

Crossing borders: A comparative assessment of community resilience to natural hazards in Arica and Parinacota (Chile) and Tacna (Peru) regions.

Launch of the Global Model for Earthquake Social Vulnerability and Resilience

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The research aims to answer the following questions:

1. What are the main differences between the analysed country territories?
2. What are the key drivers for the construction of disaster resilience in the area of study?
3. What are the most significant gaps in the understanding of resilience and its drivers by national and local stakeholders and communities?

Contribution to Resilience Studies by:

Developing an extensive literature review on:

- Concept of resilience
- Operationalization of the concept (measures)

Adapting and applying an existing resilience framework:

- Disaster Resilience of Place (DROP) model

Developing and proposing resilience indices:

- A quantitative model (composite indicator)
- A qualitative model (Resilience Performance Scorecard (RPS))



Generalities about the area of study

- Complexity of the South America's Region:
 - Poverty, inequality, conflicts, bad governance, migration, socio-economic vulnerabilities, etc.
- Exposition to a variety of multiple hazards:
 - Floods, landslides, mudflows, avalanches, windstorms, earthquakes, volcanic eruptions, tsunamis, droughts and extreme temperatures.
 - Climate change estimations.





Development of the Composite Indicator (1)

A quantitative model developed from statistical data (Census, National Databases, National Information Systems)

Steps:

1. Adoption and adaption of the theoretical framework selected: The Disaster Resilience of Place (DROP) developed by Cutter et al., (2008)
2. Definition of resilience dimensions and general assumptions
3. Data sources
4. Identification and selection of variables by dimensions. Including data convergence and directionality based on literature, standards and expert view
5. Multivariate analysis – normalization and correlation
6. Rescaling and aggregation: Resilience Index
7. Test of balance: linear regression analysis as a measure of sensibility

Dimensions:

1. Human
2. Social
3. Economic
4. Physical
5. Institutional
6. Environmental



Development of the Composite Indicator (1)

45 Variables were initially selected on the basis of their availability in both countries, their relevance, analytical soundness, timeliness, and accessibility.
30 were finally selected after multiple correlation analysis (τ)

Directionality of available variables:

- Percentage; complementarity calculations were performed:

$$[\bar{X} = 1 - X]$$

- Ratios or absolute values; inverted calculations were performed:

$$\left[\bar{X} = \frac{1}{X}\right]$$

- Coefficients (for example the Gini Coefficient); a negative value was applied:

$$[\bar{X} = X * (-1)]$$



Resilience Performance Scorecard (RPS) - (2)

A qualitative model that incorporates the views of different stakeholders and communities. Linked to the UNDRR New Ten Essentials Scorecard

Dimensions:

1. Awareness and advocacy
2. Social capacity
3. Legal and institutional arrangements
4. Planning, regulation and mainstreaming risk mitigation
5. Emergency preparedness, response and recovery
6. Critical services and public infrastructure

Score system:

- 4 = Full resilience integration
- 3 = Engaged in resilience
- 2 = Emerging resilience
- 1 = Little or no resilience



