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## Resilience and Environmental Justice: Potential linkages

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### Abstract

In May 2008, the remote city of Chaiten in Chile was evacuated due to the risk of a volcano eruption. Few days later, severe floods drove to the destruction of the almost entire city. In the months following the disaster, the Government developed projects that failed to relocate the city to a safer location as well as strategies to support the affected population aimed to improve community resilience. Contradictory institutional policies as well as the unforeseen effects of implemented bond schemes have resulted in a highly segregated and environmentally unjust city where public policies' outputs are unevenly distributed. Thus, this paper addresses how some related processes of increasing resilience may impact negatively upon environmental justice, hence exploring a potential inverse relationship between resilience and environmental justice. Five years on, nearly half of the population have returned to Chaiten despite the refusal of the authorities. While northern Chaiten concentrates most of the population and investment, 160 families living in the southern Chaiten bear the lack of potable water and other basic services, and are more vulnerable to future disaster impacts. Split in two due to both geography and policies, Chaiten faces now two realities.

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## 1. Introduction

This paper covers the collaborative work of consulting projects, previous studies and observations conducted by authors from 2011. Likewise, it compasses several community focus groups, interviews to authorities and local leaders undertaken between March and July 2013. Besides, an extensive archival and literature review led the observation and analysis processes.

This paper focuses on discussing the case of Chaiten and the potential linkages on the co-production of resilience and environmental justice. On the one hand, environmental justice is understood here as the uneven distribution of risks, but also to access to goods and services such as clean water, energy, healthcare and education as well as an appropriate urban environment, including green-spaces (Walker and Bulkeley, 2006). On the other hand, resilience is understood here as follows:

“[T]he ability of a social system to respond and recover from disasters and include those inherent conditions that allow the system to absorb impacts and cope with an event, as well as post-event, adaptive processes that facilitate the ability of the social system to re-organize, change, and learn in response to a threat” (Cutter et al., 2008).

Based on the case of Chaiten, the discussion is centered on how did the social system – i.e. community and authorities at different levels– react to disaster and cope with disaster effects; how did the different stakeholders organize, adapt and learn from the event and whether or not community is better prepared for future events.

In terms of the relationship between resilience and environmental justice, it is argued that post-disaster actions taken by both the authorities and community aimed to increase resilience may have negatively impacted on environmental justice. Hence, this paper explores a potential inverse relationship between resilience and environmental justice (Schilderman and Lyons, 2010).

Likewise, this paper argues that erratic policies have led to uneven distribution of risks and limited access to basic needs and services among the population of Chaiten. Finally, this paper illustrates how inequities that did not exist before Chaiten volcano have erupted. Accordingly, it asserts that Chaiten population or *Chaiteninos* are nowadays more vulnerable to disasters than before 2008.

## 2. Chaiten post-disaster context

In May 2008, the Chaiten volcano, located in Los Lagos Region at southern Chile, erupted and caused the evacuation of Chaiten’s entire population (De la Barrera et al., 2011) and some other localities of Palena Province– (around 8,000 inhabitants). The population was evacuated mainly to surrounding cities such as Puerto Montt and Castro, all located more than 100 km away by sea. Several days after the evacuation, lahars combined with rain caused a massive flood that left Chaiten devastated and uninhabitable (Lara, 2009). The city split in two due to the Blanco River changed its course creating a new riverbed and river mouth (see Figure 1). Economic losses were estimated in US\$12 millions for insured public buildings only (Lara, 2009), and still there is no estimation of the total cost of the disaster. About US\$129 millions were spent during the first year and more than US\$3 million were used to rebuild public infrastructure (Presidencia de la Republica 2009).

The disaster not only affected Chaiten, the capital of the Province of Palena, but also the entire province –18,971 inhabitants (INE 2002)–. Provincial Government had to move temporarily to Futaleufú city –another city in the Province–. Likewise, the Municipality of Chaiten governed virtually from Puerto Montt until 2011 when the provincial and municipal governments were reinstalled in Chaiten.

Three reports commissioned by the Chilean Government (Moreno and Lara, 2008, Moreno et al., 2008, SERNAGEOMIN, 2009) designated Chaiten as highly prone to new eruptions and seismic activity. Accordingly, in February 2009, the Ministry of the Interior announced by media that “Unfortunately, Chaiten is dead” (La Nación, 2009). This announcement implied that neither reconstruction of Chaiten nor further investment of any kind would take place in the current location. Consequently, alternative plans based on the displacement of Chaiten to safer areas were considered. By end-2009, Santa Barbara was chosen as location of the New Chaiten. A Master Plan was developed by the Ministry of Housing and Urbanism (MINVU) and the first planned city in Chile during the 21st century would be built in three stages, the first one to be completed by end-2012 (MINVU 2010).

