



## ASSESSING SEISMIC SAFETY FROM A JUSTICE STANDPOINT

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### **Abstract**

Disasters occur when a hazard interacts with an exposed and vulnerable society or community, whose capacities to cope with the hazardous event are exceeded. The fact that large, damaging earthquakes impact different segments of society disproportionately can be perceived as an injustice. Conceptualizing this problem within the domain of justice implies a recognition that its source is the result of an unequal social system formed by a long sequence of human decisions, and not by God's or nature's desires.

The discussion of disaster justice is still nascent, with the term itself being coined only in 2010. However, disaster justice can be understood as a concern of how the crisis and systemic collapse caused by disasters bring issues of socioecological justice to the front. Disaster justice stems from, builds on, and refers to some of the concepts and claims of environmental and climate justice, but expands them to address the scale, scope, dynamics, and challenges that are particular to disaster contexts as opposed to normal times.

This article presents the different frameworks of social justice in the context of environmental hazards (i.e., environmental, climate, and disaster justice) and opens the discussion about how justice claims can be incorporated into the discussion and practice of providing seismic safety and increasing disaster resilience.

*Keywords: disaster justice; environmental justice; seismic risk; disasters; disaster risk reduction*



## 1. Introduction

Disasters are not natural. Instead, they occur when a hazard interacts with an exposed and vulnerable society or community, whose capacities to cope with the hazardous event are exceeded [1]. Disaster scholarship widely shows that the effects of natural hazard events are larger in minorities and low-income population, who are less likely to be prepared for the event, more likely to suffer damage from it, less able to act during the emergency phase, slower to recover and reconstruct their lives, and more likely to present psychological long-term effects after the event [2]. This is certainly true for the case of earthquakes.

The fact that damaging earthquakes impact different segments of society disproportionately can be perceived as an injustice. Indeed, conceptualizing this problem within the domain of justice implies a recognition that its source is the result of an unequal social system formed by a long sequence of human decisions [3]. However, justice in context of disasters is under-theorized [4].

With this article we aim to open the discussion about the concepts of seismic safety, risk, and resilience when examined from a justice lens. For that purpose, the next section presents how justice is conceptualized in the context of environmental hazards. Then, we examine some particularities of earthquakes and discuss the challenges they pose to include address them from such frameworks. We conclude the article with a case study in Chile which supports the discussion about how to incorporate justice claims in engineering practice.

## 2. Conceptualizing justice in the context of environmental hazards

Theorizing justice in the context of environmental hazards and disasters falls widely in the domain of *social justice* as opposed to that of *criminal justice*. Whereas the latter refers to the application of criminal law, social justice “expands beyond the boundaries of the law to discuss general principles of fairness and democracy, and the rights and responsibilities attached to being a member of a particular social group, whether or not they are legally defined as such” [5, p. 74].

Approaching earthquake disasters from a social justice perspective is conducted as a theoretical exercise in this paper. Advancing this into a practical one implies adopting justice as a normative framework, which would require acceptance of this new concept in the earthquake disasters field. Before discussing the implications of looking at the concepts of earthquake safety, risk, and resilience behind a justice lens, it is useful to understand how the discussion about justice has been held in the context of environmental hazards. Hence, three frameworks addressing this issue are presented next, namely *environmental justice*, *climate justice*, and *disaster justice*.

### 2.1 Environmental justice

What is known today as the environmental justice (EJ) movement started in 1982 as a massive social movement in North Carolina, US, in opposition to the installation of a toxic waste landfill in a community of mainly coloured, rural, and low-income people. The community residents were joined by groups coming from the environmental and civil-rights movements, and triggered in the following years considerable scientific studies about the relationship between race and socioeconomic demography with environmental hazards, risk, and the siting of *Not in my back yard (Nimby)* facilities, such as hazardous waste landfills [6].

