European Parliament

TOWARD A TRANSFORMATIVE AND FAIR EU APPROACH TO POST-DISASTER RECONSTRUCTION

Study commissioned by Prof. Nikolaos Farantouris,
Member of the European Parliament,
the Left Group, Member of the Budgets Committee (BUDG)

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ENA Sustainable Development Observatory[1]

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1 https://enainstitute.org/en/publication/categories/sustainability/

Abstract

This report highlights the urgent need for a transformative and equitable European framework for post-disaster recovery in the context of escalating climate-related hazards. Drawing on recent disasters in Greece, Spain, and other EU Member States, it identifies persistent governance, policy, and knowledge gaps that undermine resilience and exacerbate social and territorial inequalities, posing risks to EU cohesion and stability. The analysis reviews international experiences and best practices, stressing the importance of integrating climate adaptation, just transition, and sustainability principles into recovery strategies. Without a coherent European approach, reconstruction efforts risk reinforcing existing disparities, weakening social trust, and undermining democratic legitimacy. To address these challenges, the report advances targeted policy recommendations: embedding Build Back Better principles into fiscal policy and funding mechanisms, strengthening governance and evaluation, enhancing public administration, promoting education and training, and supporting research. Ultimately, it argues that reconstruction must move beyond emergency relief to serve as a strategic driver of climate-resilient development, social cohesion, and the EU's role as a global leader in implementing the Sendai Framework for Disaster Risk Reduction.

Introduction

Humanity is experiencing an increase in the frequency, intensity and impact of extreme weather events, including in Europe which is the fastest warming continent in the world. Recent disasters in European countries such as in Spain (meteorological phenomenon 'Dana', Valencia, October 2024), Greece (Storm 'Daniel' in Thessaly and Dadia mega-wildfire in Evros, 2023), Central and Eastern European countries (Storm 'Boris', September 2024[2]) and Portugal[3] (Aveiro and Porto wildfires, September 2024) confirm that Europeans citizens are increasingly confronted with the devastating impacts of extreme weather events.

A key question that has been at the forefront of the public's mind has been whether climate change has any connection to these events. The World Weather Attribution (WWA) initiative have been reporting since 2014 on extreme weather events, highlighting where climate change played a key role and where other factors were the main drivers of the events. In a recent report (WWA, 2024), WWA tracks the fingerprints of climate change in all of the ten deadliest events[4] since the devastating European heatwave of 2003, when the scientific field of attribution first began[5].

As a result, WWA concludes that the number of meteorological hazards that can be described as 'natural' is decreasing. Successive climate-related disasters have accumulated a critical mass of severe cases, underscoring for policymakers the urgent need to shift reconstruction strategies beyond simply providing relief to disaster victims, repairing damaged infrastructure and addressing immediate needs. Instead, these strategies must seize the opportunity to integrate climate change adaptation and mitigation, promote a just transition and advance long-term environmental sustainability as core objectives of the reconstruction process. International experience shows that urgent disaster recovery policy responses made under pressure for quick results can in fact harm long-term sustainability while increasing pre-existing social and territorial inequalities. Vulnerable populations, including low-income households, single-parent families, the dependent elderly, economic migrants and refugees, as well as small farmers, the self-employed and SME-owners, are often much more exposed to the compounding and cascading effects of disasters due to fewer resources and opportunities, and to the uneven impact of disasters and policy responses.

Taking into consideration the deteriorating climate conditions in Europe and their increasing impact on local communities and regional productive systems, a major challenge in disaster reconstruction lies now in addressing immediate needs promptly while laying the foundations of a sustainable development

2 2024 Central European floods

3 2024 Portugal wildfires

4 The events include three tropical cyclones in the Indo-Pacific (Sidr, Nargis and Haiyan), four heatwaves in Europe, two heavy rainfall events (one in India, one in the Mediterranean) and a drought in the Horn of Africa. Together, these events caused more than 570,000 deaths.

5 In 2003, Europe experienced a heatwave that claimed over 70,000 lives, making it one of the deadliest natural disasters in recent history. In 2004, the first concrete evidence linking the heatwave's intensity and likelihood to human-induced climate change from burning fossil fuels was provided. This groundbreaking study marked the birth of 'attribution science,' a field that identifies the influence of climate change on specific weather events (WWA, 2024).

model that is adapted to climate change. This model is referred to as “climate resilient development" in the IPCC's AR7.

International experience shows that urgent disaster recovery policy responses made under pressure for quick results can in fact harm long-term sustainability while increasing pre-existing social and territorial inequalities

In this direction, the present report aims to map and assess the current situation and the challenges faced in the field of post-disaster reconstruction in Europe with a special focus on Member-States in Southern Europe given their higher vulnerability to climate hazards:

- **The first section** outlines the main challenges and gaps facing Europe and its Member States in the field of sustainable and equitable reconstruction. A mapping of the communications, resolutions, opinions and strategies issued by the EU institutions on post-disaster reconstruction is carried out. Evidence is also provided on the challenges of reconstruction in Greece and Spain following the major disasters of the last two years, and on the long-term impact of disasters on public health based on the US experience.
- **The second section** explores public policies, international best practices, and prevailing public discourses related to sustainable and equitable approaches to post-disaster reconstruction.
- **The third section** sets out a series of recommendations and policy proposals aimed at establishing a European framework for sustainable and equitable post-disaster reconstruction, and strengthening national frameworks.

Successive climate-related disasters have accumulated a critical mass of severe cases, underscoring for policymakers the urgent need to shift reconstruction strategies beyond simply providing relief to disaster victims, repairing damaged infrastructure and addressing immediate needs. Instead, these strategies must seize the opportunity to integrate climate change adaptation and mitigation, promote a just transition and advance long-term environmental sustainability as core objectives of the reconstruction process.

