

# **Report on Resilience Workshop I (24-25 November 2020) and Resilience Workshop II (26-27 May 2021)**

## **Section 1: Andean Hazards, Resources and Resilience**

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### **Introduction and context**

This summary paper is born out of presentations and discussions from two workshops on the theme of Andean hazards, resources and resilience that were jointly organized by the School of Engineering at Pontificia Universidad Católica de Chile (PUC) and the Department of Earth Sciences at University College London (UCL). The first workshop was hosted by PUC and took place online on November 24<sup>th</sup> and 25<sup>th</sup> 2020 and fostered discussions in two separate roundtable sessions entitled '*Natural hazards and geothermal energy in an Andean context*' and '*Building resilience to natural, environmental and mining hazards in the Atacama Desert of Chile*'. A second workshop, hosted online by UCL, took place on May 26<sup>th</sup> to 27<sup>th</sup> 2021 and saw the progression of the theme into one two-part session entitled '*Andean hazards, resources and resilience*'. In this summary paper, we document the main discussion points from the two workshops and propose a series of suggestions both for formalizing Earth Science related collaborations between PUC and UCL and for expanding opportunities for multi-disciplinary collaboration.

### **Workshop I**

During the two sessions of the first workshop, presentations provided a broad overview of some of the fundamental scientific, environmental and societal questions related to living along an active subduction zone tectonic plate boundary and in one of the world's driest and harshest multi-hazard environments. A number of synergies were found between these sessions, which showed that many of the geological, geophysical and geochemical processes operating in the Andes that generate negative consequences, exemplified by numerous natural and environmental hazards, are also those responsible for generating positive attributes, such as mineral deposits and geothermal energy resources. We concluded that the overarching fundamental challenge is to build resilience to the negative aspects whilst simultaneously efficiently and sustainably harnessing the positive

aspects. In order to responsibly benefit from the abundant resources present in Chile, we further concluded that this requires collaboration between interdisciplinary researchers engaging with the multiple stakeholders who depend on and manage these resources.

## **Workshop II**

In order to evolve from the first workshop, we continued to consider the same subject matter, but presented it through experiences gained from existing joint PUC–UCL Earth Sciences collaborative research. A combined session provided a brief overview of the outcomes from Workshop I and documented the history of a selection of projects undertaken between research groups in the two institutions. The involvement of Early Career Researchers (PhD students and Post-Doctoral Researchers) was shown to be an integral and fundamental element of this collaboration, even though there has historically been no formal mechanism at institutional level either to foster collaborative research or to permit joint studentships. Consequently, the session gave centre-stage to Early Career Researchers, who presented the most important findings from their respective research projects and at the same time recounted their scientific, cultural and social experiences of working jointly between the UCL and PUC Earth Science groups.

The session witnessed presentations from seven early career researchers who conducted, or are in the process of carrying out, inter-institutional postgraduate research between UCL and PUC. Rebecca Pearce and Almudena Sanchez, both PhD students at UCL, presented their work on geophysical imaging of crustal structures and fluids in the Andes. They demonstrated that collaborative Earth Science PUC–UCL networks were essential in raising the fundamental scientific questions regarding Andean tectonics and then installing instruments to perform seismic and magnetotelluric surveys in a region of the Chilean Southern Volcanic Zone. These activities occurred over several field campaigns in Chile and involved many researchers and students from both UCL and PUC. The results from the study gave insights into the way in which crustal structures, such as fault zones, concentrate fluids and seismicity, which are fundamental in the production of geothermal springs and mineral deposits (Pearce et al., 2020). Pamela Perez, a PhD student from PUC, presented her work on combining geological field measurements from the active volcanic and geothermal systems of the Chilean Andes with laboratory experiments performed during a one-year exchange visit to the Rock and Ice Physics Laboratory at UCL. She experimentally quantified how the offset along fractures can influence the ability of fluid to flow through the fractures, which is again essential for understanding geothermal and mineral deposition processes (Perez-Flores et al., 2017). Ashley Stanton-Young, a current PhD student at UCL and former masters student at PUC, continued the theme of geothermal energy, with a presentation linking multiple scales of fluid flow from mm-scale laboratory experiments to km-scale fracture networks and gave examples from fieldwork in Iceland.