Landing the labels of environmental racism and environmental justice in 1987, the movement was, at its start, mainly concerned with the (in)equitable distribution of environmental *goods* and *bads* and its relationship with race and income. However, the EJ movement quickly incorporated other groups (e.g., indigenous rights, public and occupational health and safety, and urban environmental movements) and expanded its claims beyond equity in the distribution of environmental risks and governmental protection. Instead, the focus shifted towards the active remedy of how environmental injustices are constructed through policies, procedures, and (power) structures, in recognition that it is the lack of inclusion and representation in the decision-making processes that enables an inequitable distribution of environmental conditions in the



first place [7]. As such, “the definitions of justice used by movement organizations address distributive inequity, lack of recognition, disenfranchisement and exclusion, and, more broadly, an undermining of the basic needs, capabilities, and functioning of individuals and communities.” [6, p.361]

## 2.2 Climate justice

The climate justice (CJ) movement stemmed from the EJ movement; the two firstly interacting in the year 2000 around the COP6 meeting of the United Nations Framework Convention on Climate Change. The principles of the CJ movement were defined in the lines of mainstream global warming and climate change mitigation measures, such as reducing emissions, the use of fossil fuels, and the just transition to renewable energies. However, the CJ movement extended beyond these issues to include concerns on climate vulnerability, uncertainty, and transversal inclusion in decision-making processes [6].

The devastating effects of hurricane Katrina in 2005 brought the CJ and EJ movements closer. Once again, there occurred a disaster that disproportionately affected ethnic minorities and low-income population (i.e., the more vulnerable), which echoes what happens globally when the effects of climate change affect most low-income communities in developing countries despite them not being the major contributors to the emissions triggering climate change [8]. This evidence changed understanding of the value of the environment and climate systems in the EJ and CJ communities from yet another manifestation of social injustice to “the necessary conditions for the achievement of social justice.” [6, p.363]. Thus, similar to EJ, CJ aims higher than merely achieving a *green* or *sustainable* adaptation through the redistribution of resources and climate change-related benefits and harms (i.e., distributive justice). Instead, the focus is put on real representation, inclusion, and participation in the decision-making processes where the injustices are shaped in the first place (i.e., procedural justice). Naturally, the learnings from Katrina and the inspection of the disaster from a justice lens provided a space to generalize the EJ and CJ concerns into the field of environmental disasters.

## 2.3 Disaster justice

Disaster justice (DJ) can be understood as a concern of how the crisis and systemic collapse caused by disasters bring issues of socioecological justice to the fore. DJ stems from, builds on, and refers to some of the concepts and claims of EJ and CJ, but expands and applies these concepts to address the scale, scope, dynamics, and challenges that are particular to disasters as opposed to “normal” times [9].

Douglass and Miller [10] justify the need for an exclusive framework for disaster justice based on three considerations. First, that disasters “violently disrupt normal channels through which to pursue justice” and therefore justice in this context should “move beyond conventional resolution of an environmental problem” (p. 272). Consequently, although DJ can be understood as a form of EJ, the special dynamics of disasters and the crisis they carry justify a specific focus for research. Second, the scale and scope of disasters, which immediately affect local and global contexts and increase the complexity of justice claims. Disasters can move injustices elsewhere, spread them even globally, and increase the complexity of justice claims. Moreover, considering how weak the institutions in charge of addressing these injustices are after a catastrophic event, it is relevant to address these issues separately. Thirdly, that the rise of disaster-related organizations and a specific language for tackling disasters in governmental, NGOs, and international development agencies is posing a demand for a specific discussion of justice claims in a context where traditional formulations of justice are simply insufficient [10].

The concept *disaster justice* was coined in 2010 by Robert Verchick, a legal scholar, in his assessment of the disaster following hurricane Katrina. There, Verchick compares DJ to EJ and defines it simply as “the failure of law—specifically, the failure of law to provide vulnerable people with the protections and benefits they need to lead safe and productive lives” [11, p.128]. Two years later, Verchick highlights the need of advancing theoretical and practical knowledge in this field, and on shifting the focus on maldistribution of resources and assessment of inequal outcomes after disasters to understanding the processes leading to them [9]. Simply put, DJ addresses “the notion that government has a moral and legal responsibility to protect all



its citizens to a minimally acceptable level”, and failing to do so constitutes not only an injustice, but the non-fulfilment of the obligations of a democracy to its citizens [3, p.364].