1. Current challenges and opportunities in Post-Disaster Reconstruction

1.1. From disaster relief to transformative resilience

Concerns regarding post-disaster reconstruction extend to the current debate on the contribution of reconstruction plans and policy responses to shocks and crises to sustainability goals, as highlighted by the European Environmental Agency (EEA, 2023). Three policy responses are possible during transitions and crises responses:

1. Focusing on resilience as an adaptation to shock but neglecting sustainability goals.
2. Prioritising transition goals without ensuring resilience, thereby maintaining vulnerability.
3. Aligning long-term transition goals with short-term resilience needs, i.e. using shocks as a window of opportunity for systemic change and enhancing both sustainability and resilience.

The third policy response outlines the notion of *transformative resilience*, which can be defined as the capacity of transitions to generate transformative change towards desired outcomes (e.g. carbon neutrality and circularity of the economy, and societal justice and fairness).

Resilience is expected to become increasingly important on the European policy agenda as time goes on and the 'unavoidable' impacts of climate change become more manifest. Key questions include whether the EU can embed transformative resilience in its governance, maintain stability and adaptability in the face of new shocks, and ensure that transitions are just, resilient and transformative, addressing regional disparities and promoting equitable transitions. Transformative resilience requires policies that support long-term transformative goals while responding to shocks. Effective governance of systemic change calls for policies that are aligned with sustainability transitions, using crises as windows of opportunity for innovation and structural change. Transformative resilience requires thus innovative governance to reorganise through collaboration, inclusive participation and leadership.

Key questions include whether the EU can embed transformative resilience in its governance, maintain stability and adaptability in the face of new shocks, and ensure that transitions are just, resilient and transformative, addressing regional disparities and promoting equitable transitions

1.2 Call for action to address policy and knowledge gaps in sustainable post-disaster reconstruction

Future shocks and crises will further test resilience and sustainability, challenging the EU's ability to maintain its sustainability goals in the midst of the polycrisis. Despite the increasing frequency, intensity and impact of climate-related disasters in Europe, the EU and its Member States lack a consolidated approach to sustainable post-disaster reconstruction. However, the need to make progress in this area has been highlighted and explicitly recognised by the EU institutions in recent years:

- **In its Resolution of 18 May 2021 on the review of the European Union Solidarity Fund (2020/2087 - INI), the European Parliament** recognised the need to guide and monitor the qualitative dimensions of post-disaster reconstruction, calling for the criteria for determining which projects are "eligible" for assistance from the Fund to take greater account of the latest risk prevention principles and calling for the ***Build Back Better*** principle to be fully integrated into Article 3 of the EUSF Regulation in a future revision, in order to contribute to improving the quality of infrastructure in these regions during reconstruction and to better prepare them to avoid future disasters by building preventive infrastructure.
- **In its Conclusions on civil protection work in view of climate change (2022/C 322/02), the European Council** notes the need for the Union to develop a more coherent and proactive systemic approach to enhance resilience to the consequences of climate change in all phases of the disaster management cycle, which includes prevention, preparedness, response and **recovery**.
- **The EU Strategy on Adaptation to Climate Change (European Commission, 2021)** highlights similar considerations on the need to better leverage synergies between climate adaptation and broader work on disaster risk prevention and reduction. According to the European Commission, both offer a range of complementary approaches to managing climate risks in order to build resilient societies. In this respect, the Commission committed to strengthen climate considerations in EU disaster risk prevention and management. As specifically stated, better coherence in terms of practices, standards, guidelines, objectives, resources and knowledge needs to be achieved through closer coordination at national level, at EU level (through the EU Civil Protection Mechanism) and at international level (through the Sendai Framework for Disaster Risk Reduction). The EU Strategy on Adaptation to Climate change also stresses the potential contribution of dedicated funds and instruments, both at EU and national level, such as from the EU Solidarity Fund, to post-disaster emergency and recovery operations. As stated, such contributions shall include **as a minimum "build back better" considerations** in order to provide incentives for adaptation and reduce moral hazard.
- **In its Opinion (REX/542) of March 2022 on "Consolidating the EU-Civil Protection: Mechanism in order to improve the EU's capacity to react in the face of extreme events, including those occurring outside its territory", the European Economic and Social Committee** underlines the importance of focusing on prevention, preparedness and recovery procedures in a more resilient way; working with the UN on Disaster Risk Reduction strategies

and the implementation of the **"build back better" priority** of UN-Sendai Framework of Action to strengthen resilience inside and outside the EU, as a sustainable approach adjusted with the SDGs.

Despite the increasing frequency, intensity and impact of climate-related disasters in Europe, the EU and its Member States lack a consolidated approach to sustainable post-disaster reconstruction. However, the need to make progress in this area has been highlighted and explicitly recognised by the EU institutions in recent years.

The Restore proposal

The EU Regulation 2024/3236 of December 19, 2024, amending Regulations (EU) 2021/1057 and (EU) 2021/1058 on regional emergency support for recovery (RESTORE) was adopted in the wake of the devastating floods and fires in Central, Eastern and Southern Europe. The EU stresses that extensive reconstruction work will be needed in many cities, towns, and villages to repair damaged infrastructure and equipment. The text of the new regulation stresses that, in the context of reconstruction after natural disasters, priority should be given in the selection process to actions based on the principle of 'building back better'. This principle involves using the recovery, rehabilitation, and reconstruction phases after a disaster to strengthen the resilience of communities by incorporating disaster risk reduction measures, as referred to in the United Nations Sendai Framework for Disaster Risk Reduction 2015-2030.

Furthermore, it is explicitly stated that the continuity and reinforcement of planned investments in disaster prevention and preparedness, as well as climate adaptation, should be ensured in order to mitigate the impact of the increasingly frequent natural, including climate-induced, disasters. Reconstruction efforts should not come at the expense of investments in long-term structural prevention and preparedness measures. The application of climate proofing and the ‘do no significant harm’ principle should be ensured when investing in infrastructure to enhance the resilience of Union funded infrastructure in the face of future, more frequent and severe climate-induced disasters. The Build Back Better approach is clearly reflected in the Regulation when it states that support for reconstruction in the event of natural disasters under the new specific objective may cover the restoration of infrastructure damage or destruction, such as public infrastructure or investment in fixed assets for businesses and equipment, including restoration in a different location or in a form that is not identical to the original, if necessary, in a resilient and sustainable manner. In addition, support may be provided for the restoration of natural areas, biodiversity, and green infrastructure, including Natura 2000 sites. Last but not least, if a Member State is eligible for support from the EUSF to finance essential emergency and recovery operations restoring infrastructure to its condition prior to the occurrence of the natural disaster, the support from the ERDF and the Cohesion Fund may be used in a complementary manner with the EUSF to improve the functionality of the infrastructure affected in order to enhance its capacity, sustainability and resilience to withstand future natural disasters. The purpose of the support from the ERDF and the Cohesion Fund is to increase resilience and risk preparedness.