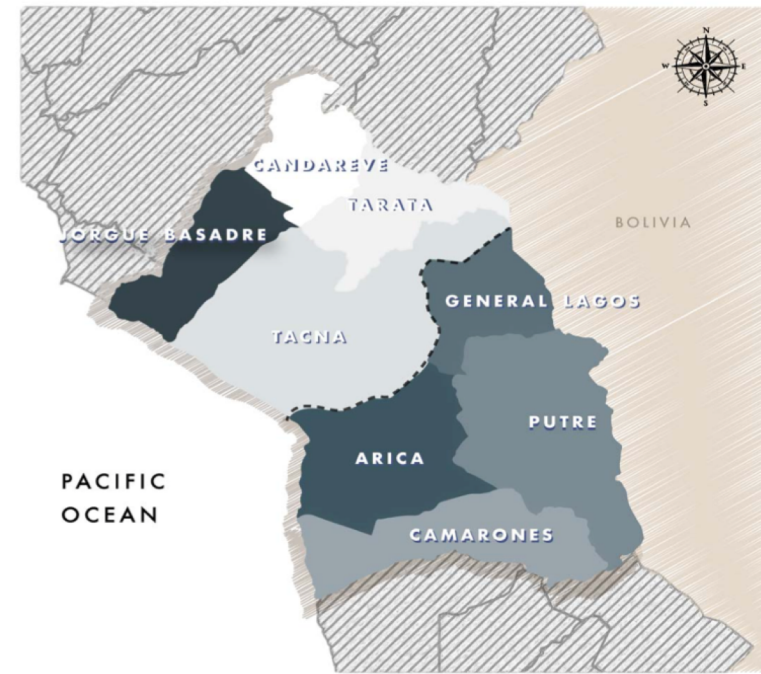
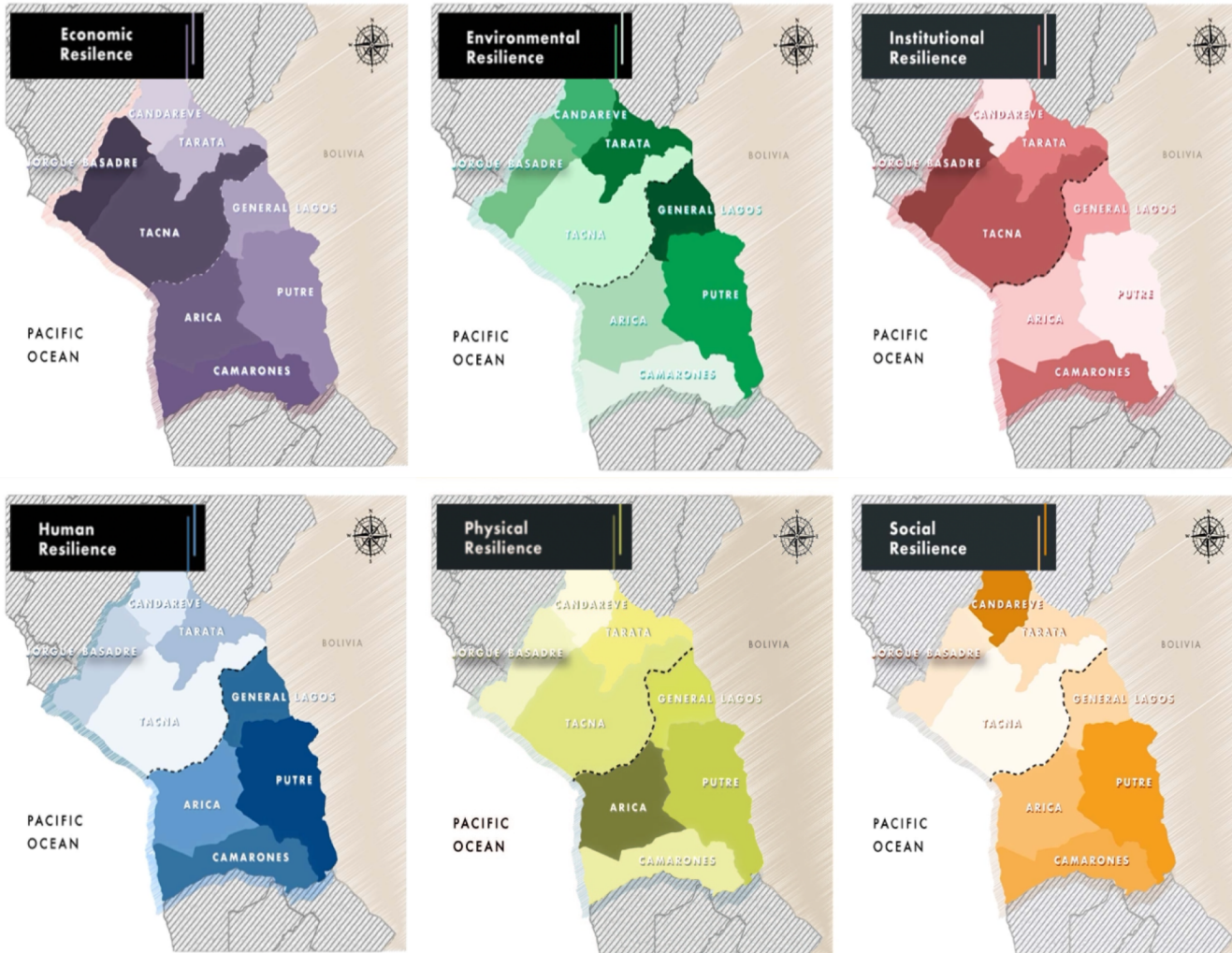