Verchick’s construction of DJ rests on political and economic theories related to inequality, social justice, and personal freedom. On one side, injustices exist because there is a party to be held *accountable* (someone to blame). In the case of environmental hazards and disasters, the *agency* of injustices is directly related to the (in)actions by the state through the institutions put in place to address and manage risk and emergencies, i.e., *risk governance*. Evidently, for this claim to be valid, it is required to understand disasters as the result of an unequal social system formed by a long sequence of human and institutional decisions, and not just as the desire of a superior force, be that God or nature [3]. On the other side lies the aggrieved party, the recipient of such injustices. Justice in a disaster context is then related to the access that citizens have to interact with this governance system to hold it accountable, to make claims through it to pursue the fair (re)distribution of resources, and to demand democratic and representative participation in the decision-making processes associated to disaster risk reduction. DJ is thus a claim for fairness and equity in how governance see citizens in a context of disasters. Thus, and informed mainly by the work of sociologists and geographers, the practical manifestation of disaster injustices in social vulnerability can be seen as a direct result of faulty risk governance, which leaves a portion of society more exposed and less prepared to withstand and recover from hazard events [9].

It is important to acknowledge that the span and scope of rights and claims will always be restricted by how governance is defined locally, including the responsibilities such governance system is willing to adopt, and how power is organized to give (or not) representation to different group of actors across society [10]. The main shortcomings of DJ as a concept is that it is mostly sustained in mainstream and traditional concepts of justice and lacks a serious incorporation of critiques to them coming from, among others, grassroots, feminist, queer, antiracist, and decolonial standpoints [12].

### 2.3.1 The dimensions of disaster justice

According to Douglass and Miller [10], similar to those in environmental and climate justice, DJ claims fall into one of three dimensions: (i) the sources and uneven distribution of disaster vulnerability and risk; (ii) *distributive justice*, or the just distribution and equitable access to assistance and resources allocated for disaster survivors; and (iii) *procedural justice*, or the just, participatory, and democratic decision-making procedures and processes concerning all aspects of disasters throughout the disaster risk reduction cycle. The authors put a call to focus on the latter, since procedural and participatory justice are likely to receive less attention. This is clearly true in the physical and natural sciences where, attention focusses on the quantification of vulnerability and risk, often without consideration of how these are constructed beyond the physical/natural causes.

Alternatively, Shrestha et al. [4] propose a slightly different triad: “*accountability over redistribution* of resources, *representation* of different voices in participatory decision-making spheres, and *recognition* of multiple forms of knowledge. These domains shape the politics of recognition as well as processes of redistribution, which in turn define why recognition of diversity and differences are important, how and why issues of power and knowledge are fundamental, and who gets what in disaster recovery practice” (p. 208, italics added). Although two out of the three identified dimensions roughly correspond to distributive and procedural justice, the key difference comes from the emphasis on representation and recognition. This is partly explained by the stronger emphasis Shrestha et al. put in the formulations of social justice by Nancy Fraser. For her, the politics of recognition and the politics of redistribution should not be dissociated but integrated in a single framework through *parity of participation*, a social arrangement permitting “all (adult) members of society to interact with one another as peers.” [13, p. 5] Thus, Shrestha et al. move away from Verchick’s explicit claim on governance and stress instead the need for actual recognition to lead democratic processes which will in turn produce (more) just outcomes.



### 3. Earthquakes as environmental hazards

As mentioned in the previous section, any definition of justice and the scope of justice claims in a society are highly contextual. They depend both on the temporal and cultural setting where the inquiry is being made, making them local and dynamic [3]. From here onwards, we use the specific setting of Santiago, the capital of Chile, to illustrate the ideas about justice in the context of earthquakes.

