

## CONCEPTUAL ANALYSIS ON DISASTER RESILIENCE IN THE CLIMATE VULNERABLE COMMUNITY CONTEXT

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### Abstract

*Disaster resilience is the ability of individuals, communities, organizations, and systems to anticipate, prepare for, respond to, and recover from the impacts of hazards, such as natural disasters, extreme weather events, and other emergencies. It encompasses a broad range of factors and capacities that enable communities to withstand and bounce back from adverse events, minimizing their negative impacts and promoting long-term sustainability and well-being. Response efforts focus on the immediate actions taken during and immediately after a disaster to save lives, protect property, and meet the basic needs of affected populations. This includes deploying emergency services, providing medical care, search and rescue operations, and distributing aid to affected areas. Overall, disaster resilience is a dynamic and multidimensional concept that requires a comprehensive and integrated approach to address the complex challenges posed by natural hazards and climate change. By investing in resilience-building measures, communities can enhance their ability to withstand and recover from disasters, ultimately reducing human suffering, economic losses, and environmental degradation.*

**Key words:** adaptation, prevention, preparedness, recovery, response.

### INTRODUCTION

The issue of disasters and their management was and remains a necessity and a subject of continuous topicality that requires a joint and multidisciplinary effort, involving human resources and special materials. Improving disaster resilience is used as one of the key approaches to minimise the impact of disasters (Fernando et al., 2023). Disaster resilience in climate-vulnerable communities involves the ability of these communities to anticipate, withstand and recover from the impacts of natural disasters exacerbated by climate change (Parsons et al., 2021). Resilience involves not only the ability to absorb shocks, but also to adapt and transform in response to these events. This encompasses different dimensions,

including social, economic, environmental and institutional aspects. As climate change contributes to increased disaster risk, disaster risk management becomes a vital and urgent component of any climate change adaptation programme (Irshad Ahmad et al., 2024). Climate change has been seen in Europe in the form of higher temperatures, changes in rainfall and runoff patterns, and extreme weather events, prompting reports of an increased incidence of weather-related disasters – such as floods, droughts, fires vegetation, storms and heat or cold waves (Shear et al., 2023).

Climate-vulnerable communities are those disproportionately affected by the impacts of climate change due to factors such as geographic location, socio-economic status, lack of resources and inadequate infrastructure. These

communities are more susceptible to extreme weather events and long-term environmental changes, which can exacerbate existing vulnerabilities and inequalities.

## MATERIALS AND METHODS

In this article, we analyzed the specialized literature, identifying the main characteristics and attributes of the concept of resilience to climate change, identifying its antecedents and consequences and their application in the case of vulnerable communities.

To this end we have taken the following steps:

I. We have chosen the concept of "resilience to disasters".

II. We conducted a literature review to obtain information about this concept and identify its different nuances. The Mendeley platform was used as a search engine to define the topic of this review article.

III. We identified the characteristics of the concept.

IV. We examined and evaluated the concept in simpler elements.

V. We characterized the communities at risk from climate change.

## RESULTS AND DISCUSSIONS

I. Choosing the concept. In recent years, disasters have occurred more often around the world (Charles et al., 2024). Economic losses from disasters increased by 82% to \$2.97 trillion in 2000-2019, from \$1.63 trillion in 1980-1999 (Elkady et al., 2022). Recent disasters occurring as natural events, industrial incidents and public health crises impose unprecedented challenges on people and communities. The increasing uncertainty and complexity of disasters requires multidisciplinary research efforts due to the various elements involved in a disaster management system (Son, 2023). We chose the concept of "disaster resilience" on the grounds that it is still not clear what it means and how it can be promoted during and after a disruptive event has occurred. The number of those affected by disasters does not appear to be diminishing, and repeated efforts to intervene in the same areas of the world to provide recovery aid have led to a reconsideration of the vulnerabilities that contribute to the triggering of

crisis situations. In 2021, 432 catastrophic events were recorded, which is higher than the average of 357 events that occurred in the last 20 years (Fernando et al., 2023).

Climate change is expected to cause disasters with increasing frequency and expanded impact capacity due to the global connections in contemporary society. Climate change refers to changes in the natural world, including ecosystems, climate patterns and biodiversity, often resulting from both natural processes and human activities.

II. For the literature review, the Mendeley platform was used as a search engine to define the topic of this review article, for the last two years. The first search using the key word "resilience" provided 4,471 relevant results represented by "Conference Proceedings" type documents.