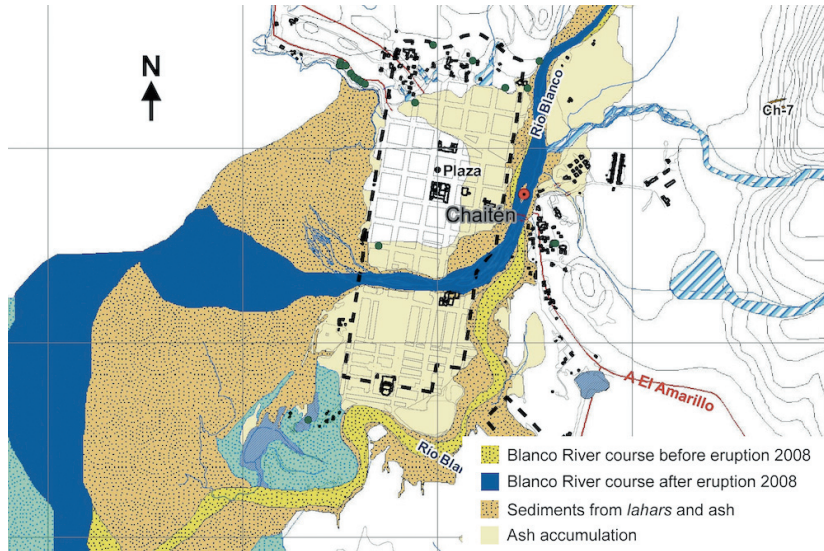


Fig. 1. Map of Chaiten and the Blanco River pre- and post-2008 river course (Based on INFRACON S.A., 2012).

However, in February the same year, a massive earthquake struck the southern-central area of Chile killing around 500 people, affecting other two million, and causing around US\$30 billions in losses (EM-DAT, 2013). Therefore, plans for the New Chaiten were not a priority anymore (Ramirez, 2010).

Despite the political shift from a left-wing government to a right-wing government in 2010, President Pinera stated that Chaiten should be relocated confirming the decision of the prior administration. Contradictorily, by end-2010, the northern sector of Chaiten was declared inhabitable again. This drastic change, the Government stated, was based on a technical study (Municipalidad de Chaitén, 2011) but it was also as response to the demand of more than 500 people who had informally returned to the city and resisted any attempt of eviction and relocation (Rojas, 2013). According to local people:

“It was a tremendous struggle against Government’s intentions for relocating us definitively [...] We stayed firm and strong because Chaiten has always been our land, we did not want to live anywhere else” (anonymous local leader, 2013, personal communication).

Chaiten was then divided not only by the new course of the Blanco River but also, and more importantly, by a political status that only considered livable the northern sector of Chaiten. However, according to local authorities, by 2013 more than 160 families informally inhabited the southern sector. Those families still live in a precarious situation; lack of access to basic services such as potable water, electricity or sewage as well as to health, social care and education. Although there are not official records on the total population of Chaiten, authorities assert that by 2013 around 2500 people inhabited the city, including those in the southern sector.

### 3. Promoting resilience from the State: Setting the unequal distribution of risk and urban services

Although Chaiten is located near several active volcanoes, people were no aware of volcanic hazards (INFRACON S.A., 2012). When the eruption occurred, there was no evacuation plan. However, in 24 hours 4,101 people were evacuated by sea –by both Navy and private ships–, and in few days, more than 8,000 people were forced to evacuate the area (Presidencia de la Republica 2009).

On 2nd May 2008, the area was declared as “Catastrophe Zone” (Gobierno Regional de Los Lagos - GORE, 2008). This measure had one-year application extensible for the same period. In Chaiten, it was in force until May 2010. During that period, several resources were allocated to support the displaced population by a total of US\$ 78,5 million (Presidencia de la Republica 2009). Emblematic measures included monthly bonds –up to US\$1,000 per family– for more than 3,200 families during the first year and about 1,800 families the second year; compensation

bonds for farmers; grants for children education; housing subsidies of around US\$ 20,000 for 2,235 families; subsidies to entrepreneurship and psychological support; among others (Gobierno Regional de Los Lagos - GORE, 2009, Gobierno Regional de Los Lagos - GORE, 2010, Presidencia de la Republica 2009).