#### 3.1 The local context

Chile's seismicity is dominated by large earthquakes produced in the subduction zone between the Nazca and South American plates. These are complemented by large inland intermediate-depth earthquakes and shallow crustal events mainly occurring along the Cordillera de los Andes [14]. Santiago is the main city of a highly centralized country hosting a population of more than 7 million (41% of the country's population) and generating 45% of Chile's Gross Domestic Product (GDP) in less than 1,000 km<sup>2</sup>, roughly 0.1% of the country's surface. In the eastern limit of Santiago lies the San Ramón Fault (SRF), a system recently identified as active with the capacity of producing crustal earthquakes in the range of  $M_w$  6.9–7.4 [14]. Thus, Santiago is not only constantly threatened by the earthquakes from the subduction zone but is starting to understand just now what the SRF would mean in terms of seismic hazard and community preparedness.

With this omnipresent seismic hazard, it is no news that earthquakes are deeply rooted in the Chilean identity. The long seismic tradition of the country can be dated back to the Valparaíso earthquake of 1906. Two years later, the National Seismological Service was established and immediately started a push for regulating the built environment in terms of forms and materials allowed for use. Since then, every major event has contributed to improve and strengthen the Chilean earthquake-related capacities, ranging from upgrade and enforcement of building codes, to monitoring and reporting of the seismic hazard.

The Chilean approach to deal with its seismic condition is highly technocratic, relying heavily on earthquake-resistant construction. In the early 1930's, the first version of the General Law of Constructions and Urbanism (GLCU) established the maximum heights of construction for different building materials (e.g., 40 m for steel and concrete, 1 storey for adobe). However, it was the 1939 Chillán earthquake, the deadliest disaster in the country's history, which provided the opportunity to implement the fully rational approach to (re)construction in large scale. The earthquake destroyed nearly 95% of the city, including 57% of the adobe and 67% of the unreinforced masonry structures [15]. However, less than 20% of the confined masonry buildings constructed following the indications of the GLCU were destroyed. After this evidence, and under the premise of modernity, the reconstruction of Chillán and other affected cities proved a definitive shift from vernacular materials and construction techniques to reinforced concrete "without romanticism, decorations or stylish facades, they were pure geometry, pure functional rationality" [16, p. 126].

Since then, the technocratic model has been consolidated providing overall good results. Building codes have been discussed, published, upgraded, and enforced. Meanwhile, urban regulation—including the GLCU—moved away from guiding construction itself and concerned more on setting the criteria for urbanizing and formally occupying the territory. As a result, earthquakes became explicitly absent from urban regulation and replaced by references to the corresponding building codes.

Perhaps an unintended consequence of a code-compliant, earthquake-resistant built environment was a lack of care for, investment in, and development of disaster risk reduction (DRR) capacities and institutions. The National Emergency Office (ONEMI) was created as a consequence of the Great Chilean earthquake of Valdivia in 1960. However, until recently, the institution was very weak and completely unprepared to face the challenge of massive disasters in the 21st century. This was evidenced when the 2010 Maule earthquake and tsunami struck, triggering the second worst disaster in national history. Only since then, ONEMI has increased its capacities, enlarged its staff and scope, and led the discussion of the bill creating a new national DRR agency, which is expected to be approved in 2020.



### 3.2 Environmental hazards and earthquakes

With their roots on activism and an opposition to current and future *bad*s, environmental and climate justice research has focused mainly on the environmental hazards closer related to healthcare, such as air and water pollution, and those being exacerbated by climate change, like flood-related phenomena. These hazards trigger everyday risks, threatening and harming people's current and future health, lifestyles, and livelihoods. With this pressure, it is natural that seismic safety is not in the top of any list of environmental conflicts despite the devastating consequences earthquakes have on already vulnerable populations. This is especially true in Chile, a country where the current socio-environmental conflicts around water ownership, scarcity, use, and management are in their most algid point, and where earthquakes are widely seen as a non-issue and sufficiently solved through building regulation and practice [17].