The RESTORE Regulation is therefore an important milestone in European legislative activity, confirming the importance of restoring the built and natural environment in a way that improves sustainability and resilience. The Restore regulation confirms that the use of European funds available for restoration requires the establishment of a dedicated governance framework to operationalize the *Build Back Better* concept with an emphasis on the environmental dimension (*Build Back Greener*) so that both aid recipients and funders can implement, monitor and evaluate the effectiveness of projects based on clear and reliable sustainability and resilience criteria.

Ensuring socio-environmental impact of EU funds dedicated to post-disaster reconstruction

Through the EU Civil Protection Mechanism and European Disaster Risk Management, the EU has steadily improved its civil protection and humanitarian aid operations. The European Union Solidarity Fund (EUSF) has provided crucial support for post-disaster recovery, demonstrating EU solidarity and contributing to the EU's political project. The European disaster resilience goals[6] issued in February 2023 aim to improve the capacity of the EU, its Member States and participating states in the EU Civil Protection Mechanism, to anticipate and withstand the effects of future major disasters and emergencies. In particular, the European Commission -in close cooperation with Member States- has identified five (5) goals to pursue collectively, each with specific objectives and flagships: 1) Anticipate; 2) Prepare; 3) Alert; 4) Respond; 5) Secure.

Despite their positive contribution and the substantial advancements introduced by the RESTORE regulation, these mechanisms still fall short of adequately ensuring equitable and sustainable reconstruction in a comprehensive way, particularly under the complex conditions that prevail in post-disaster contexts. While European Disaster Risk Management frameworks prioritise prevention, risk reduction, resilience, and disaster response—without addressing reconstruction—the EU Solidarity Fund lacks explicit conditionality to guarantee that its resources are deployed in line with socio-environmental objectives consistent with the *Build Back Better* priority.

The necessity to bridge the gap between *transformative resilience* requirements and current practices in the EU has been recently highlighted in the public discussion (EEA, 2024b). Based on their considerable experience, international initiatives for emerging economies such as the UN, EU and World Bank Post-Disaster Needs Assessment (PDNA) and Disaster Recovery Framework Guide, emphasise the necessity to promote equitable reconstruction and the enhancement of adaptive and resilient capacities.

Due to the particularly challenging context of successive climate-related disasters, the lack of an established comprehensive *Build Back Better* framework across the EU can adversely affect disadvantaged groups and undermine their ability to adapt to future climate impacts as well as harm sustainable development. When multiple disasters occur in quick succession, periods of response, recovery, and preparation for future risks may overlap or take longer than originally expected (Finucane et al, 2020). This approach is now also linked to the concepts of cascading and compounding risks from AR7 (IPCC, 2023). Planning for recovery in the context of overlapping or compounding disasters requires in-depth research and open consultation on challenging trade-offs when choices are made for example regarding priorities such as risk mitigation, equity and social cohesion, infrastructure for

6 European Disaster Resilience Goals, 23.2.2024.

resilience, economic development, environmental clean-up, and restoration of natural systems. These choices in disaster reconstruction strategies and plans will determine the extent to which future generations will be able to adapt and cope better with future climate-related hazards and disasters, highlighting critical intergenerational climate justice issues.

Recent disasters in EU Member States identified as climate change hotspots -highly vulnerable to the impacts of climate change- underscore the significant macro-level risks stemming from the absence of coherent reconstruction frameworks. It is crucial to understand, that after disasters, whether climate-related or otherwise, fair, sustainable, resilient, and participatory reconstruction cannot be assumed as a natural outcome. Evidence from past disasters highlights that reconstruction often exacerbates existing inequalities, as vulnerable groups are disproportionately excluded from decision-making processes and recovery benefits. Delayed recovery efforts, displacement, and inadequate housing solutions affect low-income and minority communities. Weak governance structures and limited institutional capacity frequently result in poorly coordinated responses and reliance on unsustainable practices. Competing political and economic interests often prioritize short-term infrastructure restoration over long-term climate resilience, failing to integrate local needs and ecological considerations into planning.

