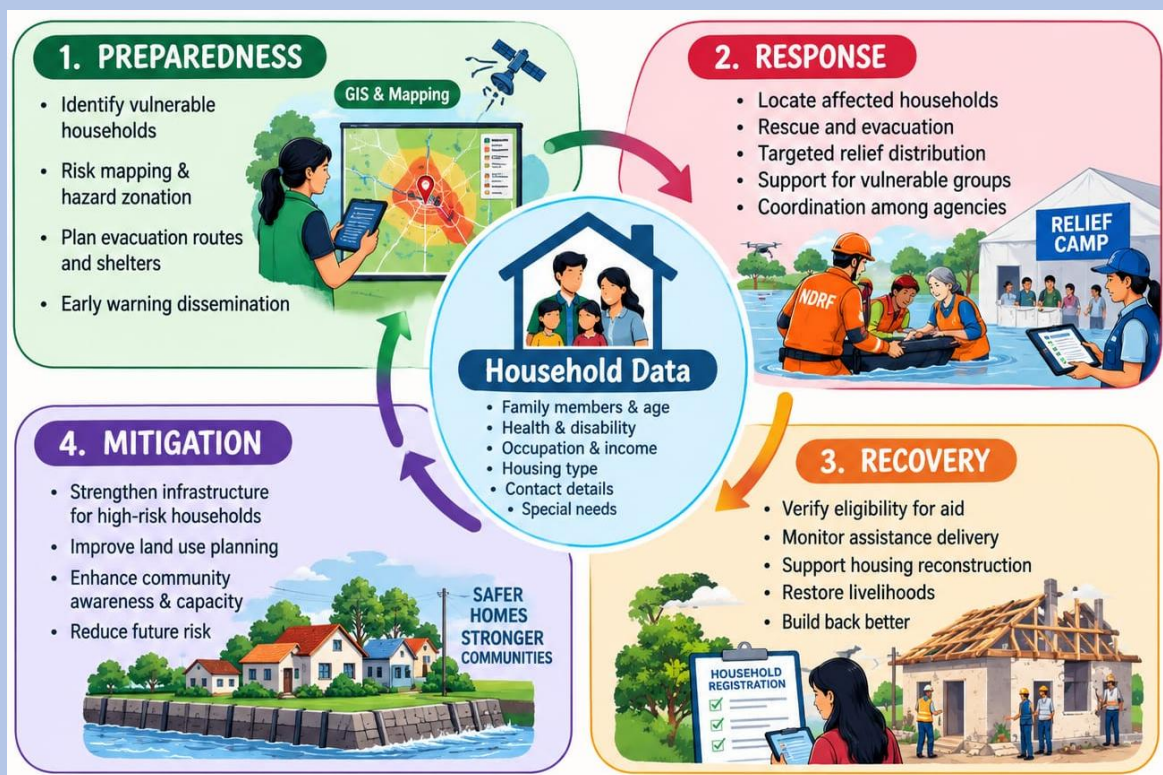
However, another equally important but less visible form of infrastructure is household data. Accurate household-level information provides the foundation for understanding community vulnerability and ensuring

that disaster-management measures reach the people who need them most. Household data includes information about the number and location of family members, age, gender, disability, health needs, livelihood, housing conditions, income, access to water and sanitation, and availability of essential services. When this information is systematically collected, updated, and securely managed, it becomes a valuable disaster-management resource. It helps authorities identify vulnerable households and understand their specific needs before, during, and after a disaster.

The importance of household data is particularly evident during disaster preparedness and response. It can support targeted early warnings, evacuation planning, shelter management, and distribution of food, drinking water, medicines, and financial assistance. For example, households with elderly persons, children, persons with disabilities, or people requiring regular medication may need additional support during evacuation. Household data can help disaster-management agencies identify these requirements in advance.

It also plays a significant role in damage and loss assessment and post-disaster recovery. Comparing pre-disaster information with post-disaster conditions can help determine the extent of damage to homes, livelihoods, and essential services. This supports fair compensation, rehabilitation, and reconstruction.

Therefore, household data should be considered a form of social and informational disaster infrastructure. Like physical infrastructure, it requires regular maintenance, updating, accessibility, coordination, and investment.



PRIVACY VS PROTECTION: WHO SHOULD KNOW YOUR HOUSEHOLD DISASTER RISK?