A second search using the key words "disaster resilience" provided 345 results of the same type. We then performed a final search with the key phrase "resilience to disasters and climate change" and obtained the 60 most relevant results from "Conference Proceedings". The increasing frequency of disasters has drawn more attention to the notion of community resilience, which provides society with the ability to prepare for risks, cope with the consequences and recover from the effects (Elkady et al., 2022).

Community resilience has many definitions. Disasters are complex global issues which are inevitable in the community. Community resilience reflects the collective and individual capacity of people to manage and respond adaptively to extreme resource demands and losses caused by disasters. The characteristics of the "resilience to disasters" concept. Natural or man-made disasters can strike at any time or place and can have a catastrophic impact on towns, cities and entire countries. The consequences of natural hazards can be reduced through disaster resilience, even if their prevention is impossible.

Disaster resilience is a comprehensive strategy for disaster management that includes several features such as: preparedness, early warning systems, risk reduction, disaster response, recovery and reconstruction, community involvement, capacity building, adaptability and

flexibility, strong communication and inclusivity. By developing and implementing these features, communities and societies can become better prepared to resist, adapt and recover from disasters. The Disaster Resilience Of Place Model (DROP) is a reliable technique

that supports both disaster resilience development and benchmarking, while supporting local and community practices. The DROP model is presenting the relationship between mitigation, preparedness, event, and adaptive resilience (Figure 1).

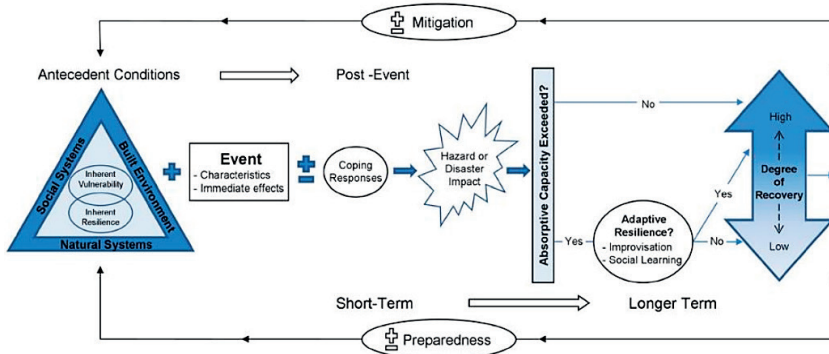


Figure 1. DROP model  
 (Cutter et al., 2008, cited by de Fernando et al., 2023)

Two essential components help a community overcome an emergency: the physical and the perceptual. Physical elements include infrastructure, economic resources, availability and access to services. Individuals' perceptions of their community involve factors such as social trust, leadership, and previous experiences with crises (Radu, 2018). This will ultimately reduce the negative effects that natural and man-made disasters have on certain individuals, families and entire communities. Sarker et al. (2020) analyzed the most relevant 21 documents to reveal the potential sources of big data (satellite imagery, aerial imagery and video, wireless sensor web network, simulation and spatial data, crowdsourcing, social media, mobile GPS and call recording (Figure 2).

### III. Examining the concept in simpler elements.

Resilience is a concept used in many fields of study. Resilience is an important and highly recognised concept within modern-day disaster management initiatives (Dharmadasa et al., 2023). The concept of resilience has gained significant attention among researchers due to the increasing occurrence of natural and man-made disasters worldwide (Boahen et al., 2023). It is at the heart of current discussions about development, climate change adaptation and

humanitarian action. But it is still unclear what this concept means and how it can be promoted during and after a disruptive event has occurred (Baltasiu, 2015).

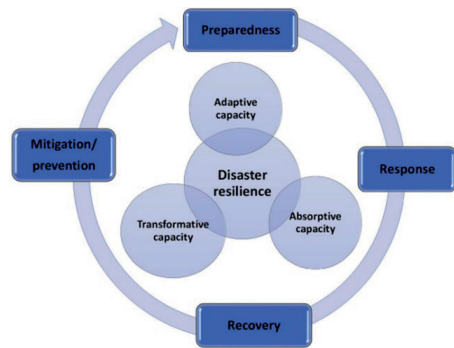


Figure 2. Disaster resilience through big data (after Sarker et al., 2020)

In the context of climate change, the resilience of urban communities can be conceptualized as their ability to sustain their social and economic functions. In addition, it involves improving, preparing to address the consequences of climate change, such as floods, droughts and rising temperatures (Sumardjo et al., 2023). The concept of resilience has gained significant attention among researchers due to the increasing occurrence of natural and man-made

disasters worldwide. The resilience of a vulnerable community can be increased by reducing exposure to hazards, reducing its vulnerability and thereby reducing risk, enabling the community to resist, absorb, adapt and recover from hazards and restore its basic functions in a timely and efficient manner. In this way, the respective community will recover from the disaster suffered and improve its resistance.