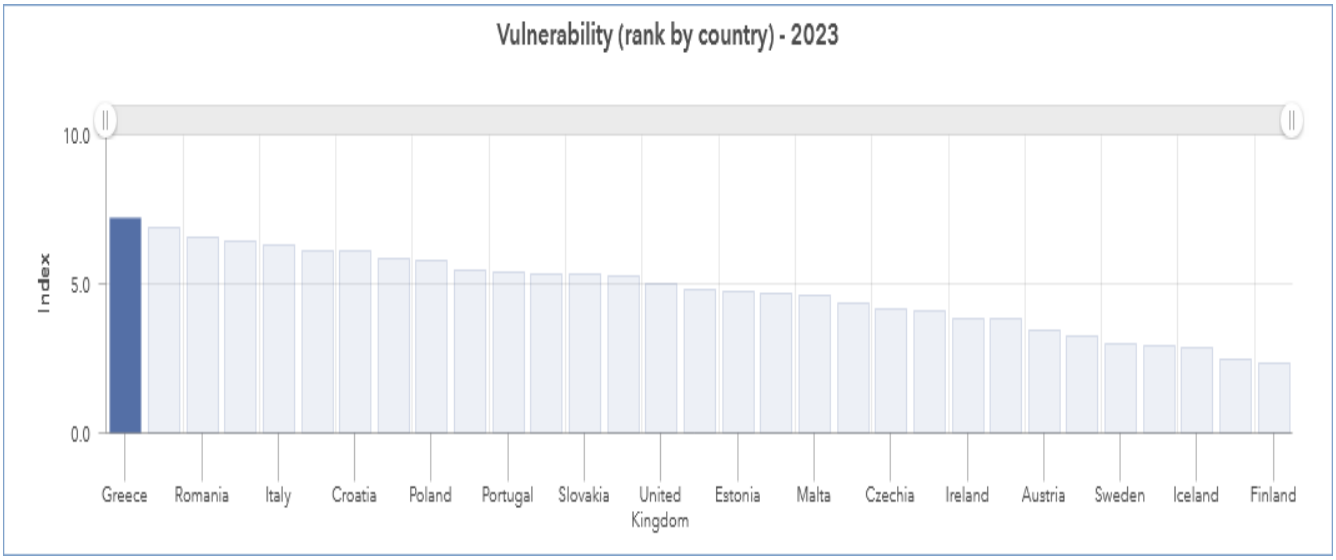
When multiple disasters strike in rapid succession, the phases of response, recovery, and preparation for future risk often overlap or extend far beyond initial expectations. Planning reconstruction in such a context of overlapping or compounding disasters demands thorough research and inclusive consultation to navigate complex trade-offs. These trade-offs often involve prioritizing areas such as risk mitigation, equity and social cohesion, resilient infrastructure, economic development, environmental remediation, and the restoration of natural systems. The strategic choices made in disaster reconstruction plans will profoundly influence future generations' ability to adapt and cope with climate-related hazards, underscoring the importance of addressing intergenerational climate justice.

All these elements are evidence of the urgent need for a comprehensive European framework to help less developed and more vulnerable regions to rebuild in a coordinated, equitable and sustainable way. As examined in the following section, the challenges posed by recent disasters in EU Member States also highlight the importance of an EU framework for reconstruction.

1.3 Post-disaster reconstruction in Southern Europe

Lessons from Greece's Post-Disaster Recovery Efforts

Southern Europe faces challenging climate risks, as documented by the EEA, being particularly vulnerable to climate hazards (EEA, 2024). In particular, Greece ranks first in the EU, based on the Disaster Risk Management Knowledge Centre's vulnerability index for 2023 (Greece: 7.21; EU: 4.78).



Source: DRMKC - Risk Data Hub

Major recent climate events in Greece, such as the devastating floods in the region of Thessaly in 2023 and the mega-fires in Evros in 2023 and in Euboea in 2021, highlight the dramatic economic, social and environmental consequences of climate-related hazards. The year 2023 was marked by numerous and interconnected negative climate records in Greece (Lagouvardos, 2023), confirming that Greece has entered a phase where the manifestations and impacts of climate change, both acute (rapid) and chronic (slow-onset), are becoming increasingly severe.

Reconstruction strategies following recent major climate-related disasters in Greece reveal policy frameworks that do not seize the opportunity to integrate international best practices, EU policy guidelines and recommendations of scientific organisations. Public debate and scientific discussion on these strategies have highlighted **the absence of a concrete, stable and efficient administrative model** for the development and implementation of sustainable reconstruction plans (Barbaroussi et al, 2024; Labrianidis, 2023). Other observed weaknesses include[7]:

- **The inconsistency of proposals** submitted with EU legislation, EU guidelines and, in particular, the new Nature Restoration Law;
- **Low level of public participation** either due to a lack of appropriate mechanisms or to the negative impact of disasters on the ability and willingness of disaster-affected people to participate in relevant initiatives;
- **The lack of data** and/or of information on the sources which have been used;
- **The emphasis on large-scale gray infrastructure** and neglect of nature-based solutions;

7 See for example: Comments from environmental organisations on the HVA report "Water management in Thessaly in the wake of Storm Daniel"; North Evia: New rehabilitation model but with insufficient support; The HVA report promotes huge construction projects of an obsolete generation and privatisation of water resources throughout the courrealistic and viable is the Dutch plan?

- **Proposals that deviate from sustainable development goals** and that raise strong concerns among local communities about the displacement of farmers and small farms in favour of large companies (i.e. “land and green grabbing”);
- **The poor consideration given to mental health** and psychosocial support in disaster recovery plans to address the emotional and psychological impact of disasters on affected populations;
- **The lack of gender-sensitive approaches** to disaster recovery planning so that women's specific needs and contributions are duly recognised and addressed;
- **Significant delays due to the ad hoc nature of the administrative structures** set up to implement the recovery plans, most of which are designed outside the public administration and therefore do not internalise both the objective constraints and opportunities for the effective and timely completion of the necessary works and projects;
- **Finally, none of the proposed solutions** address the necessary capacity building of local and regional authorities to enhance long-term sustainable resilience to the next climate-related natural hazards.

These initial indications of shortcomings in recent Greek reconstruction policies point towards a lack of guidelines and tools to develop a comprehensive long-run reconstruction vision promoting key policy aspects such as social and territorial cohesion, just transition, climate change adaptation and mitigation, and environmental sustainability. Recent reconstruction efforts following climate disasters have revealed the Greek administration's and local communities' weaknesses to effectively and sustainably manage the significant economic, social, and environmental repercussions of extreme events such as mega-floods and fires. As one of Europe's top vulnerability hotspots, as confirmed by the JRC index, Greece is at risk of entering a vicious circle in which post-disaster reconstruction plans increase vulnerability to future climate risks, which could exacerbate the impact of new climate hazards in the affected areas. The effects of acute climate-related events come on top of chronic impacts of climate change such as the drought and water resource problems which currently affect many regions in Greece in 2024-2025. The consequences of drought are exacerbated in regions that have recently experienced the acute effects of climate change and disasters.

As one of Europe's top vulnerability hotspots, as confirmed by the JRC index, Greece is at risk of entering a vicious circle in which post-disaster reconstruction plans increase vulnerability to future climate risks, which could exacerbate the impact of new climate hazards in the affected areas.