In addition, the special Act so-called “Chaiten Law” allowed the State to purchase properties paying for them their market price prior the eruption. Once approved, the State bought 889 properties for a total of US\$30 million (El Mercurio, 2013), that represented more than 75% of the housing stock. About 70 housing units were rented by inhabitants in the northern sector. Others, who did not sell their properties, re-occupied their own houses. About 50 properties were assigned to Public offices to function and, nowadays, the State is offering to sell back 112 properties, mainly to their previous owners (El Mercurio, 2013). However, in the southern sector there is no permission to rent or buy back properties, thus the occupied houses are illegally inhabited (Rojas, 2013).

Besides supporting the displaced population, the Government commissioned technical studies to assess the feasibility of rebuilding or relocating Chaiten. The conclusion was to relocate Chaiten to the near town of Santa Barbara, located 10 km north from Chaiten (Pontificia Universidad Católica de Chile PUC et al., 2009). The Master Plan for the New Chaiten (MINVU 2010) had an implementation cost evaluated in US\$300 million (Silva, 2010). Although some public infrastructure was built in Santa Barbara for aeronautical services, police and other Public offices, no other action was implemented. By May 2010, the regional authorities decided to discard the New Chaiten because of its cost and the refusal of local population (Municipalidad de Chaitén, 2011). As evidence of lack of coordination, days after that announcement, President Pinera amended the regional intendant’s declaration and insisted that the New Chaiten would be built (El Mercurio en Internet, 2010). Ironically, in December 2010 the northern sector of Chaiten was definitively declared inhabitable (Municipalidad de Chaitén, 2011).

In order to take the decision of inhabit Chaiten again, the Government commissioned another study, which concluded that local population could live near volcanic ash because its effects could be mitigated by cleaning and planting the area (CIMM T&S Consultores, 2010). In addition, the volcanic activity was decreasing and some areas were not at risk from new floods and *lahars* (Intendencia Región de Los Lagos, 2010) (see Figure 2).

Thus, by declaring Chaiten inhabitable, the relocation project was aborted and hence the responsibility of deciding to live in a place at risk was transferred to local people. The Government valued the insistence of *Chaiteninos* to live in Chaiten:

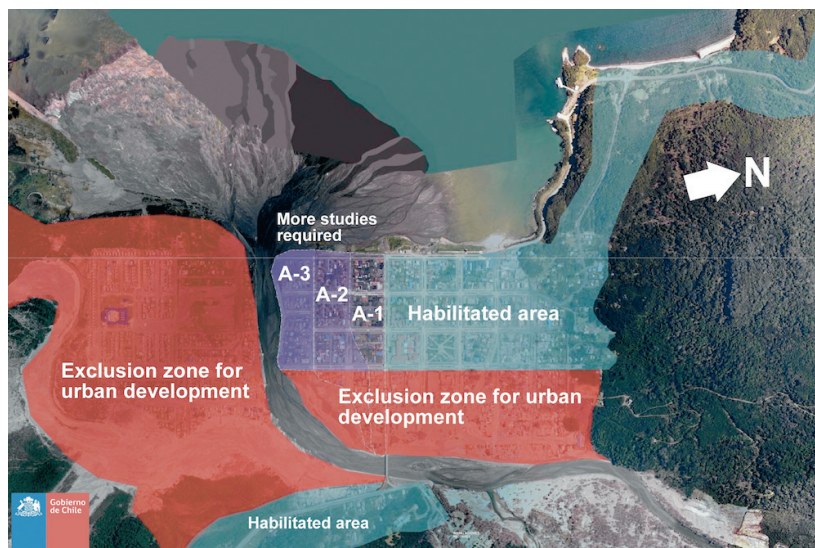


Fig. 2. Analysis of exposed areas and their categorization (Based on CIMM T&S Consultores, 2010, Municipalidad de Chaitén, 2011)



“The Government has the conviction that cities have to born and grow by normal evolutionary processes, supported by the local population and not under the desire and majoritarian support of the State [...]. Santa Barbara would be today a venture financed and directed exclusively by the State, without evidence of support from a substantial group of local population to accompany such entrepreneurship of relocation. Moreover, the present inhabitants of Chaiten, in an firm and courageous attitude, have assumed based on their freedom and responsibility, the decision of inhabiting their land and stay in there, which this Government values and recognizes as the spirit that must animate the decisions of territorial settling in the region.” (Intendencia Región de Los Lagos, 2010).

