



(REVIEW ARTICLE)



Critical analysis of post-disaster management in Morocco: Towards a new model of territorial resilience

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International Journal of Science and Research Archive, 2025, 16(01), 016-020

Publication history: Received on 25 May 2025; revised on 28 June 2025; accepted on 02 July 2025

Article DOI: <https://doi.org/10.30574/ijrsra.2025.16.1.1990>

Abstract

Faced with rising natural and man-made risks, post-disaster management is a strategic challenge for strengthening territorial resilience in Morocco. This article offers a critical analysis of current policies, identifying their institutional, social and technological limitations. It highlights the need for an integrated approach based on inclusive governance, the participation of local stakeholders and the use of innovative technologies. The study argues for a paradigm shift towards proactive and sustainable disaster management, to better prepare Moroccan territories for future crises.

Keywords: Post-disaster management; Territorial resilience; Morocco; Risk governance

1. Introduction

In a global context marked by an increase in the frequency and intensity of natural disasters, the issue of post-disaster management is becoming a strategic challenge for governments. Climate change, increasing urbanization, pressure on ecosystems and fragile socio-economic dynamics make many regions particularly vulnerable. All over the world, disasters - whether earthquakes, floods, forest fires or storms - cause considerable human, economic and environmental losses. This reality calls for a paradigm shift in the way societies think about risk management, from a reactive, ad hoc approach to a proactive, systemic one focused on territorial resilience.

Morocco, with its geographical and climatic diversity, is no exception to this dynamic. Situated at the junction of the African and Eurasian tectonic plates, with an extensive coastline, fragile mountainous areas and arid regions, the country is exposed to a variety of natural hazards: earthquakes, floods, landslides, droughts, among others. Rapid, sometimes uncontrolled urbanization and growing pressure on natural resources further exacerbate this vulnerability. In recent years, several catastrophic events, such as the Guelmim floods (2014), the Al Hoceïma earthquake (2004), and the forest fires in the north of the country, have highlighted the limits of the national post-disaster management system.

Against this backdrop, it is becoming increasingly clear that post-disaster management in Morocco cannot be confined to isolated emergency interventions. It must be part of a long-term strategy, based on a detailed understanding of territorial vulnerabilities, shared governance and coherent mobilization of institutional, economic and social players. This is the background to the present article, which offers a critical analysis of current post-disaster management systems in Morocco. It questions the theoretical foundations of territorial resilience, assesses the policies implemented and identifies levers for action to build an integrated, adaptive and sustainable model, capable of strengthening the resilience of territories in the face of future disasters.

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2. Theoretical and conceptual framework

2.1. Territorial resilience

The notion of territorial resilience emerged in the 1970s in the field of ecology, before being extended to the social sciences, geography and land-use planning. It refers to a territory's ability to absorb, adapt and reorganize in the face of a shock, while maintaining its essential functions, structures and identity.

According to Cutter et al (2008), this resilience is based on four interdependent dimensions:

- Social: level of education, solidarity networks, social capital, social inclusion;
- Economic: diversity of activities, capacity for recovery, local financial autonomy;
- Environmental: robustness of ecosystems, capacity for natural regulation, reduction of physical vulnerability (Folke, 2006);
- Institutional: governance, anticipation, coordination between stakeholders, integration of risks into public policy.

Territorial resilience goes beyond a simple return to the initial situation: it implies an adaptive transformation (Walker et al., 2004), based on the capacity to learn, innovate and improve systems in the face of future risks. This conceptual framework is now widely mobilized by international institutions such as UN-Habitat (2020), the OECD (2014) or the Sendai Framework for Disaster Risk Reduction (2015-2030), which advocate integrated and territorialized approaches to resilience.

2.2. Post-disaster management

- Post-disaster management refers to all actions taken after the occurrence of a catastrophic event. It generally revolves around three main phases (Alexander, 2013; Tierney, 2014):
- Impact assessment: data collection, damage mapping, analysis of economic, social and environmental losses (World Bank, 2010);
- Early recovery: emergency relief, shelter, aid distribution, restoration of basic services;
- Resilient reconstruction: sustainable rebuilding of infrastructure, reduction of future risks, involvement of local communities (UNISDR, 2017).