In the second half of the session, the focus turned to northern Chile. Tiaren Garcia, a recently graduated PhD student from PUC, also spent one year at UCL during an exchange program and presented her research on numerical simulations of how seismic wave propagation is influenced by coastal topography in northern Chile. Guilia Magnarini, a recently graduated PhD student from UCL, discussed the two field campaigns she undertook to collect geological field data and images from drones to investigate large-scale landslides near Iquique in northern Chile, with collaboration from researchers at PUC. She showed how she is using these data to draw conclusions about similar landslide structures on other planetary bodies. Finally, Jonathan Mille, a current PhD student at UCL, presented research from northern Chile on the linkages between water, energy and mining, and the exposure of their critical networks to hydrometeorological hazards, including climate change. He has been assisted by researchers at PUC in CIGIDEN (Research Center for Integrated Disaster Management) and his presentation led to a new collaboration with Itrend (Institute for Disaster Resilience).



*Figure 1. Selected photos highlighting the diverse contributions of researchers and students from both PUC and UCL, as well as local assistance, from fieldwork campaigns in Chile and laboratory working in London.*

### **Proposals for further developing PUC–UCL links**

During the two workshops we emphasised the large quantity of productive work that has already been undertaken by researchers and students collaborating between PUC and UCL, pointing out that all this collaboration has been conducted without any formal interinstitutional network or funding stream. We invited the participants to imagine what could be possible with a formal

partnership agreement and associated funding. It was suggested that a modest amount of match funding, of the order of at least £20,000 per year, could be made available specifically for PUC–UCL collaborative research ventures, open to all faculties, on the topics of hazards, resources and resilience. This would help facilitate the transfer of students and academics between the two institutions and also support critical field and laboratory work.

### **Routes to catalyse interdisciplinary collaboration**

In discussions regarding resilience and associations with place and memory in literature, it was shown how important themes relating to disasters are recorded and remembered. One difficulty for any community to become resilient to a particular hazard relates to the frequency with which that hazard occurs. In geology, often the time scale of processes is challenging to comprehend, because many hazards, such as volcanic eruptions and major earthquakes and tsunamis, can occur several generations apart. This makes communication and understanding of potential risks related to these hazards also difficult to fully appreciate. As such, we see a great opportunity for linking themes in historical geology from written texts and literature with our understanding of fundamental Earth processes. This could be expanded to include historic indigenous resilience through sustainable use of natural resources, particularly water and land, and application to modern mining and its impacts on the environment and local people.

It is clear that working effectively with communities in Chile, and elsewhere, requires clear communication and trust, which takes time to build. We have demonstrated the need for working with local communities, as it is often necessary to utilize their land for the installation of geophysical equipment or to access geological outcrops. As such, PUC and UCL Earth scientists have built close working relationships with many different people in diverse communities; these have been achieved through explaining the importance of the work and its potential local benefits, and through direct involvement in the research and data-gathering process. It could then be pragmatic to build on these relationships to include topics related to education and risk understanding and reduction, as shown to be important in other sessions of the workshops.

### **References**

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**Section 2:**  
**Resilience, resistance, regeneration:**  
**Resilience and the Humanities**

Stephen M. Hart  
Camila Gatica Mizala  
Nicolás Lema Habash  
Nicola Miller  
José Manuel Castro

In 26-27 May, 2021 we were invited to participate in the workshop on the concept of Resilience, organised by UCL-PUC. As part of this meeting, we began to discuss and interrogate the concept placed at the centre of the workshop: What does ‘resilience’ mean in a Humanities context? Is it a useful concept for the Humanities? And particularly, what happens with ‘resilience’ when the geographical focus is placed in Latin America? As we began to approach it from our respective areas of expertise, another concept appeared: resistance. The latter allowed us to problematise our understanding of resilience, thinking beyond the idea most commonly linked to it, which is that of ‘bouncing back’. Resistance, on the other hand, appeared more clearly in our sources and provided a contrast to our understandings of resilience. As an extension to this first encounter, we continued the discussion in the conference *Quo Vadis? Arts and Humanities Research in the 21st Century* (19-23 July, 2021). For this panel, we invited José Manuel Castro to add a fifth paper to the initial four that were presented in the workshop. The five papers, summarised below, explored the questions proposed above through different case studies.

In ‘The Rhetorical Resilience of the Araucanians in Ercilla’s *La Araucana*’, **Stephen M. Hart** discussed a specific verse of the epic poem on Spain’s war with Chile’s Araucanian communities in the second half of the sixteenth century (published in three volumes in 1569, 1578 and 1589). Alonso de Ercilla y Zúñiga (1533-1594), a page who worked for Philip II, a conquistador who left Sanlúcar for the New World in 1555, and a soldier who fought against the Araucanians in 1557-1559 in the Kingdom of Chile, has been referred to as the ‘Inventor of Chile’ by Pablo Neruda. This epic, one of only three books which were ‘saved’ by the priest in Don Quijote’s library, given its pedigree (Vergil’s *Aeniad*) and its form (the sober and authoritative, even militaristic ‘Octavo real’, eight hendecasyllables with alternating rhyme) predisposes us to expect the poem will be a straightforward celebration of Spain’s conquest of the Araucanian people. But it turns out to be a literary work without a single (or indeed Spanish) protagonist with more than a sneaking admiration for this ‘indomitable, feared [people] / free of laws and their head held high’ (Canto I, ll. 27-28). Drawing on some theorisations of resilience – ranging from the ecological-biophysical positivist methodology favoured by the natural sciences and the