IV. Below it is a summary of the key points regarding climate change:

1. *Natural processes*: Climate change can occur from natural phenomena such as volcanic eruptions, earthquakes, variations in solar radiation, and geological changes. These processes have occurred throughout Earth's history and have shaped the planet's landscapes, climates and habitats over millions of years.

2. *Human activities*: in the last centuries, human activities have become significant factors of environmental change. Activities such as deforestation, industrialization, urbanization, agriculture, burning fossil fuels, and pollution have profoundly altered Earth's ecosystems and climate systems. These activities have accelerated rates of change far beyond what would occur naturally, leading to widespread environmental degradation and loss of biodiversity.

3. *Climate change*: one of the most pressing environmental changes facing the planet is climate change, caused mainly by the release of greenhouse gases (such as carbon dioxide and methane) from human activities. Climate change is causing global temperature increases, changes in precipitation patterns, more frequent and more severe extreme weather events, melting ice sheets and glaciers, rising sea levels, and disruptions to ecosystems and biodiversity.

4. *Biodiversity loss*: environmental changes have led to significant biodiversity losses, species extinction rates are currently estimated to be tens to hundreds of times higher than the natural background rate. Habitat destruction, pollution, resource overexploitation, invasive species and climate change are major drivers of biodiversity loss, threatening the stability and resilience of ecosystems around the world (Figure 3) (Foden et al., 2013). Taking into account some interdependencies between

regions, along with climate and socioeconomic projections, (Hochrainer-Stigler et al., 2016) estimates that average annual flood losses in Europe could increase from the current level of €4.9 billion to €23.5 billion in 2050.

5. *Ecosystem services*: environmental changes affect the provision of ecosystem services – benefits that people derive from nature, such as clean air and water, fertile soils, pollination, climate regulation, and cultural and recreational opportunities. Disruption of ecosystems can affect their ability to provide these services, compromising human well-being and livelihoods.

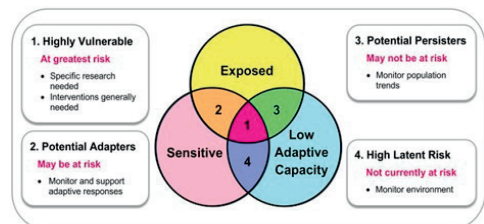


Figure 3. Framework to assess the impacts of climate change on species (Foden et al., 2013)

6. *Adaptation and mitigation*: Addressing environmental change requires both adaptation and mitigation strategies. Adaptation involves adapting to the impacts of environmental change, such as building resilient infrastructure, protecting natural habitats, and implementing agricultural practices that increase resilience to climate variability. Mitigation involves reducing the drivers of environmental change, such as transitioning to renewable energy sources, improving energy efficiency, and implementing policies to reduce greenhouse gas emissions.

7. *Global cooperation*: given the interconnected nature of environmental change and its impacts, addressing these challenges requires coordinated efforts at local, national and global levels. International agreements, such as the Paris Agreement on Climate Change, aim to mobilize collective action to mitigate greenhouse gas emissions and build resilience to the impacts of climate change (Nichersu et al., 2022). We consider the following simple elements particularly important in achieving community resilience: resilience, trust, response and recovery. Human capital (education, physical abilities and skills) has a special role in

increasing individual resilience, and social capital (reciprocity, trust, feeling of belonging to a certain group) includes communication and mutual help.

V. According to the Intergovernmental Panel on Climate Change (IPCC, 2022), vulnerability to climate change is determined by:

- Exposure to climate variability and change: refers to the extent to which an entity (be it a country, community, individual or ecosystem) experiences climate variability and change.
- Sensitivity to climate shocks and stresses: is an assessment of the impact that climate factors have on the entity concerned.
- Adaptive capacity: describes the entity's ability to manage negative impacts and capitalize on any opportunities that arise.