Reconstruction challenges for the post-disaster era of Valencia

On Tuesday, 29th October, terrifying flash floods struck the broader Valencia region, in eastern Spain. This has been the most severe flood disaster in Spain's modern history and the deadliest to affect Europe since 1970 (229 casualties). Early interventions focused on relief for the population and the gradual restoration of basic services and infrastructure, while at the same time a debate emerged over the nature of the reconstruction process. The regional government of the Valencian Community (Generalitat Valenciana) presented a plan comprising 136 measures and a reconstruction project initially estimated by its President, Carlos Mazón, at €31.4 billion. This proposal was criticised for being disconnected from the real needs of the population, as it did not involve local residents in the decision-making process (Valladares et al., 2024). Fears were expressed that the proposed reconstruction path is likely to perpetuate an economic model that reproduces vulnerability to climate hazards in the future. Beyond the inability of Valencian regional authorities to manage the red flood alert effectively and to accelerate emergency evacuation, the deeper causes of the Valencia disaster are considered to stem from decades of real estate speculation, poor urban planning, and the absence of proper climate risk management. Three out of every ten affected homes were built during the housing bubble years (2000–2008) or earlier, during the development boom, in areas officially designated as flood-prone. Consequently, if these systemic failures are not addressed, the repetition of the same mistakes during the reconstruction of devastated areas will not be avoided.

Various topics have been raised in the public discussion on the reconstruction of the Valencia Region (Salas et al., 2024; Valladares et al., 2024):

- **Concerns Over Equity and Transparency**: There is widespread concern that national and EU funds allocated for reconstruction may disproportionately benefit large corporations while sidelining small businesses, vulnerable populations, and rural landowners. Critics emphasize the risk of perpetuating unequal power structures, corruption, and uncontrolled urbanization. Lessons from past international disasters, highlight the dangers of prioritizing profit over welfare. Public opinion strongly calls for equitable reconstruction that reduces disparities and avoids repeating historical mistakes.
- **Democratic Oversight and Public Participation**: A key theme in the public discourse is who should control the allocation of reconstruction funds. Proposals include establishing a public fund, overseen by institutions like the Treasury or the Official Credit Institute (ICO), to manage investments transparently. Calls for participatory decision-making processes have been growing, with advocates urging that affected municipalities be granted control over investments in their towns. Engaging residents in planning and reconstruction is seen as vital to creating sustainable and resilient communities. Collaborative efforts between citizens, architects, urban planners, and technical experts are encouraged to ensure reconstruction aligns with the needs of local populations and avoids speculative development.
- **Universal Income as a Reconstruction Tool**: Another proposal gaining attention is the introduction of a basic universal income for all those affected by the floods. Proponents argue that this measure would provide immediate and equitable support to vulnerable families, enabling

them to meet their basic needs during the recovery process. While emergency aid and subsidies have been distributed, delays and inefficiencies have left many residents struggling. A universal income could streamline support mechanisms, avoiding the long queues and bureaucratic challenges experienced in previous disasters, such as the 2011 Lorca earthquake and the 2021 La Palma volcanic eruption. Advocates believe this approach could strengthen social cohesion and ensure no one is left behind in the reconstruction process.

- **Women, Youth, and Families**: Reconstruction must also consider the specific challenges faced by women, youth, and families in affected areas. Preventing depopulation is a major priority, with strategies like improving public transport and mobility services to support young families. Strengthening childcare and educational facilities is essential to help working mothers manage the dual pressures of employment and caregiving, particularly when schools and nurseries remain non-operational. Women's participation in the reconstruction process is another crucial factor. Drawing lessons from Japan's post-tsunami recovery, where women were formally recognized as key actors, experts advocate for integrating gender equality mechanisms at every level of reconstruction. Studies show that involving women in planning leads to cities with fewer barriers, more green spaces, and greater investment in women entrepreneurs.

The deeper causes of the Valencia disaster are considered to stem from decades of real estate speculation, poor urban planning, and the absence of proper climate risk management. If these systemic failures are not addressed, the repetition of the same mistakes during the reconstruction of devastated areas will not be avoided.

1.4 Long term impact of disasters on public health

Research conducted in the United States, a country with extensive experience in managing disasters caused by extreme weather events, confirms that the impacts of such disasters on public health persist over the long term. These effects disproportionately burden the most vulnerable segments of the population, resulting in significant challenges to social cohesion and equity. Hurricanes have a hidden and long-lasting impact on public health, significantly increasing mortality rates for years after their occurrence, as revealed in a comprehensive analysis of more than 500 tropical cyclones that struck the United States since 1930 (Young & Hsiang, 2024). Hurricanes lead up to 11,000 excess deaths per storm, with the total toll between 1930 and 2015 reaching 5.7 million Americans. These "indirect deaths" are linked to medical conditions such as cancer and cardiovascular disease, which are exacerbated by the stress and disruption caused by storms. Vulnerable populations—infants, the elderly, and racial minorities—are disproportionately affected, with infants accounting for 14% of excess deaths despite representing only 1% of the population. The findings underscore systemic shortcomings in disaster recovery systems, which leave communities economically and socially fractured (Kaplan, 2024). Budget reallocations for infrastructure repairs often divert funds from essential services like health clinics and

food programs, while the upheaval of community structures isolates vulnerable individuals. Elderly residents suffer from poorly managed chronic illnesses and lack of care due to younger people relocating, while infants face heightened risks from deteriorated health and social conditions. The study also challenges the assumption that hurricanes primarily damage capital in wealthy countries, showing instead that the mortality impacts in the U.S. have grown over time. Stress-induced health problems and long-term demographic changes in storm-hit areas contribute to persistent excess mortality. These effects highlight the need for disaster reconstruction efforts that go beyond infrastructure to address the sustained health and social needs of affected populations.

The assumption that hurricanes primarily damage capital in rich countries has been challenged, as the mortality impact in the US has increased over time. Stress-related health problems and long-term demographic changes in storm-affected areas contribute to persistent excess mortality.