According to Vale and Campanella (2005), these phases should be conceived as a learning cycle, in which each disaster becomes an opportunity for transformation. This requires a strategic vision, the mobilization of multiple stakeholders (State, local authorities, civil society, private sector) and the integration of sectoral policies (urban planning, housing, environment, economy).

Recent studies also emphasize the role of territorial governance and citizen participation in the success of recovery processes (Pelling, 2011; Aldrich, 2012). The concept of "resilient reconstruction" implies avoiding the reproduction of pre-existing vulnerabilities, by integrating standards of sustainability, social equity and prevention into rehabilitation choices.

In the Moroccan context, natural disasters such as earthquakes (Al Hoceïma, 2004), floods (Guelmim, 2014), repeated droughts, or more recently the Al Haouz earthquake (2023), have revealed structural fragilities in post-disaster management: excessive centralization of decisions, weak inter-sectoral coordination, lack of sustainable recovery funding mechanisms, and little consideration for local communities.

The link between territorial resilience and post-disaster management is thus becoming a strategic lever for rethinking intervention models. Reports such as that by Morocco's Cour des Comptes (2016) or studies by the World Bank (2019) alert us to the need to develop an integrated framework, based on fine-grained risk mapping, strengthened local governance, and greater synergy between development plans and risk reduction policies.

This theoretical framework thus aims to provide the foundations for a critical analysis of existing arrangements and for the proposal of a new Moroccan model of territorial resilience, consistent with the Kingdom's international commitments to sustainable development and the fight against climate change.

3. Post-disaster management in Morocco

3.1. Status and limitations

Post-disaster management in Morocco is part of an evolving strategic framework aimed at strengthening the country's resilience to recurring natural hazards (earthquakes, floods, droughts, landslides). The National Strategy for Natural Disaster and Risk Management (PNGRCN) is the cornerstone of this strategy, promoting the structuring of institutional responses, the reduction of vulnerabilities, and the strengthening of local capacities.

The Fonds for the Mitigation of Natural Disaster Effects (FLCN), set up in 2009 with the support of the World Bank, represents a key financial mechanism, having enabled the funding of prevention and reconstruction projects in vulnerable regions. Notable progress has been made in risk mapping (use of GIS and satellite data), emergency planning, and the partial professionalization of intervention teams (Ait Brahim et al., 2017).

However, a critical reading of the system reveals major deficiencies at several levels:

Institutional fragmentation: the multiplicity of stakeholders without clear leadership hampers coordination and efficiency. This fragmentation is highlighted in the work of Bouabid & Chikhaoui (2019) and in World Bank reports, which stress the absence of a central risk management authority.

Excessive centralization: disaster management remains largely centralized, which limits adaptation to local specificities. The process of regionalization, although constitutionalized, has not yet been accompanied by an effective transfer of risk management competencies (Bencheckroun, 2021).

Low community participation: A top-down approach predominates in post-disaster management. Affected populations are rarely involved in the planning or implementation of recovery actions, which undermines their effectiveness and sustainability.

Lack of a clear strategy for resilient reconstruction: In the absence of a dedicated regulatory framework, reconstruction is often carried out on an emergency basis, without integrating dimensions of sustainability, climate adaptation or social justice (UNDRR, 2019; Clinton, 2006).

Poor access to innovative technologies: Although efforts exist (pilot projects on early warning, satellite detection), their application remains very limited, particularly in landlocked rural areas (Alami, 2021; Mansour & El Menzhi, 2022).

Uneven local capabilities: Most local authorities lack qualified human resources, dedicated budgets and crisis planning mechanisms, as highlighted in the studies by Haddadi (2020).