Uma Bala

“Those who would give up essential Liberty, to purchase a little temporary Safety, deserve neither Liberty nor Safety.”

— Benjamin Franklin

A household database can tell us who may face difficulties in evacuating during a disaster. This kind of information can save lives, but it can also put poor people at risk. These formulate a question for disaster management: **How much information about a household should be collected, and who should be permitted to access it?**

The need is real. West Bengal has **38,168 sq km of flood-prone area spread across 198 blocks**—nearly 43 per cent of the state’s total land area. Government records from 1960 to 2024 show that extreme floods have occurred in many years. This repeated threat makes vulnerability information crucial for preparedness and response. Research shows why household-level data matters. A study in the flood-prone district of Murshidabad found that vulnerability depended on factors like **household income, family size, the age of the household head and landholding**. Another study in Malda combined satellite-based flood mapping with data and found that **4 per cent of the assessed area fell into the "very high" social-vulnerability category while 37 per cent were in the "high" category**. The study identified **70 villages in the high-risk zones and 662 villages in high-risk zones**. These numbers show that a flood hazard map alone cannot tell us who is at risk.

Still, useful data can turn into sensitive data. A household risk profile may list an address, a phone number, an income level, an age, a disability status, health needs, the condition of a home or details about belongings. In an emergency, knowing that an elderly person lives in a house can help rescuers. Yet putting this data in the eye can bring privacy and safety dangers.

Therefore, disaster data must obey a rule: the correct individual must get correct information for a correct purpose. Emergency responders may need household locations. Planners may need vulnerability indicators. Researchers often need aggregated disaster data rather than names and exact addresses. The public usually wants risk maps and warnings—not a listing of vulnerable families.

India’s **Digital Personal Data Protection Act** recognises purposes and responsible handling of personal data. Disaster agencies must therefore gather essential disaster data, state its purpose, limit who can see it guard it against misuse and keep it only for as long as disaster data requires.

GIS, remote sensing and digital databases can speed up. Sharpen disaster response. Technology alone does not build resilience. Trust does.

Saving lives and protecting privacy should not be mutually exclusive. By having responsible data governance, both can strengthen resilience.

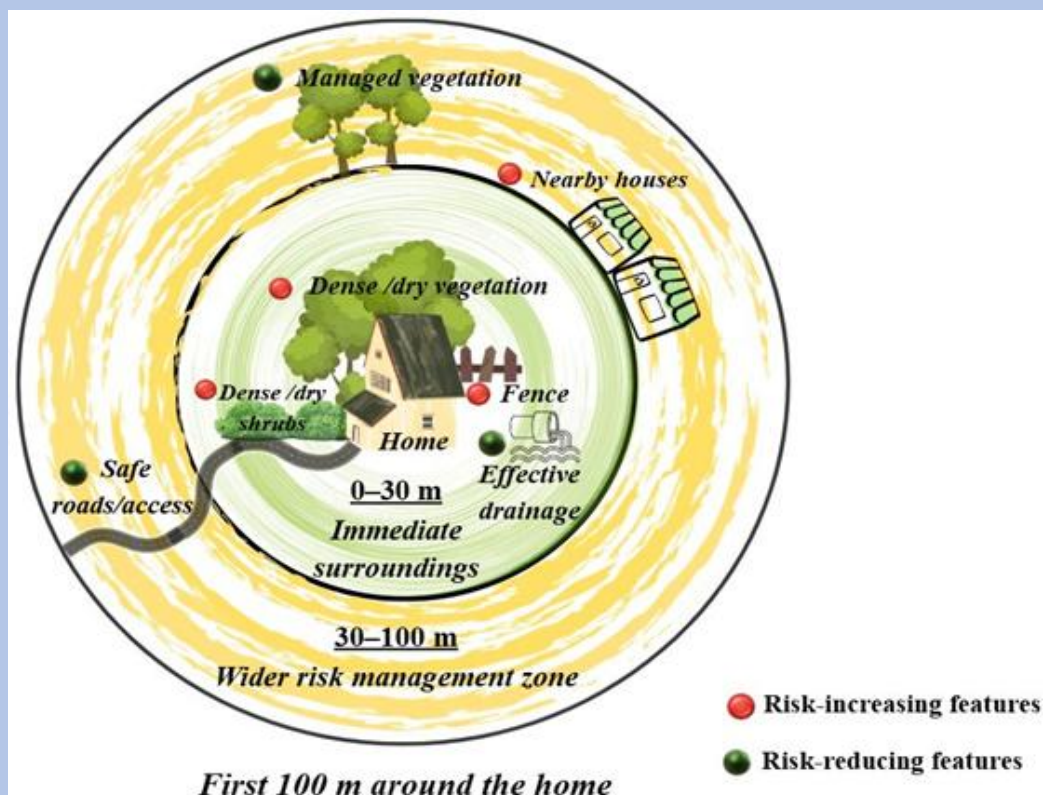


THE FIRST 100 METRES: WHY THE SPACE AROUND A HOME DETERMINES DISASTER RISK?