social-political constructivist approach favoured by social scientists<sup>1</sup> – Hart argues that the root of the Araucanian community's resilience, as viewed by Ercilla, is located not so much in their physical strength but in their rhetorical power, as epitomised by the speech given by the elderly chieftain, Colocolo (Canto II, ll. , ll. 89-152), which was much praised by Voltaire.

The second paper, given by **Nicola Miller**, explored how, during the Wars of Independence, utopian visions were articulated of what a modern republic could be: free, equal, just, virtuous and enlightened. In 'Resilience: The eternal return to the republican ideal', Miller discussed the way new constitutions envisaged representative government and, in many jurisdictions, placed few restrictions on male suffrage. Most of these constitutions contained clauses committing to state provision of education for all. As is well known, the implementation of democratic government and inclusive education policies has been an enduring struggle. What interested Miller in relation to the theme of resilience was the extent to which the founding moment was repeatedly invoked as a key reference point by participants in struggles for greater representation and inclusivity: after civil wars, dictatorships, uprisings and revolutions, political leaders spoke of founding the republic anew, reviving the ideals, restoring the body politic to the possibility of a virtuous future. Of course, there was wide variation in how the republican ideal was interpreted in different places at different times, but this continual return to the possibility of a re-foundation of the republic made me ask whether the (or a particular version of) republican tradition could usefully be thought about as a form of resilience.

As illustrative examples, Miller focused on national libraries, which were often the first institutions to be founded during the struggle for independence, in some cases even before independence was formally declared; later, they were recurrently invoked as the source -- sometimes the only credible one -- of institutional continuity. As institutions 'born with the *patria* itself', they fulfilled a central role in social self-definition and their place in national life continues to be celebrated to this day: foundation days have long featured annually in the press; special anniversaries have customarily been gala occasions, attended by local dignitaries and foreign guests. The libraries have also been sites of national disaster, both natural and manmade: nearly all of them have experienced destruction or damage by fire, earthquake, or military occupation.

The histories of the national libraries point to a spectrum of possibilities of what resilience might be. Is resilience: not to be overwhelmed; to keep on keeping on; to flourish despite adversity? Does it entail restoration of a previous condition? Or changing to stay the same? Or can it --must it -- involve transformation into something different? Somebody's going to be taking those decisions; precisely because 'resilience' has connotations of elasticity (automatic) it can be a useful shield for those who want to push through radical change or to avoid doing so.

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<sup>1</sup> Fiona Miller, Henny Osbahr, Emily Boyd, Frank Tomalla, Sukaina Bharwani, Gina Ziervogel, Brian Walker, Jorn Birkmann, Sander van der Leeuw, Johan Rockstrom, Jochen Hinkel, Tom Downing, Carl Folke and Donald Nelson, 'Resilience and Vulnerability Complementary Concepts?', *Ecology and Society*, 15.3 (Sept 2010).

**Nicolás Lema Habash** suggested that the current uses of the concept of resilience should not be detached from the cultural, social, economic, and bio-political context in which we are located. Why are we called upon to be resilient? Why has a concept, mostly used in natural sciences, recently acquired a key role in social and mental health sciences, such as sociology and developmental psychology? Why has it been densely integrated into the technocratic public discourse and security reports? The purpose of his paper ‘Resistance and Resilience: are we talking about the same thing?’ is to explore these questions through a study of the concept of resilience, specifically in the form of what critical theorists would call an immanent critique. For it is necessary to establish the shortcomings of this concept, the limits of its promises when articulated in public discussions and its relationship with the current neoliberal context within which it is applied to several modes of existing and experiencing reality. Moreover, beyond an analysis of resilience itself, Lema Habash is interested in what this notion does to the concept of resistance, proposing an openly political study on contemporary works and uses of this notion in the public sphere, while also attempting to relate this perspective with the development of the lexicon of resilience and trauma in psychoanalysis. Lema Habash’s hypothesis is that resilience is a conservative concept because it refers to the ‘conservation’ of a specific state, or set of practices, after the unavoidable changes produced by a shock or trauma. What does resilience help to conserve exactly? It does not conserve the same state of the object or person that has undergone a trauma, but a specific *relationship* between this object or person and the other entities surrounding it. It is this specific relationship that renders the object pragmatically, practically and axiologically operative in a specific context. When associated with the concept of resistance, resilience affects it by emptying any political positive meaning in resistance. Through assimilation with or differentiation from resilience, resistance is reduced either to a passive acceptance of normality or to a passive moment of the trajectory of the person who has undergone a trauma. The paper argues that resistance should be understood, not merely as a passive instance facing trauma, but as a way of establishing critical and existentially concrete mechanisms that counter the *structural* aspects of life that make catastrophe and trauma possible. Resistance is therefore especially—but not exclusively—operative at times when life seems to be ‘normal’; namely, when the relationships that sustain a specific way of life are in place and appear to be working as if no trauma is taking place.