A few works inspecting earthquakes through an environmental and disaster justice lens concentrate in the post-disaster phase of single events to identify and characterize the injustices in redistribution and recognition during the reconstruction process [4], and the unintended physical and social injustices stemming from reconstruction policies and actions [18]. There is thus a lack of discussion about how these injustices form and look like in a pre-disaster setting, what are the paradigms and (power) structures leading to these unjust outcomes, and how these justice claims evolve during the emergency and long-term recovery processes following the disaster occurrence.

Next, we reflect on three features of earthquakes that differentiate them from the other hazards on which EJ and CJ movements and scholarship have focused. Although these ideas are discussed specifically for the case of Santiago, some apply generally to earthquakes across the globe.

#### 3.2.1 Seismic hazard does not discriminate

One of the core problems in environmental conflicts and addressed by the EJ and CJ movements and literature is that exclusion patterns and power structures tend to push the most vulnerable into the most environmentally challenged land. It is easy to see this pattern for the case of flood-prone areas and coastal plains, where again climate change exacerbates this pre-existing condition further putting vulnerable communities in higher risk. However, this is not necessarily true for the case of earthquakes, because the socio-demography of cities is usually unrelated to the seismic hazard.

In Chile, the urban planning instruments at national, metropolitan, and local levels do not incorporate seismic hazard at all. Thus, excluding the vulnerable by pushing them to the most hazardous areas of the city would only occur by coincidence. Moreover, the absence of earthquakes from planning instruments contributes to making seismic hazard invisible in the only formal mechanisms and tools guiding the development of cities, sitting of critical infrastructure included. Besides, regardless of a real estate market completely driven by the market, there are no market mechanisms such as mandatory insurances linking the urban (re)development with the seismic hazard.

Hence, exclusion patterns in Santiago do not follow a risk-driven logic. Instead, land and real estate values push the poor away from the centre and peri-centre of the city where most services concentrate (healthcare, education, entertainment, transportation), to an abandoned periphery with poor connectivity and long commuting times to the centre; the poor are excluded from the city regardless of the type of soil and how hazardous it is, as long as it is cheap(er). Partly because of the overall successful historical seismic performance of the country's infrastructure, *earthquake safety* is not a variable someone would consider given the possibility of choice [17]. For example, *Ciudad Empresarial*, the prestigious industrial and commercial hub in northwest Santiago concentrating more than 1,000 companies, sits on one of the worst soils of Santiago and sustained widespread damage in the 2010 Maule earthquake.

#### 3.2.2 The scale of destructive earthquakes and the local

Destructive earthquakes in Chile are necessarily massive. This is partly due to the subduction-led seismicity of the country, and partly explained by the overall seismically "safe" built environment Chile has which requires large shaking to trigger damage and a disaster revealing the socio-environmental problems hidden



within the “normality”. Destructive earthquakes thus usually involve large portions of the territory, trespass several administrative boundaries, and can shift the political agenda and alter the national budget for years. Take the case of the  $M_w$  8.8 Maule earthquake of 2010. The fault ruptured for more than 500 km parallel to the coast affecting ca. 75% of the country’s population across several metropolitan areas, cities, towns, and administrative regions. The earthquake resulted in economic losses equivalent to 18% of the country’s GDP, and required an investment in housing for the three most affected regions that equated to more than 5 times the budget spent in the previous year by the Ministry of Housing for those regions [19].

The scale of such disasters necessarily demands the involvement of the state with its resources and capacities (political power, budget, personnel) for its management. Indeed, historical evidence shows that disasters triggered by natural hazards, and especially by large earthquakes, have strengthened the capacities and overall enlarged the Chilean state beyond its DRR-related activities, such as improving its tax-collecting capacity [16]. Although a state-led recovery process can be approached from a fully bottom-up paradigm (which has not been the case in Chile), the scale of catastrophic earthquakes Chileans are used to poses a challenge to the local scale in terms of capacities, resources, and local organization both in government and in communities. The involvement of grassroots organizations is a key feature of the EJ and CJ movements, complementing the academic discussion and leading the implementation of actions within the communities. Both the scale of destructive earthquakes in Chile, and the absence of earthquakes in political and urban development conversations, makes seismic risk difficult to address under the same logic as other environmental hazards. To break this pattern, Santiago has the opportunity of turning the recent media, scientific, and political attention drawn to the San Ramon Fault into a local concern of EJ, similar to what occurs in California with the San Andreas fault.