Bhoulmika Chakraborty

Disasters are usually described as events that cause physical, social, and economic loss beyond the community's ability to cope. For example, when a cyclone sweeps through a coast, a river flood sweeps through a village, a fire goes through a forest, or a landslide slides down a mountainside affecting the exposed community. The damage to a home usually depends on the environment close to the home. That environment shapes the hazard and the way damage occurs. The speed at which recovery begins also matters.

The area surrounding a home can determine how exposed and vulnerable it is to a disaster. The land use pattern, drainage, roadways, vegetation, nearby structures and their amenities, the type of houses and the condition of the house all modify risk. Often, two identical homes in the same hazardous area with different surrounding environments experience different disaster impacts. So, the disaster



risk is shaped by the interaction of hazard, exposure, vulnerability and capacity. Human activities can increase or reduce risk. For example, many hazards like wildfires, are made worse due to anthropogenic activities including leaf litter, stacks of firewood, highly flammable fencing, dense shrubs and gaps in ground cover near a home.

Home Ignition Zone (HIZ)- the area within 0-100meters of a home- is a concept for managing the hazard, particularly wildfires. Although the idea of this plot approach can be adopted for other hazards also. It's important to understand that these features are helpful to lower the risk but do not remove it completely. Like, during rainfall, impermeable surfaces, blocked drains, poorly maintained culverts, and waste accumulation can cause surface overflow. This overflow happens because water cannot infiltrate and runs directly onto homes. In cyclone-prone areas, poor roof materials, fragile boundary walls, unstable objects, and nearby buildings can all amplify damage. In hilly areas, vulnerability increases due to poor drainage systems, low vegetation, and unplanned infrastructure.

That's why the surrounding area within the 100 metres around a property can influence household exposure and vulnerability. It also shows how different hazards, with characteristics of both man-made and natural environments, influence risk. In an urban setting, exposure of households and infrastructure is high during a disaster.

To reduce household disaster risk, action from both the household and neighbourhood is required. Building guidelines, drainage maintenance, vegetation management, safe access routes, waste management and community-based preparedness must be coordinated at the neighbourhood level. Disaster work is not about warning and response; it is also about making the places around the household resilient.

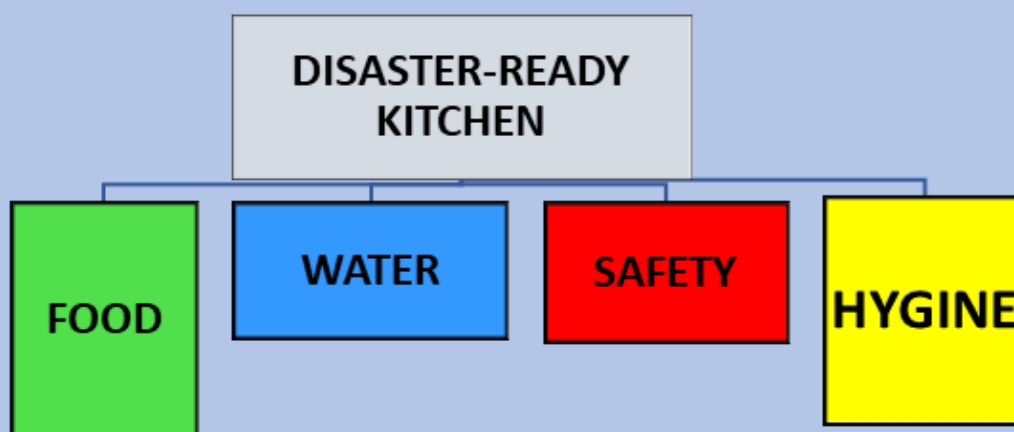
THE DISASTER-READY KITCHEN: FOUNDATION OF HOUSEHOLD RESILIENCE

Mohana Mandal

When a disaster happens, the kitchen becomes the place a household can depend on. Whether the disaster is a flood, a cyclone, an earthquake, a heatwave or a power cut that lasts days, a well-prepared kitchen keeps families safe. This is why the theme of the International Day for Disaster Risk Reduction, "Resilience Starts at Home," matters so much. Household resilience starts long before an emergency arrives.