In her paper, ‘Reimagining home. Exile and resilience in Latin American film, 1973-1983’, **Camila Gatica Mizala** focused on the experience of Chilean filmmakers in exiles, questioning whether this was, indeed, an experience that one could think of as ‘resilient’. As a way of exploring the concept, Gatica Mizala worked with the idea of filmmaking as a way of making home in exile. The concept of ‘homemaking’ allowed her to connect the experience of exile, and the concept of resilience, directly with emotions and everyday life. When thinking about resilience in relation to exile, one idea that keeps appearing is that of having no choice but to be resilient. However, is it a survival strategy? Or is it, to some extent, a form of resistance? As

people were forced to move from one country to another, what emerged were new sites of relations between identity and territory where memory and history are activated in connection to the new place of settling, signifying the notion of home as the new is imbued with memories and sentiment. Through the work of filmmakers in exile, Gatica Mizala suggests that homemaking could also be extended to the practice of cultural production in exile, particularly filmmaking, as directors aimed to make sense of a new territory and a new reality by displaying their memories, and a narrative linked to those memories, onto their films. The narrative element is important as it reveals agency, through a way of organising the personal and collective experiences.

Thus, one of the ideas that can be suggested is that the resilience that arises from films done in exile respond to memory, nostalgia, and imagination, as an idea of Chile is enacted. At the same time, it also works as a form of resistance in that it insists on the possibility of a 'Chile' that exists beyond the trauma of the coup and the dictatorship. In this sense, cinema can work as an important device to secure we remember, not only by capturing relevant images and showing a particular reality, but by playing an active role in the battle for *what* and *how* we remember.

In 'People's resilience and natural disasters in Chilean history', **José Manuel Castro** explored how Chileans, in 500 years of history, have dealt with earthquakes, floods, and fires have been part of the country's landscape. Chile is located on the western edge of the South American Plate, on the border with the Nazca Plate. Between 1541 and 1992 Chile experienced 166 earthquakes and volcanic eruptions, 260 fires, 136 epidemics and famines, and 173 floods and droughts. These natural disasters escape human control, and erupt without warning, putting people in close and sudden contact with death and life. Focusing on the relationship between natural disasters and people, Castro asks how useful might be the concept of resilience to understand the discourses created on the relationship of Chilean people with natural disasters, especially with earthquakes? A quick examination of natural disasters in Chilean history allows a broader understanding of resilience and some linked concepts. The original meaning of resilience has been included in Chilean history as part of discourses that seek to encourage its people to stand up after the disaster and to restore a former condition. Two types of discourses emerged: those produced to stimulate a 'new beginning' in order to overcome a previous state and to generate a better country than in the past; and those which have emphasised how disasters allow reconciliation of people with a religious dimension and the need to be always prepared for imminent disasters.

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These five papers problematise the concept of resilience and what it means when put in context through different case studies. Perhaps, one of the main questions that arise is how to add a political perspective to the concept of resilience. Common elements found in the works presented in the panels are the relevance of having agency; given the vulnerability, or even the survival aspect of experiences of resilience, the preeminence of sensitivity/empathy, as well as the construction of a community, appear to be key; and the idea of refunding. Based on the latter and



as part of our general discussion, Nicola Miller presented three areas to pursue further in thinking about the concept of resilience:

- 1) Add a further concept to the discussion: regeneration. This notion allows us to account for the significance of ideas as a source of resilience.
- 2) The question of agency and its location; to what extent do the conditions of possibility for resilience lie in the social-ecological systems, in the supposedly resilient being itself, or in interactions between them?
- 3) The places, peoples, communities, individuals to which 'resilience' is attributed are worthy of attention; who decides to characterise them as resilient? Is it a quality individuals or communities or societies claim for themselves? What stories do people opt to tell? The concept entails a story: it makes no sense without a narrative before disruption/trauma, during disruption/trauma and after disruption/trauma. Perhaps this is a good way to approach it, as a narrative, bringing methods of discourse analysis and asking the old historical questions: who did what to whom, where, when and why?