### 3.2.3 The unexpected disaster

Earthquakes are sudden and unpredictable. Moreover, destructive earthquakes have low frequency. In a country functioning fundamentally under a reactive paradigm, it is hard to draw attention to seismic safety in “normal” or pre-disaster times. Furthermore, after a large earthquake strikes, the window of opportunity to address this issue is every time shorter, whilst the pressure for understanding, explaining, and correcting what is observed after the event increases. This is even more important if we consider that citizens’ expectations basically do not allow for any damage, even though controlled damage occurrence in structures is integral to the seismic design philosophy and practice.

The EJ and CJ movements have long focused on more silent, cumulative, and everyday risks such as pollution, draughts, and the forthcoming effects of climate change in everyday hazards. Unlike with earthquakes when a large event strikes, these types of hazards struggle to draw attention from media, politicians, and sometimes academics. However, EJ and CJ communities focus on maintaining the discussion alive daily, pushing for a political agenda to address the necessary structural changes to properly deal with the situation. Earthquakes, even in one of the most seismic countries in the world, are still surprising and “unexpected”—at least, politically. If they are not a concern, be that out of omission, lack of memory, or trust in the “safe” built environment, then activism and action research are likely absent of the conversation. This turns earthquakes into a niche concern and therefore restricts conversations to a small community of academics and professionals in the field who are still interested in addressing it. This is not necessarily wrong; the scientific community is well-regarded and trusted in Chile and historical results show that this approach has worked. However, leaving earthquakes to a specific, homogeneous group implies a withdrawal, remoteness, and unawareness of the rest of the population and lay people from the processes leading to create, increase, or decrease risk, which is harmful for everybody from a DRR and justice perspective.

## 4. Discussion

The *Población 26 de Septiembre* was a social housing complex near the city of Santa Cruz in the O’Higgins region in central Chile. Built in 1996, it was formed by 28 three stories-high apartment buildings with a total of 339 flats accommodating equal number of families. The complex suffered severe structural damage and



the collapse of one of the buildings (attributed to soil conditions) after the 2010 Maule earthquake, which took the lives of two people and left residents with uninhabitable structures that were eventually demolished [20]. A months-long discussion among residents and with the authorities addressed the issues of relocation or not, and the shift from flats in apartment buildings to semi-detached houses; the latter a solution requiring much more investment to buy the land required for the new housing complex. In the end, over half of the families decided to stay in the same location where *Población 26 de Septiembre* sat, partly seduced by the new housing complex proposal from the government that was developed by SIRVE S.A., a company linked to a prestigious national university. The project, called *Villa Nueva Paniahue* (VNP), consisted in 192 flats distributed into 8 apartment buildings incorporating seismic isolation through a combination of base isolators and sliders, plus a common playground and room for activities of the community, and a memorial to remember and honour those deceased in the 2010 disaster. The project was important, as it was the first instance when such advanced technologies for seismic resistance were used in social housing; until then, these technologies were only present in a few emblematic, mostly non-residential facilities. The project also took advantage of the seismic isolation to structure the buildings as reinforced concrete frames (not common in Chile for residential structures), giving freedom to the residents to divide the open plan flats at their will, and to significantly increase the architectural standard of social housing by, for example, including balconies in all the flats, reducing the overall population density of the complex, increasing the surface of the flats, and providing a uniform façade with a unique design for the whole complex.