A disaster-ready kitchen provides food and water when markets, transport, electricity, or cooking gas are unavailable. Every family should keep safe drinking water for at least three days. It is also helpful to store dry and ready-to-eat foods such as rice, biscuits, pulses, roasted grains, canned foods, nuts, milk powder, and baby food when needed. Check these foods often, and expired items should be replaced.

Safe storage matters as much as the food required for family members. Keep food in airtight containers, up off the floor level, and keep away from moisture, pests, and possible floodwater. Keep a torch, batteries, matches, candles, a first-aid box, essential medicines, and clean dishes nearby. During an emergency, each family member should know where these items are and how to use them safely.



The kitchen can also help prevent health problems after a disaster. Contaminated food and water can cause serious illness, mainly among children, older adults and people with medical conditions. Never eat food that has touched floodwater or has a strange smell, colour or anything else. Boiling water, washing hands with soap and safe water, keeping cooked food covered and separating raw food from cooked food these small habits protect health in difficult times.

A disaster-ready kitchen is not only about storing supplies. It is also about planning together. Families can make a simple emergency menu that needs little water, fuel and cooking time. They can identify safe alternative cooking methods if electricity or gas fails, while carefully following fire safety rules. A written list of emergency contacts and medical needs can also be kept in a waterproof bag.

Preparedness does not require expensive or lots of things. A few actions, updated regularly, can make a major difference when normal life is disrupted. Neighbours can help each other by sharing information, checking on older people, and helping vulnerable families by sharing food and clean water. Not only do they share food, but they can also make a plan for when a cyclone or flood occurs. They can decide where to go to stay safe, or build a home on higher ground so they have a place to go and cope if floodwater enters their house.

By building a safe, organised, and well-stocked kitchen, every household becomes better able to cope, recover and protect family members. Household resilience grows through everyday preparedness, and this process can start in the kitchen.

THE RESULT HOUSEHOLD CALENDAR: PREPARING BEFORE RISK BECOMES VISIBLE

Neha Roy

A disaster can happen when a hazard affects the vulnerable, and they do not have enough capacity to deal with it. It can cause loss of life, damage to property, and harm to the environment, but the risk is often like a slowly developing, unseen problem until it becomes apparent. That is why preparing for disaster should not just be a reaction to receiving a warning; it must start with routine practices at the family level, or what I call the Resilience Household Calendar.

The core concept pairs predictable seasonal hazards with actions your family can take before any danger is evident. This means answering: What disaster are we preparing for? When is the risk expected to increase? What should we do to be safe until then? Before monsoon season, think about clearing drains, checking your roof and walls, observing electrical connections, storing important papers, securing clean drinking water, and identifying a removal location. When summer heat becomes very strong, focus on improving air movement, managing water use efficiently, reducing time outdoors during peak temperatures, and ensuring vulnerable family members are accounted for. In cyclone-prone regions, reviewing warning systems, evacuation routes, emergency supplies, and communication plans is important.

This expected approach is central to disaster risk reduction. A warning is only effective if you hear it, understand it, trust it, and know exactly what to do. Early warning requires a solid understanding of potential risk. Reliable hazard monitoring, clear communication, and a capacity to act.

Household preparation also needs to be fair, identifying that children, the elderly, persons with disabilities, pregnant women, and those with mobility issues may need extra support. Assign responsibilities beforehand. Store essential medicines, identity documents, clean water, preserved food, torches, chargers, sanitary supplies, and a first aid kit in an easily accessible place.

Many preparations don't involve an important cost. Saving emergency contacts, safe removal routes, protecting documents from water, knowing how to receive official warnings, and checking on vulnerable nearby people are simple but effective steps. Schools, local government and communications can support these efforts through drills and community maps.

Most importantly, the calendar needs to be reviewed annually or after an important hazard or close call. Families can discuss what was useful, what didn't work, and improved preparedness for the future. A resilience household is not merely one that owns an emergency kit. It is a family that comprehends its hazards, takes preventive action before risk becomes imminent, safeguards its vulnerable members, uses trusted information, and learns continuously. When home preparedness becomes a routine, community resilience becomes a visible resource.