2. Build Back Better & Transformative Resilience initiatives: Beyond 'Back to normal'

2.1 Building Back Better: A critical necessity in the face of escalating climate change impacts

The UN Sendai Framework for Disaster Risk Reduction 2015-2030 emphasises the reduction of future disaster risk, promoting a "build back better" approach. According to the UN Office for Disaster Risk Reduction (UNDRR), this approach is defined as "the use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment"[8]. Overall, build-back-better frameworks stress the importance of disaster governance, from preparedness to long-term reconstruction, shifting from incident command and control structures to supportive function-based systems such as economic reconstruction, climate adaptation and resilience, health and social services, housing, infrastructure, natural and cultural resources, community planning and capacity building. The European Commission has played a leading role in the international negotiations for the Sendai Framework and supports EU Member State signatories and third countries in implementing the Agreement to ensure EU action is coherent with the global agenda. Overall, sustainable disaster reconstruction requires the integration of multiple stakeholder perspectives. Yet, disaster recovery and

8 https://www.undrr.org/terminology/build-back-better

reconstruction still remain the less studied disaster phases while the identification of best practices in disaster governance is still limited (EEA, 2023).

2.2 International experience

Whole Community approach (US)

The "Whole Community" approach in the US seeks to implement a comprehensive policy that incorporates best practices in disaster planning and reconstruction to reduce vulnerability and inequality and promotes cooperation between various stakeholders -such as local residents, emergency management professionals, local authorities and officials- to assess community needs and strengthen assets, capacities and interests (FEMA, 2023). Equitable recovery ensures that policies, practices, and distribution of resources are impartial, fair, and responsive to all community members. Public authorities can achieve equity by addressing systemic barriers to recovery and ensuring inclusive participation in recovery planning and decision-making. Understanding pre-disaster inequalities and incorporating the perspectives of diverse stakeholders is also essential to avoid exacerbating vulnerabilities. The following lessons provide useful insights for the development of equitable post-disaster strategies (Finucane and al, 2020; FEMA, 2023):

- International experiences illustrate that the "need for speed" in disaster recovery can hinder broader community consultation and reinforce existing biases.
- Recovery efforts can lead to gentrification, displacing vulnerable communities and harming economic sectors while benefiting specific industries such as tourism, agri-business and energy corporations at the expense of SMEs, local energy cooperatives and more diversified productive models.
- Cash-for-work programs often benefit able-bodied individuals, excluding vulnerable populations such as women, the elderly, and disabled individuals.
- The negative health outcomes associated with transitional shelters highlight the importance of providing adequate, permanent housing solutions in recovery plans.
- Recovery plans should aim to preserve and support community networks, particularly in rural and fishing communities. Disruptions caused by non-traditional groupings in resettlement camps can hinder established socioeconomic patterns.
- Recovery plans should be built on open data to enable transparent and accountable recovery collaboration with community stakeholders such as banks, insurance companies and real estate companies, SMEs, universities/academia, media, NPOs/NGOs, local government agencies and citizens.
- After a disaster, recovery leaders must identify the most reliable methods of community outreach.
- Safeguards are necessary to prevent the abuse of power and fraud during recovery.

- Combining green building practices with economic and social equity actions can enhance long-term resilience.
- Adaptive post-disaster financing tools can ensure timely and sufficient recovery funding, addressing changing conditions and community needs effectively. These tools can include pre-approved solutions for various scenarios and integrate financial and non-financial programs to meet the complex needs of affected communities.
- Formal mechanisms such as equity and social impact assessments should be adopted to ensure equitable recovery outcomes. Incorporating Diversity, Equity, Inclusion, and Accessibility (DEIA) principles into recovery planning can address social inequalities and support vulnerable populations.
- Balancing short-term resilience with long-term sustainability goals will avoid policy lock-ins that compromise environmental and social dimensions.

Rio Grande do Sul: Human centered approach of disaster reconstruction (Brazil)

In May 2024, Brazil's southern state of Rio Grande do Sul experienced unprecedented flooding, resulting in at least 163 deaths, extensive infrastructure damage, and the displacement of hundreds of thousands of residents. This disaster has ignited a public discourse on the nation's approach to post-disaster reconstruction, emphasizing the necessity for resilient and sustainable rebuilding strategies. This debate, with its focus on reconstruction frameworks, offers valuable insights for global policy, including in Europe, where lessons from Brazil's approach could inform disaster recovery strategies.

The vision for reconstruction has been described as a human-centred response to climate disasters which can be developed based on four core measures (Perfeito Da Silva, De Gaspi & Zucker-Marques, 2024):

1. Tempering intentions towards austerity;
2. Mobilising domestic and international affordable financing to support reconstruction efforts;
3. Linking reconstruction efforts to development of national green industries;
4. Adapting and strengthening local institutions to enable a mission-oriented response.

One of the central themes emerging in Brazil's response is the necessity to move away from austerity-driven policies, especially in the context of disaster recovery. The Lula government's New Fiscal Framework (NAF) has signaled financial prudence, yet it allows exemptions for large-impact disasters like the Rio Grande do Sul floods. While this provision unlocks additional funds for rebuilding, the debate highlights a deeper issue: how to sustain long-term infrastructure investment while maintaining fiscal stability. The suspension of Rio Grande do Sul's debt payments for 36 months is a significant step, enabling resources to be channeled toward recovery. However, such measures are not sufficient alone. Analysts argue that bold, creative governance is essential to ensure reconstruction efforts are not constrained by short-term budgetary concerns, setting a precedent for developing countries to balance fiscal responsibility with resilience-building. National and multilateral development banks, such as

Brazil's National Development Bank (BNDES), are pivotal in ensuring reconstruction efforts are well-financed without worsening debt burdens. This approach highlights the need for an adaptive financial ecosystem that aligns emergency funds with long-term climate resilience, providing a roadmap for other nations facing similar challenges.