| Theme | Question | 4 | 3 | 2 | 1 |
|---|---|---|---|--|---|
| Awareness and Advocacy | Are there activities to inform the public about safety and disaster preparedness and risk reduction (e.g. drills, community meetings, family plans)? – [1.3] | Activities are frequent and regularly performed | Activities are sometimes performed | Activities are rarely performed | Activities are never performed |
| Social capacity | To what extent can the residents of your community influence the decisions made by the authorities? – [2.10] | Almost always | Most of the time | Occasionally | Never |
| Legal and institutional arrangements | Are there people in your community with clear roles and responsibilities for Disaster Risk Reduction (DRR)? – [3.2] | There are designated and trained people whose main function is DRR | There are designated and trained people, but their main functions are not DRR | There are designated people without experience training and their main functions are not DRR | There are no people with such functions |
| Planning, regulation and mainstreaming risk mitigation | Are there insurances available against catastrophic natural events? Are they accessible in economic terms? And can they be used by residents and business owners? – [4.3] | Insurances are widely available, accessible and used by most residents and businesses | Insurances are available and accessible, but there is no insurance culture | Insurances are available, but not accessible due to their costs | No insurances available |
| Emergency preparedness, response and recovery | To your knowledge, do people in your community have prepared a basic emergency kit (e.g. water, non-perishable food, batteries, radio, lighter, can opener, medicines, identity papers) and do they check it regularly? – [5.1] | The majority | Some | Few | Almost nobody |
| Critical services and public infrastructure | Do you have knowledge of specific structural improvements to reduce the risk that have been incorporated into essential networks (e.g. water, electricity, bridges)? – [6.4] | They have been incorporated in most of the essential networks | They have been incorporated in many elements of the essential networks | They have been incorporated in few exceptional cases | They have not been incorporated |



Results - (1)

What are the main differences between the analysed country territories?





Results - (1)

What are the key drivers for the construction of disaster resilience in the area of study?

Human:

- % Population living in urban contexts
- % Population covered with health insurance
- % Population that have completed secondary education

Social:

- % Population born in the same municipality
- # Social and community organizations per 1,000 inhabitants

Economic:

- % Population without income poverty
- Employment diversification ratio [Shannon's Diversity Index]
- Business Density [enterprises/population]

Physical:

- Health units per 10,000 persons
- Daily average tonnage capacity by access roads
- % Vacant housing units

Institutional:

- % Voting age population participating in municipal election
- % of DRR and emergency committees (existence and formalization)