THE RESILIENCE OF HOUSEHOLD NETWORKS: WHY SOCIAL CONNECTIONS MAY MATTER MORE THAN EMERGENCY KITS

Samanawaya Banerjee

Social Connections Last Longer Than Emergency Kits

Solar panels, power banks, emergency lights, and other off-grid devices can provide valuable support during a crisis. However, these resources have limitations. Batteries eventually run out, equipment can become damaged, and devices may stop working when they are needed most. Long-term recovery and a return to normal life depend not only on physical resources but also on strong infrastructure, cooperation, and networks of trust within families and communities. In times of disaster, people often depend on one another for information, emotional support, food, water, transportation, childcare, and assistance with recovery. These social connections can remain valuable long after emergency equipment has been exhausted.

The Limitations of Physical Preparedness

Emergency kits are an important part of disaster preparedness, but relying solely on physical survival equipment can create a false sense of security. Technological equipment can deteriorate over time, batteries may be exhausted during prolonged power failures, and individual devices can fail at a critical moment. More importantly, emergency supplies cannot meet every need during a prolonged crisis. A backpack containing food, water, medicines, and a torch may help a family survive the first few hours or days, but it cannot provide emotional reassurance, protect children, share reliable local information, or organise neighbourhood rescue and recovery. Preparedness, therefore, should not be limited to what a household can store inside its own home. It should also include the relationships and support systems that surround the household.

Key Pillars of Social Resilience

Resource Pooling:

No household can store every type of resource in sufficient quantities. Strong relationships and mutual trust allow neighbours and families to share essential resources such as food, water, medicines, fuel, tools, and temporary shelter when shortages occur. One household's surplus can become another household's support during a crisis.

Collective Information and Care:

During disasters, reliable local information can be as important as physical supplies. Neighbours often know which roads are accessible, where help is available, who needs immediate assistance, and which areas are unsafe. Social networks can also provide childcare, assistance to older people, emotional support, and help for people with disabilities or other special needs.

Collective Recovery:

Recovery becomes easier when people work together. Families can help one another clean damaged homes, restore essential services, arrange transportation, share tools, and access government assistance. Unlike physical equipment, strong social relationships can become stronger through cooperation and shared experiences during difficult times.

Preparedness Is More Than an Emergency Backpack

An emergency backpack provides immediate support, but resilience extends far beyond the contents of a bag. A household that is connected to its neighbours and community has access to a wider network of knowledge, resources, skills, and emotional support. This does not mean that emergency kits, backup power, or other technologies are unnecessary. Rather, physical preparedness and social preparedness should complement each other. Equipment can help people survive the immediate emergency, while social connections can help them cope, recover, and rebuild over the longer term.



THE MEMORY OF A DISASTER: CAN HOUSEHOLD EXPERIENCE IMPROVE FUTURE RESILIENCE?

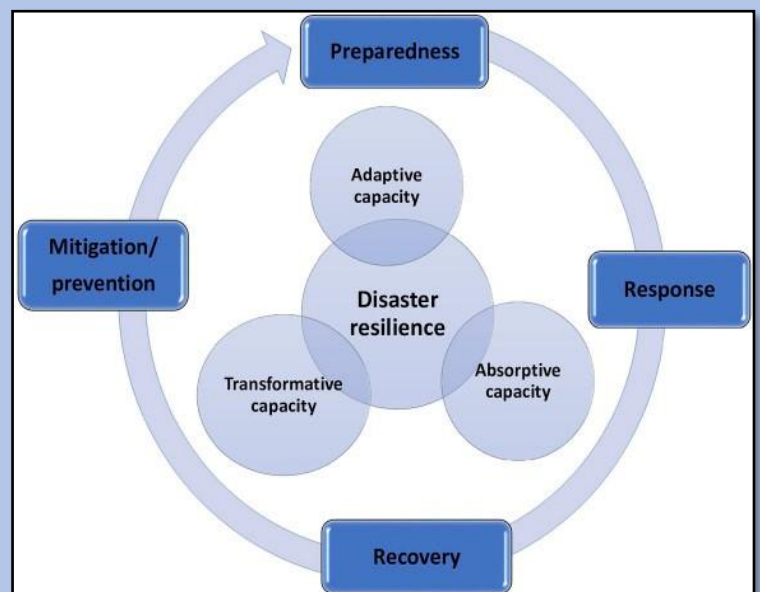
Shilpi Sen

After a disaster, a family not only recalls the wind speed, the rainfall, or the damage caused by it, but the moment they knew they had to run, the road that was flooded, the night they could not sleep, and the neighbor who came to their aid. While these are all stories that may not seem to matter, they can have an effect on how a household prepares for the next disaster. Families in high-risk areas use their experience to show them informally. Past floods, storms, or cyclones can affect how their daily lives go and how prepared they are. Home experience can be helpful in more than one way:

- 1) **Better preparedness:** such as having food, water, medicine and important documents close at hand
- 2) **Quick decisions:** knowing the warning signs and when to move to a safe place
- 3) **Local knowledge:** knowing which roads flood first and where the safe places are
- 4) **Caring for members:** vulnerable people, such as children, the elderly and others who may need extra help
- 5) **Co-operation in the community:** knowing who can help, such as taking you to a place of safety, providing information or having spare accommodation for you etc.

One such instance is the Amphan cyclone that hit West Bengal in 2020. This had the effect of flooding, blackouts, felling of trees, damage to property, and problems with access to essentials for many families in the coastal region. All such experiences might impact their decisions in the future. They could pay attention to subsequent warnings or keep their valuable documents safe in a different place. But memory alone does not create resilience. Disaster memories can also be passed down from generation to generation through storytelling and everyday practices, creating a household experience of local knowledge.

Therefore, memory of disaster is not just an act of recalling past suffering. Disaster memory can be a resource that provides knowledge to reduce the risks of the future. By integrating past experiences with warnings, planning, proper assistance, and disaster management, families can prepare well for the dangers that they might face in the future. Past experiences can help them become more alert and prepared for future dangers. This will allow them to protect themselves and their families better. As philosopher George Santayana famously said, **“Those who cannot remember the past are condemned to repeat it”.**



RESILIENCE AFTER THE WARNING: WHAT HAPPENS BETWEEN EVACUATION AND RETURN?

Soumi Manna

A disaster alarm ringing causes confusion. As soon as the alarm sounds, people need to quickly gather their things and leave their homes to find a safe place. The act of leaving everything and being able to return to your home later shows the most basic form of human strength. The Place of safety and the fight when people get into a cyclone shelter or a refugee camp: they face a kind of struggle to survive. Disasters bring issues for people such as: too many people in one place, long lines for food, no clean water, and bad hygiene. Older people, children and women face these issues more. Even though many people are tired and worn out from living in a shelter, a new way of surviving starts to form. Community as a shield usually when people show will during a crisis it's because a group of people are working together to stay alive. In a shelter, people who don't know each other become friends. People give food to others; young people help take care of someone's baby and other adults look after the sick. All these small acts of kindness help people avoid feeling hopeless. It proves that even though disasters can move people away from their community, they can never break their spirit. During a disaster, while many are busy with saving people or securing the area from the approaching flood or fire, an invisible fight occurs within the minds of the displaced persons. The feeling of loss, uncertainty, fear of the worst outcome, and hope that something would come out well soon transforms into multiple stresses that people have to deal with during their stay at shelters. Individuals are concerned about their houses, animals, businesses, properties, and family members. Besides, the absence of information about the disaster and the time it will be safe to return home increases the stress levels among people. Furthermore, the described state of affairs demonstrates that the resilience factor is magnetic. It attracts people's attention, and they address it through various means, such as socialization, comforting each other, engaging in activities that they like, participating in volunteering, and religious practices. Individuals try to help each other and do everything possible to return to normal life as soon as possible. Finally, resilience is the psychological ingredient that brings forth the ability to look the bad times in the face, the power to endure, and the belief in the possibility of the future.



HOME INSURANCE IN THE CLIMATE ERA: CAN RISK TRANSFER STRENGTHEN HOUSEHOLD RESILIENCE?

Srestha Sarkar

When discussing climate change today, it is already a present-day reality that people live through in their communities. Whether floods, wildfires, cyclones, heatwaves, or other extreme weather events, average households feel the devastating effects first. Hence the importance of making home insurance an interesting topic for discussion: it has quietly transformed from an object of mere speculation to the backbone of society's resilience to climate change. But how far should the adaptation of risk transfer mechanisms go, and is insurance really an enabler of resilience or a dampener of the blow that is yet to come?