By examining the State responses, this paper discusses that, although these responses aimed to promote resilience and lower levels of risk, actions taken have been the main cause of exacerbating vulnerability and triggering unequal distributions of risk, resilience, and environmental and social justice.

#### 4. Community responses, reacting to the State

Erratic communication about the causes of seismic activity in the area preceding the eruption and potential risks to the population can be exemplified in a meeting between representatives of Chaiten population and the Regional Government few days before the eruption; “[T]he situation about tremors was so unclear and confuse that the conversation turned to the effects of drought in the region” (anonymous local leader, 2013, personal communication). Despite this, most of the population accepted the evacuation –without resistance– immediately when the authorities decided it.

Both authorities and people considered the evacuation of the city as an appropriate preventive measure when pondering the risk of eruption. However, evacuees were guided with no predefined order to disperse cities in the region. In some cases, families were parted because women and children were evacuated first. Furthermore, the existing social organization was disarticulated and no interlocutors were able to represent the dispersed population or establish communication with regional and local authorities (Mardones et al., 2011).

To face uncertainty, *Chaiteninos* configured a collective force named “Children and friends of Chaiten” in order to communicate to authorities their needs as well as their intention to return to the city. Due to the low impact they had on media, some of them decided to occupy Chaiten despite the existing ban. Some media agencies named them “The Rebels” (Rojas, 2013). Living in the abandoned city meant they had to manage to get potable water from a little stream they connected to water pipes, while energy was obtained from a diesel generator. People organized themselves to clean the streets and to repair their houses. They also redefined their previous livelihoods into subsistence strategies to face the scarcity of goods and products available in the city, with no commerce or jobs available. The Rebels –an emergent group as stated in Quarantelli (2004)– became the voice of the dispersed population. Communication between *Chaiteninos* was possible due to a radio programme called “Chaiten Here” emitted from the city.

Despite the difficulties, the first settlers adapted to the new situation while encourage other *Chaiteninos* to return. The Rebels perceived that the “exiled people” were under pressure to stay in their hosting cities by the psychologists provided by the Government in order to support them in the relocation process. Psychologists were instructed to tell people that “Chaiten was dead and they could never inhabit there again”. Both the Rebels and other *Chaiteninos* referred that situation as “brain washing” promoted by the authorities in an effort to elude facing the demands of the population (anonymous local leader, 2013, personal communication) (Rojas, 2013).

In 2010, when the decision of relocating the city was still in course, authorities argued that it was essential to establish a dialogue with the community to make this project come true (Cifuentes, 2009). However, the community considered the initiative came too late and claimed that the new city was only in the imagination of planners and public authorities. People living in Chaiten also argued that they were not considered during the participation meetings held regarding the relocation project. However, MINVU (2010) asserts that 460 displaced people living in 14 localities participated during the planning process (Chaiten was not in the list).

By end-2010, basic services were restored in the northern sector of Chaiten, the local and provincial Government returned to the city and a new investment Plan was announced to improve public infrastructure (Municipalidad de Chaitén, 2011).

The first settler of the South returned in 2010 to her own house –she did not sell it through “Chaiten Law”–, and currently near 160 families occupy houses in the sector, claiming that there is no housing stock available in the North. During the last two years, those families have invested in repairing houses while no public services are

available. South residents have organized to get water and electricity, prorating the cost (around US\$60/month per family). However, no organization exists to satisfy other needs such as transport, healthcare and education as well as to secure livelihoods. Furthermore, people describe the South sector as a “post-war” environment surrounded by demolished buildings and debris accumulation (see Figure 3). Many people in the South walk every day to the centre, where things are coming back to normal while they still demand for a bridge which connects again North and South.

In both sectors of Chaiten, social organizations have emerged mainly to secure access to basic services. In the case of northern Chaiten, there are territorial organizations such as the neighbourhoods committees "Chaiten Alive" and "Pillan". In the South, organizations that stand out are rather functional because residents still have not secured their basic needs. According to some neighbours, the level of participation (in terms of Wilson, 2012) has fallen since northern organizations have obtained solutions to their claims.