The case of VNP illustrates some interesting points for the discussion about justice concerns in an earthquake disaster context. Firstly, and by all accounts, this project was a considerable improvement in the quality of life of the residents as compared to the pre-disaster situation. The main reason for this is that the project went significantly beyond a replacement/rebuilding logic in terms of architectural features and seismic safety. The seismic isolation system was designed and tailored specifically for the project under the budget constraints typical of social housing investment. Moreover, providing this solution instead of using traditional structural engineering alternatives (e.g., ground improvement, a different design of foundations) tackled both the technical problems associated with the soil, largely responsible of the damage and collapse observed after the earthquake, and responded to the concern of the families that did not want to move from the site they had inhabited for years.

Damage will continue to occur as future earthquakes strike the country. Providing the same levels of seismic safety to everybody—*equality*—disregards the pre-existing conditions that determine and partly explain the recovery trajectories across the population, i.e., social vulnerability and/or (lack of?) resilience. Not addressing this issue can already be understood as an injustice; meanwhile, the next disaster that will disproportionately affect the most vulnerable starts incubating. The example of VNP portrays how an uneven redistribution of resources—in this case, providing seismic isolation to some families (i.e., the most vulnerable)—may allow those who have less capacity to recover from a future disaster to never enter in such need. In the words of Fainstein [21], “A proposal more sensitive to issues of justice...would start with examining the situation of the most vulnerable populations and develop alternatives that would best protect them in the event of a major storm.” (p. 165) In this case, protecting the most vulnerable from the next major earthquake is indeed providing what some people would consider *extra* safety via non-traditional solutions. It is unlikely that the VNP project had been conceived explicitly pursuing socio-environmental justice. However, the solution did consider variables beyond the traditional structural and architectural solutions and typologies used for social housing. Unfortunately, despite this project’s achievement and success, it did not become a new standard for social housing but is instead an exception.

A further examination of the VNP project under a justice lens tackles two other ideas. The first, that if the families occupying VNP can be considered as winners, then there are certainly losers elsewhere. Acknowledging this fact is already an advancement; every decision ever made implies some will benefit and some will not. The important is that this is recognized and analysed, and not hidden behind the label of “political” or “technical” decisions, thus revealing the power structures determining who wins and who loses. The second idea relates to procedural justice and implies questioning how much space for recognition and representation the processes leading to the design and implementation of VNP actually had. The story of





the VNP constitutes an imperfect case study as the project was not completely co-designed with the community. However, it did consider the history of the community, their social, economic, and cultural characteristics and needs (i.e., their social vulnerability), and their apprehensions and fear of rebuilding in the same location where the soil was ultimately blamed for the massive damage observed after the earthquake. Beyond answering this query for this specific case, it is noteworthy how a justice lens poses unorthodox questions to processes usually regarded merely as technical, and challenges to reconceive them to include these concerns and claims.

## 5. Final remarks

Be it safety, risk, or resilience, none of these narratives and frameworks are currently sufficiently broad to include social justice considerations if earthquakes are still perceived merely as a technical issue. The technocratic approach to earthquake risk reduction continues to give voice and representation to a very narrow number of stakeholders, which are also quite homogeneous. Although this has allowed significant advancements in the disciplinary knowledge and practice, it has hindered a more holistic discourse on the physical, technical, political, and social dimensions of seismic risk and disasters.

So long as the earthquake community persists with its focus on technical solutions alone, more basic questions of recognition, participation, redistribution, and access will remain unresolved. Assessing risk is extremely useful and necessary to generate evidence and trigger investment towards its reduction. However, this assessment rarely questions the sociodemographic distribution of risk or provides solutions beyond improving physical vulnerability. What happens, then, when the limits of building safety are trespassed? Examining earthquakes from a justice perspective, can help to provide a framework within which to rethink how seismic safety is provided, ensuring that social justice plays a central role in decision-making. Looking at seismic risk through this lens, we highlight the need for participation allowing communities to be involved in the decisions on the risk they are exposed to, and for improving seismic safety differently on the basis of present and past conditions which shape the recovery trajectories of different communities. The case of the VNP sheds some light on how the latter can be incorporated into practice. How to address other considerations in pre-disaster contexts still remains a challenge.

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