To set the scene, insurance is all about diversification and risk pooling. Households receive a payout that is a fraction of the sum they hypothetically expect to receive if their home is damaged. This is clearly beneficial to a household that has just had their roof torn off by a hailstorm, as it will limit their expenditures and help them resume their life with minimal stress.

As such, it is safe to say that insurance contributes to a climate-resilient society because it enables people to recover financially right after an event, instead of paying for damages out of pocket.

However, resilience is a multi-faceted concept, and insurance products only support one side of the shield: the aftermath of the disaster, not the preparations for it. Insurance can fail as a tool for adaptation if people assume that nothing can happen to them, hence feel entitled to not prepare themselves for an extreme weather event occurring because they have home insurance. It all depends on the conditions under which insurance is provided: if the premium is lowered when a homeowner lives in a hazard-prone area or has reinforced their house against intrusion, or if the state has mandated a risk assessment for the buyer of the home, insurance can become a tool for building society's resilience. The key is to align the insurance conditions with the risk levels so that the premium is used not just as a means to obtain a payout, but as an instrument for climate change adaptation by incentivising proactive measures, such as the installation of reinforced roofing material. Another possibility is parametric insurance products that make a payout automatically upon a certain precipitation level being reached, thus quickly restoring the financial stability of the policyholder and allowing them to rebuild their homes with minimal effort. But the affordability of the insurance policies in high-risk areas is a valid concern, as insurers tend to leave these markets when the premiums increase too sharply. This creates a troubling dilemma for the homeowners: should climate risk transfer remain an option for the

privileged few who can afford it, or should it be encouraged across all socio-economic groups?

In conclusion, home insurance can strengthen the resilience of society to climate change, but it must be complemented by incentive-compatible conditions and affordable pricing. While insurance can be a strong tool for adaptation to climate change, it is not a silver bullet, and there are other vital factors in the creation of a climate-resilient society.



THE RESILIENT HOME HAS NO SINGLE HEAD: REIMAGINING HOUSEHOLD DECISION-MAKING DURING DISASTERS

Suchismita Hazra

The first response to a disaster usually does not begin in a government building or an emergency centre. It begins at home. A family must be prepared to decide whether to stay or evacuate, what to take with them, where to go for safety, how to protect children and older family members, and how to manage shortages of food, water, medicine, or money. However, disaster planning often considers the household as a group led by one person, commonly referred to as the “household head.” This approach may not reflect how families actually understand and respond to disasters.

Household resilience is not necessarily based on one person’s leadership. It is often developed through the shared abilities, knowledge, and experiences of family members. One person may pay close attention to early warnings, while another may know which local roads or paths remain safe during heavy rainfall or flooding. Other members may have greater knowledge of medicines, household finances, transportation, or the emotional needs of children and older people. In many situations, such practical knowledge can be more useful than formal authority. Resilience therefore grows when household members share information, communicate with each other, and work together according to their abilities and experiences.

The age, experience, gender, and social interactions of household members can influence their roles during disasters. Women may have detailed knowledge of household needs, food, medicines, children, and other vulnerable family members. Male members may, in some communities, have greater knowledge of transportation, local markets, employment networks, or external contacts. However, these roles are not fixed and may differ between households and communities. They should therefore not be treated as universal characteristics of men and women.

At the same time, households are not always equally democratic. Power, resources, and decision-making responsibilities can vary considerably among family members. Some members may have limited opportunities to express their views or participate in important decisions. Therefore, disaster preparedness should not depend only on the household head. During a disaster, the knowledge, information, and experiences of different members can become equally important for understanding changing conditions and making appropriate decisions.

Early warning information, evacuation instructions, and preparedness measures should reach all members of the household rather than only one designated person. When a warning is received, family members can divide responsibilities according to their knowledge and abilities. One person may arrange transportation, another may collect medicines and essential documents, while others may take responsibility for children, older people, food, or communication with relatives and neighbours. Such shared responsibilities can make household disaster management more practical and effective.

The concept of the “resilient home” therefore cannot be confined to a single household leader. No individual can possess all the knowledge and skills required to manage every disaster situation. Household resilience depends on communication, information sharing, practical experience, mutual support, and the ability of family members to work together under pressure. A resilient household is not necessarily one in which everyone has equal power or resources. Rather, it is a household in which the different knowledge, responsibilities, and capacities of its members are recognised and used effectively. Understanding these roles can help develop more inclusive and practical approaches to household disaster preparedness and resilience.