The same happens regarding risk perception as it has decay over time and less attention is paid to disaster risk reduction measures (Wisner et al., 2004), such as future evacuation plans. *Chaiteninos* mention that they do not trust in authorities anymore. They feel that Chaiten city could have been saved from floods if both people and authorities would have stayed during the eruption. “We would not evacuate again and future floods could be mitigated reinforcing the riverbed of the Blanco River” (anonymous local leader, 2013, personal communication). Although some mitigation measures were taken to protect the North edge of the new riverbed from floods and erosion, there are no studies about the South as none public investment in the area is permitted.

In contrast to this, INFRACON (2012) asserts that despite mitigation measures may decrease the damage of frequent floods, the effects of an intense volcanic event as well as extreme floods could be catastrophic for the entire city. As the city is located in a highly exposed area, it is not clear how vulnerability may be reduced by mitigation measures.

Although there are many *Chaiteninos* still in “exile”, not all of them will return to Chaiten as some have effectively integrated into other locations.



Fig. 3 Part of demolished housing units in southern Chaiten

## 5. Beyond the volcano, unforeseen outcomes on resilience and environmental justice

In Chaiten, political decisions taken and policies' effects have dramatically eroded people's ability to learn from and adapt to disasters. In that sense, an example is provided by unforeseen effects resulting from the monthly social

benefit named *Bono Emergencia Chaiten* and the one-off housing subsidy delivered by MINVU. During the two years of the emergency benefits, according to some local officers, people turned literally “crazy” due to the amount of money. “Prior to 2008, people used to live with so much less [...] when they received ‘that’ amount of money many people wasted it in holidays, travelling and expensive clothing” (anonymous public employee, 2013, personal communication). When benefits ran out, the bulk of people found themselves without savings, with debts and some with psychological problems (Paz, 2011, Sáez, 2009). In other words, while on the one hand benefits brought help and support for affected people during the crisis, on the other hand, benefits eroded community resilience by disarticulating people’s livelihoods and producing dependency on Government support, thus threatening people’s ability to react from and recover from disasters (Schilderman and Lyons, 2010)

The same logic applies to other circumstances where both community and local authorities’ actions –and inactions– exacerbated the unequal distribution of environmental risks –mainly related to floods and to volcanic hazards–, vulnerability and resilience. The divided city of Chaiten not only resulted as consequence of nature but it was accentuated by policies and responses. For instance, the institutional incapacity –i.e. at municipal and regional level– for managing and promoting resilience revealed how governance centralization may limit community and local authorities’ actions. For one year since the disaster, the Government created and maintained a special authority, the Presidential Delegate, which aimed to support displaced families but also competed with regional and local authorities on the rehabilitation of Chaiten (Allard, 2010). The tension created by this special authority affected people’s trust in authorities as much as erratic decisions of declaring Chaiten “dead” and then “alive” again. The same inconsistent attitude also feeds people’s hopes for seeing South sector declared inhabitable again, perpetuating uncertainty among the population.

The community’s demand for a bridge that connect North and South as well as flooding protection for the southern edge of the riverbed remains unattended as volcanic hazard provides an excuse. Ironically, Municipality, the Regional Government and recently the National Government have shown signs on the change of the South’s political status (Jara and Baeza, 2012) by investing in the area –i.e. an approved street lighting project for 2013 and a playground already implemented–.

While the environmental injustice in Chaiten can be expressed through the way in which the southern sector is disproportionately more exposed than the North, the resilience of Chaiten population –as a whole– has been and is being eroded by political decisions. As mentioned above, only marginal attempts for promoting resilience within people in the South have been implemented by the Government. “Chaiten population are poorer than 2008 and less self-organized than 2010” (anonymous high municipal officer, 2013, personal communication). Inversely, as Schilderman and Lyons point out (2010), the environmental injustice of the spatial distribution of risk may also be shaped by decisions taken to increase the resilience of the city. For instance, while Regional government started demolition works of housing units in the South in order to avoid more occupations in the area –and thus reducing the number of people exposed to hazards–, all new housing projects in the North were abruptly ended (Baeza, 2013).

General and specific political forces may shape the way in which processes of environmental justice and resilience interact within the Chaiten post-disaster context. As presented throughout this paper, political actions should not be considered as mere underlying factors of disasters (Pelling, 2006, Wisner et al., 2004) but determinants for defining the exposure to and ability to recover from hazardous events. As explored above, community responses to policies and decisions taken in a post-disaster context have resulted in resisting actions to and erosion-of-trust in authorities and in the public sector.

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