Another focal point in the debate is the integration of sustainability into rebuilding efforts. Brazil's push for green industrialization, including prioritizing green steel and cement, reflects an effort to align reconstruction with broader climate goals. Adjusting procurement guidelines to prioritize environmentally friendly suppliers could stimulate demand for low-carbon solutions and position Brazil as a leader in sustainable reconstruction. This strategy highlights the dual benefit of addressing immediate infrastructure needs while advancing decarbonization, ensuring that rebuilding efforts contribute to both local resilience and global climate commitments. However, effective reconstruction is not just a technical challenge but a political one. The creation of the Extraordinary Secretariat in Support of the Reconstruction of Rio Grande do Sul demonstrates a political commitment to coordinated recovery. However, the debate has also highlighted the risk of bureaucratic isolationism. To address this issue, proposals have been made to establish a dedicated council on reconstruction and climate resilience, bringing together civil society, local governments, business leaders, and multilateral organizations. Such a council could serve as both an oversight mechanism and a model for future responses, ensuring that reconstruction efforts are mission-oriented and inclusive.

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The Role of Citizen Participation in Gdańsk's Resilience and Reconstruction (Poland)

Gdańsk, a historic city on the Baltic coast, has faced recurring challenges from flooding, exacerbated by climate change, rising sea levels, and heavy rainfall. Notably, severe floods in 2016 and 2017 caused widespread damage to infrastructure, businesses, and homes. These events highlighted the city's vulnerabilities and the need for innovative approaches to urban resilience and disaster recovery. In response, Gdańsk has positioned citizen participation at the heart of its strategies, pioneering methods to involve residents in shaping solutions and policies. A cornerstone of Gdańsk's participatory governance is its use of citizens' assemblies. Following the 2016 floods, the city introduced these assemblies to

engage residents directly in deliberating and addressing pressing challenges such as flood prevention and water management. Randomly selected participants represented diverse demographics, ensuring inclusivity and fairness. These assemblies generated concrete and practical recommendations. The success of these assemblies demonstrated how participatory democracy could effectively complement technical expertise. Residents, drawing on their lived experiences, identified gaps and solutions that professionals alone might overlook. The city implemented several of these recommendations, strengthening trust between citizens and the local government and fostering a sense of shared responsibility in tackling environmental challenges.

Community-Led Recovery in Christchurch (New Zealand)

In 2011, Christchurch, New Zealand, was struck by a devastating earthquake that claimed 185 lives and caused widespread destruction of the city's infrastructure. The recovery process that followed became an internationally recognized example of community-led planning and sustainable urban design. To engage residents in reimagining the city's future, the Christchurch City Council launched the "Share an Idea" campaign, which drew input from over 100,000 citizens. Their contributions emphasized sustainability, expanded green spaces, and a more walkable urban environment. This participatory initiative focused on creating a city that was not only reconstructed but also more livable and resilient. The insights gathered through the campaign were pivotal in shaping the Christchurch Central Recovery Plan, a comprehensive strategy that integrated environmental sustainability into urban redevelopment[9]. Key projects included transforming the Avon River Precinct into a vibrant public space combining ecological restoration with recreational use. The plan also prioritized pedestrian and cycling infrastructure to reduce car dependency, promoted resilient building designs to withstand future earthquakes, and expanded parks and green corridors across the city. Community-led initiatives, such as "Gap Filler," played a crucial role in fostering hope and cohesion during the rebuilding period. These projects converted vacant lots into temporary public spaces for art, performances, and social gatherings, ensuring that recovery efforts remained closely aligned with residents' needs and aspirations. Christchurch's experience underscores the importance of intentional, inclusive, and forward-thinking approaches to disaster recovery. By prioritizing resilience, sustainability, and community engagement, the city not only restored its infrastructure but also strengthened its social fabric, setting a global precedent for effective post-disaster rebuilding.

3. Policy Recommendations for an EU Post-disaster Reconstruction Framework

The rapid deterioration of climate conditions in Europe requires the European Union to take a pro-active stance on the risks and disasters posed by climate change. The creation of a robust framework for the

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governance of post-disaster reconstruction is imperative to ensure long-term transformative resilience and sustainability in the face of the climate crisis. By wisely drawing on international experience, the European Union and EU Member states can develop their own framework for sustainable, equitable and resilient reconstruction. While protection against climate-related and other disasters is primarily a national responsibility, the EU complements, supports and coordinates national actions and promotes cross-border cooperation in this field. The potential role of the EU in equitable and sustainable post-disaster reconstruction is even more crucial in Southern European countries, particularly in the Mediterranean, due to their higher vulnerability to climate risks as highlighted in the MedECC report (MedECC, 2020) which is also reflected in their lower performance on the social, economic and political dimensions of risk vulnerability indices such as the European Commission' s Joint Research Center (JRC).

In this respect, the European authorities can develop targeted actions by focusing on the following six (6) priority areas.

3.1 Integration of Build Back Better principles in EU Funds

It is necessary to make the most of the resources directed towards reconstruction in order to enhance their social and environmental impact, strengthening the long-term sustainability of the affected areas based on the *Build Back Better* principle. This framework will contribute in a concrete way to the European Union's declared support for the Sendai Framework for Disaster Risk Reduction (SFDRR) will promote key EU objectives and policies:

- Strengthening the link between disaster risk management and climate adaptation, a recurring demand of the scientific community and practitioners (UN IBC, 2021);
- Ensure that reconstruction processes are in line with the Just transition objectives, are participatory and inclusive, *leaving no one behind*;
- Contributing to supporting the Union's economic objectives such as green deal industrial plan and the strengthening of critical infrastructure resilience;
- Finally, strengthening projects addressing climate risks with a transboundary character and making reconstruction a lever for European and transnational cooperation and economic and territorial integration.

To this end, a number of conditionalities and guidelines are proposed for the implementation of the *Build Back Better* approach in the use of EU funds.

Environmental guidelines

- Require all funded projects to incorporate resilience against future climate risks, such as floods, extreme heat, or storms;

- Make the adoption of Nature-Based Solutions mandatory for eligible reconstruction projects, such as restoring wetlands, creating green infrastructure, and reforestation efforts and prioritize projects that enhance biodiversity and ecosystem services in disaster-affected regions;
- Ensure funded projects contribute to achieving EU Green Deal targets, such as net-zero emissions and biodiversity protection;
- Mandate efficient use of resources, including water, land and energy, in reconstruction efforts and require waste management plans emphasizing recycling and reuse.