Despite these limitations, Morocco has significant levers at its disposal to strengthen its system, including:

- The development of pilot projects in certain regions ;
- International commitment to resilience;
- Adherence to the sendai framework for disaster risk reduction (2015-2030), which calls for an anticipatory, inclusive and sustainable approach.

These observations call for a structural reform of the Moroccan model, towards more territorialized governance, reinforced inter-institutional coordination, effective mobilization of local communities, and reconstruction conceived as a lever for transforming vulnerabilities.

3.2. Integrated territorial resilience

Given the limitations of the current post-disaster management system, it is imperative to adopt an integrated, proactive approach to territorial resilience. This implies structural reforms articulated around four complementary axes.

3.2.1. Strengthening watch and warning systems

Improving resilience begins with the ability to anticipate crises. The development of interconnected early warning systems based on advanced technologies represents an essential lever. The use of IoT sensors for hydrological and seismic monitoring, the exploitation of satellite imagery for the detection of environmental changes, as well as artificial

intelligence for predictive data processing, would significantly reduce the time lag between risk detection and operational response (World Bank, 2022; Pulwarty & Sivakumar, 2014). Although Morocco has some partial systems in place, it would benefit from consolidating them into a coherent national architecture that is inclusive and accessible to all regions, including marginalized rural areas.

3.2.2. Integrating risk into urban planning

The territorialization of resilience calls for an overhaul of planning policies. The systematic consideration of natural hazards in urban planning documents and infrastructure projects is crucial to reducing the structural vulnerability of Moroccan cities. This requires the adoption of resilient building standards - notably earthquake and flood-resistant - and the implementation of zoning policies prohibiting construction in high-risk areas (Jha, Miner, & Stanton-Geddes, 2013). International experience shows that the most resilient cities are those that integrate risk management into their urban planning decisions, linked to up-to-date data from environmental monitoring.

3.2.3. Participatory governance and civic engagement

Resilience cannot be decreed; it must be built with the people. Ownership of risk management systems by local populations is a decisive factor in the effectiveness of post-disaster responses. This requires the implementation of inclusive governance mechanisms, such as neighborhood committees, multi-stakeholder dialogue platforms and co-construction processes for risk management plans (Gaillard & Mercer, 2013). In addition, awareness campaigns, citizen training in first aid, and risk education starting at school are all vectors of sustainable social resilience (Twigg, 2015).

3.2.4. Technological innovation and digitalization

The digital transition offers unprecedented opportunities for disaster management. The integration of Geographic Information Systems (GIS), artificial intelligence and mobile platforms enables dynamic mapping of risks, rapid dissemination of alerts and optimized coordination between stakeholders (UNDRR, 2021; Mansour & El Menzhi, 2022). Mobile reporting applications, such as those developed in Asia or Latin America, could be adapted to the Moroccan context, facilitating real-time interaction between citizens, local authorities and emergency services.

4. Conclusion

The multiplication and intensification of natural disasters in the current global context call for a profound transformation of post-disaster management models, particularly in highly vulnerable countries such as Morocco. Although institutional mechanisms such as the National Risk and Disaster Management Plan (PNDR) have been put in place, their effectiveness remains limited by systemic flaws: fragmentation of responsibilities, weak inter-sectoral coordination, unequal access to technologies and marginalization of local populations.

The study highlighted the need for a systemic approach to territorial resilience, based on prevention, anticipation and sustainable reconstruction. It underlined the importance of strengthening early-warning systems, integrating risks into urban planning, promoting participative governance and taking advantage of technological innovations for more agile and inclusive crisis management.

In the face of climate emergency and territorial mutations, a new paradigm of post-disaster management is needed, based on institutional learning, citizen involvement and territorial intelligence. Morocco has what it takes to make a success of this shift, provided it mobilizes strong political will and sustainable resources, and fosters synergies between public, private, scientific and community players.

Finally, this reflection calls for ongoing research-action, mobilizing social sciences, engineering and territorial planning, to co-construct truly resilient territories, capable not only of recovering, but of evolving positively after each shock.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest has been declared by the authors

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