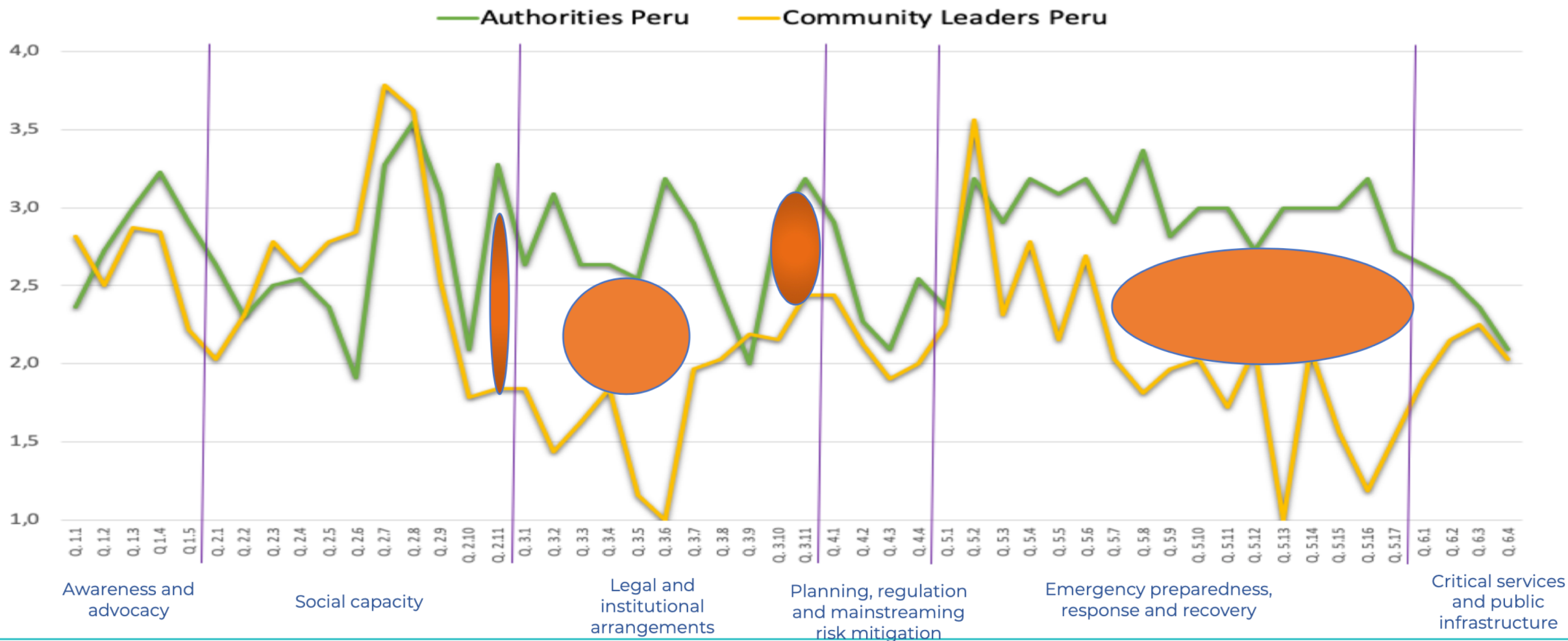
Environmental:

- % households with clean and safe public water network access
- inversed solid waste per capita and per day



Results - (2)

What are the most significant gaps in the understanding of resilience and its drivers by national and local stakeholders and communities?





Results - (2)

The results of the implementation of the Resilience Performance Scorecard show that:

- The commune of Arica, Chile is perceived to have a greater degree of disaster resilience across all the different themes explored, except on the legal and institutional arrangements where the province of Tacna, Peru, performed better.
- It is found that Arica performs especially well in terms of critical services and public infrastructure, as well as, in emergency preparedness, response and recovery, and, in advocacy and awareness.
- Both in the case of Arica and in the case of Tacna, there appears to be a gap between institutional stakeholders and community leaders, with the latter generally attributing lower scores in most of the questions.



Conclusions

- The combination of quantitative and qualitative methods seems to confirm the primary hypothesis of this dissertation, that resilience is the result of the interactions of different dimension dynamics that are related to the specific geographical area of analysis.
- The quantitative composite resilience index, provides elements of analysis on the dimensions and variables that builds resilience;
- The qualitative resilience index complemented the analysis by investigating why the designed and implemented policies are having (or not) the impact foresaw at their conception. This was done through the perceptions' understanding obtained by the participatory approach of two different focused-groups.
- The use of qualitative and quantitative methods, proved to be a powerful complementary approach, notably because outcomes are easier to understand the inherent vulnerabilities and resilience of the case study areas.



with the support of





THANK YOU!

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**Looking forward
to receive your comments**