People all over the world are facing the reality of climate change. For some, these just mean changes in weather patterns: slightly higher temperatures, slightly lower temperatures, more uncertainty. For others, however, climate change is already a survival issue: too little or too much water, insufficient food, increased safety and security risks.

Climate change adaptation efforts often focus on adjusting livelihood strategies to respond to new climate conditions. However, these approaches

assume that people have access to the necessary resources to implement these strategies.

Access to and control over critical resources, such as agricultural land, forests and water sources, are key factors in determining vulnerability to climate change. Without access to these vital resources, adaptation options are severely limited and people's ability to respond effectively to climate change is reduced. Thus, to support effective adaptation, it is crucial that policies and financing strategies ensure equitable access to resources for the most vulnerable. This would not only improve the resilience of affected communities, but also help reduce the inequities generated by climate change. Since the most vulnerable, poorest and most marginalized populations are also the most exposed to high risks, increasing the degree of awareness and responsibility regarding the protection of natural resources is essential for survival and implicitly for dealing with disasters. Funding and support should be targeted to the countries, communities and people most in need. The extent of adaptation needs is usually related to the degree of vulnerability to climate change. Vulnerability is a vital factor in resilience to climate change, but there is no universal definition of what constitutes a vulnerable community (Figure 4).

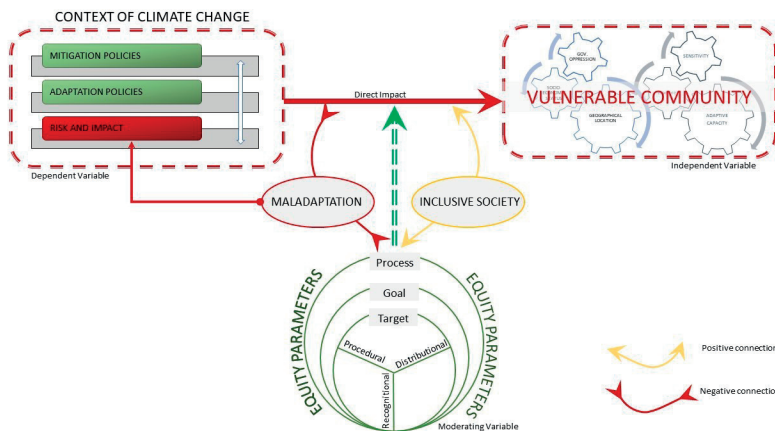


Figure 4. Impact of climate change on vulnerable communities (Hadad, 2020)

The debate is still open because the vulnerability itself is attached to the context of its assessment. Women and girls are more vulnerable to disasters, but that they can also contribute vital

information, skills, resources and experiences to disaster risk reduction and climate change mitigation. Indeed, women and men play different roles in household livelihoods and

therefore experience the impacts of climate change differently.

Following the documentation in the literature, we agree with those authors who consider that the most vulnerable to climate change are the poorest people, who do not have effective strategies to cope with shocks and stresses and who have resorted to ineffective responses. This suggests that we need to look not only at the risks people are exposed to, but also to the quality of their options for dealing with those risks and how they ultimately manage them. Without the resources to safely deal with the worst effects of the pandemic, vulnerable populations have been forced to make impossible choices.

Globally, up to 3.6 billion people live in environments highly vulnerable to climate change, and current unsustainable development patterns increase the exposure of ecosystems and people to climate risks. Romania is also feeling the impact of global warming through the effects of thermal stress, aggravated in large cities by the urban heat island phenomenon, and through the increase in the intensity of precipitation over short periods, which favors floods and urban flooding. These effects will continue to amplify in the future, having multiple socioeconomic implications.

## CONCLUSIONS

As the climate continues to change, millions of poor people face increasing challenges in terms of extreme events, health impacts, food, water and livelihood security, migration and forced displacement, loss of identity cultural and other related risks. People in vulnerable situations – due to factors such as geography, poverty, gender, age, indigenous or minority status, national or social origin, birth or other status and disability – may face increased exposure and vulnerability to human rights abuses caused by climate. Understanding the hazards and risks will inform the preparedness and mitigation approaches of local people, authorities and agencies. Poverty becomes the main factor fueling the other vulnerabilities. Therefore, it is imperative to increase the resilience of vulnerable populations in order to mitigate the adverse effects of global warming and to minimize their susceptibility to associated risks

and to strengthen the capacity to identify risks by developing multi-hazard risk information systems, which also include risk exposure and vulnerability data.

## ACKNOWLEDGEMENTS

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