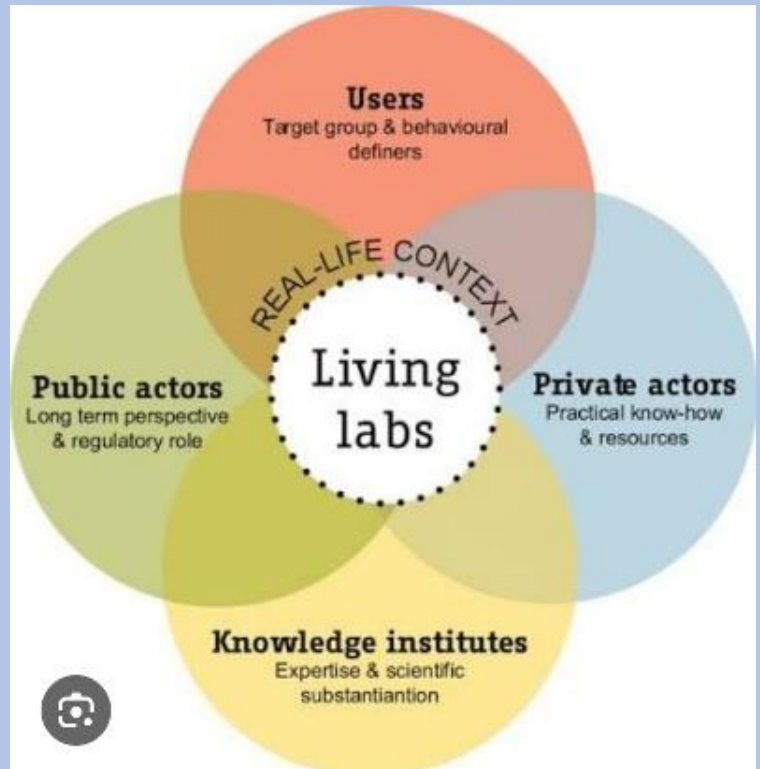
HOME AS A LIVING LABORATORY: CITIZEN SCIENCE FOR HOUSEHOLD DISASTER RISK REDUCTION

Tulika Tarafdar

Disasters, such as, flood, cyclone, earthquake, heatwave or fire can disrupt our daily lives within a matter of moments. And every year thousand people get effected by the disaster. Although disasters are commonly managed by governments, disaster management agencies and NGOs but at the initial stage, when disaster occurs suddenly, many time these agencies fails to reach to the spot at crucial time. For these vulnerable situations we need a “living laboratory” and help each other in this critical time. A “living laboratory” is a space where different social bodies like common people, government, academic institution work together and can learn, invent, find out a solution of a common problem in a systematic way.

Our home is the place where we learn to work together, empathy and hospitality with help of our elders, therefor by applying the concept of a “living laboratory” to the home the common people will be able to participate in disaster risk reduction. Disaster risk reduction refers to the policy that focuses on minimizing risks and vulnerabilities and increasing capacities, and thus it prevents the crisis from emerging and ensures the ability to withstand hazards in case of disaster.

A household can become a small but effective living laboratory by engaging in some disaster awareness activity. Family members can identify potential hazards around their home, including faulty electric wiring, fire hazard, weak structural parts, waterlogging or loose items that could fall during an earthquake. They can keep emergency contact numbers and keep a fast aid kit with them for emergency.



Citizen science can help us in this situation. Citizen science involves common people and authority to take part in scientific activities. For example, families can note down amounts of rainfall, record temperatures and water levels during floods and give reports on their observations. And each member can contribute to the disaster management authority of their area. And, because it is a citizen-based initiative, it can offer valuable data and insights that would have been impossible to get if experts were to operate alone.

A living laboratory approach encourages learning by experience. Children, adults and old people can take part in the actives according to their capacities. For example, children can acquire emergency procedures while the adults can consider them during resource allocation. Besides, the elderly can share traditional knowledge on disaster prediction and management. In this case, disaster preparedness becomes a perpetual process and not a one-time event.

A house can be the first line of defense in disaster preparedness, mitigation and management. The living laboratory model helps connect science and ordinary people by involving family members in learning new skill. It helps them to turn into active and responsible citizens who is capable of participating in and contributing towards disaster management activities in their area. Thus, making a house a living laboratory is a great way of help communities in understanding disaster which helps in sustainable development.

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