Social guidelines

- Ensure funding supports reconstruction that benefits vulnerable and marginalized groups, such as low-income households, migrants, and persons with disabilities;
- Require inclusive public consultations during the planning and implementation phases and fund projects only if they demonstrate active participation and approval from the affected communities;
- Prioritize funding for projects that utilize local labour, materials, and businesses to stimulate economic recovery in disaster-affected areas;
- Set requirements for the inclusion of social enterprises, cooperatives, or small and medium-sized enterprises (SMEs) in reconstruction supply chains.

Evaluation and monitoring guidelines

- Require detailed project plans outlining sustainability and social equity objectives before funds are disbursed;
- Mandate regular reporting on the use of funds, with independent audits to ensure compliance with EU standards;

3.2 Governance, Implementation & Evaluation

In order to effectively implement the *Build Back Better* approach in EU policy making, the authorities could consider establishing an *EU Disaster Reconstruction Task Force*, based on the standards of the Emergency Response Coordination Centre (ERCC), with the aim of extending EU intervention from disaster prevention and response to reconstruction and bridging civil protection and climate change adaptation. This dedicated entity would ensure rapid response, enhanced coordination, and strategic guidance for Member States, expanding the EU's role to include long-term sustainable reconstruction. The Task Force would work to align reconstruction efforts with EU resilience and sustainability goals while supporting the integration of sustainable post-disaster reconstruction criteria into existing EU funding instruments to secure targeted financial support. To complement the Task Force's efforts, the creation of Regional Reconstruction Hubs in disaster-prone areas would play a crucial role. These hubs would serve as centers of excellence, disseminating best practices, providing technical expertise, and fostering knowledge exchange among stakeholders, serving as a platform for public awareness, knowledge sharing, and capacity building. Additionally, an EU-wide Monitoring and Evaluation Platform would be key in ensuring transparency, accountability, and the dissemination of good practices

across Member States. This platform would track the progress of reconstruction projects, measure their alignment with sustainability and resilience objectives, and enable the sharing of lessons learned to inform future policies and initiatives.

3.3 A well-prepared public administration

At Member State level, public authorities need to develop a clear, holistic and functional governance model to ensure effective interventions, promote the accumulation of knowledge and expertise on post-disaster reconstruction and support social inclusion as a cornerstone of reconstruction planning. Such a model would also make it possible to avoid policies and practices that conflict with the wider public interest or the sustainability objectives of the Union. In this direction, research institutions, universities, and administrative and professional bodies are called upon to contribute to the establishment of a model for sustainable and equitable reconstruction in the era of climate change. It is essential to support public authorities, in particular regional and local governments, with specific methodologies and processes to enable them to effectively implement sustainable post-disaster reconstruction strategies. In addition, the use of clear metrics is critical to monitor reconstruction progress and assess its alignment with sustainability goals, both social and environmental. A robust monitoring framework will ensure accountability and support continuous improvement of post-disaster reconstruction strategies, enhancing resilience and equity in affected communities. The EU could play a leading role regarding the evaluation of reconstruction projects by establishing, for example, sustainability impact metrics to evaluate reconstruction outcomes against the European Green Deal objectives or/and developing EU-wide standards for reconstruction emphasising sustainability, resilience, and equity.

3.4 Education & Training

Sustainable reconstruction cannot depend solely on technical solutions, nor can it revert to historical approaches that fail to address contemporary environmental challenges. A critical component of achieving sustainable reconstruction is the appropriate education and training of all stakeholders, including public administration officials and political leaders. Building capacity through quality training programs is essential, particularly for civil servants at the regional and local levels, as well as disaster practitioners and managers. Civil servants must have access to comprehensive public policy guides and the latest knowledge on good practices for sustainable post-disaster reconstruction. This includes equipping them with tools to design and implement reconstruction strategies that align with climate adaptation and mitigation goals, equity and just transition. Additionally, targeted training is necessary to assist affected stakeholders in adopting sustainable practices, such as improved soil and water management, transitioning to renewable energy, implementing agrivoltaics (integrating photovoltaics into agriculture) and developing resilient nature-based infrastructure. Citizens need also clear, concise, and accessible guidance on resilient rebuilding practices to ensure they can easily apply technical expertise to affordable and resilient solutions. Municipalities and regional training institutes have a pivotal role in empowering local stakeholders. By fostering collaboration and providing tailored education, these institutions can enable communities to build back better, ensuring reconstruction efforts not only address immediate needs but also lay the foundation for long-term resilience and sustainability.

EU-funding could support the development of sustainable post-disaster training certifications addressed to local authorities, practitioners and stakeholders engaged in reconstruction projects.

3.5 Research

European and national authorities must prioritize the development of data-driven legislative initiatives and policies to effectively address the complexities of post-disaster reconstruction. Closing the knowledge gap in this field requires targeted research efforts aimed at identifying conditions, policies, and practices that either support or hinder climate objectives, social cohesion, and sustainability. This research should also focus on assessing the current state of post-disaster reconstruction strategies across EU Member States and conducting long-term evaluations of reconstruction efforts to assess environmental, economic, and social impacts.

3.6 Financing

Creative approaches to financing sustainable and equitable recovery are also essential. At the budgetary level, Member States facing major or recurring disasters must have the flexibility to balance immediate fiscal commitments with reconstruction funding needs. This flexibility is critical, as the long-term developmental soundness linked to sustainable and inclusive reconstruction ultimately ensures fiscal stability and sustainability. Additionally, the unique challenges of post-disaster reconstruction demand the involvement of a diverse range of actors to address various needs. Development banks—both national and regional—along with microfinance institutions, cooperative banks and private sector actors, have a significant role to play. Public-private partnerships that emphasize sustainability and resilience can offer innovative solutions, while mobilizing resources to support affected communities. By fostering cross-sectoral cooperation and ensuring robust financing mechanisms, European and national authorities can create a framework for reconstruction that looks to the future.

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