Following Socio-Environmental Conflict Narratives About Energy Transition in Chile

A Spatio-Temporal Analysis Using Dynamic Topic Modeling

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Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

Agencia Nacional de Investigación y Desarrollo

Ministerio de Ciencia, Tecnología, Conocimiento e Innovación

Gobierno de Chile

Text2Story'26
Delft, The Netherlands

29.03.2026

NARRATIVE PANOPTICON

SOCIOTECNOLOGÍAS DEL LITIO

dortmund university

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Introduction

Problem Setting

- Chile's energy transition expands renewable projects and mineral extraction at the same time
- These processes trigger disputes over water, pollution, territory, health, and decision-making legitimacy.
- Public narratives matter because conflicts are not only local events.
  $\Rightarrow$ National Circulation through media

Research Gap

- Prior research is dominated by case studies and "methodological localism"
- Systematic national view of how conflict narratives emerge, persist, and fade is missing

Aim: Find and visualize how Chile's narratives in the energy transition redistributes socio-environmental conflicts across time, territory, and industrial sectors.

Data

- Scraped Chilean Google News API with custom Web Scraper
- Coverage Window between 2011 and 2025
- 24.051 Scraped Articles
- Exclusion: Duplicates, non-conflict content, non-Chilean context, corporate announcements
- **1.996 final articles with text, date and location**

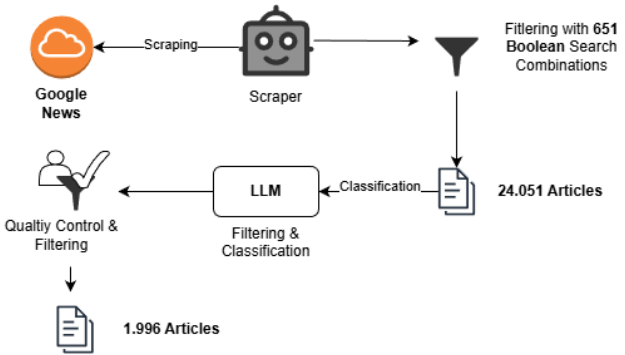
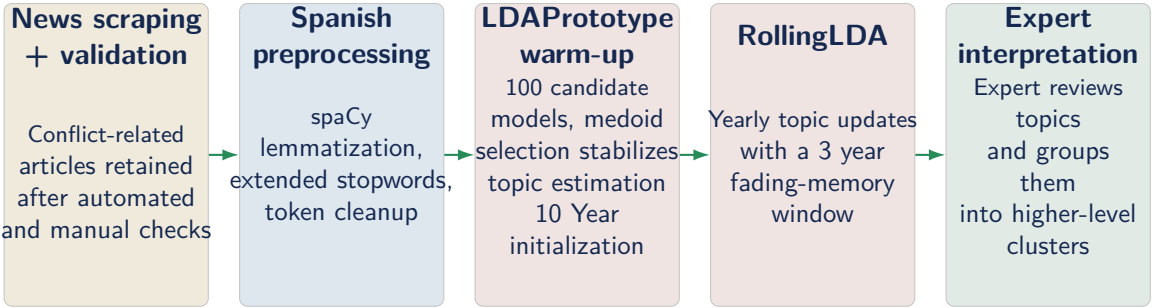


Figure: Data Gathering and Filtering

Framework I: Processing & Modeling Pipeline



Model choice for final analysis: $K = 12$ topics, $\alpha = 0.05$, selected iteratively with domain experts.

Framework II: Spatial-Temporal Dynamic Topic Modeling

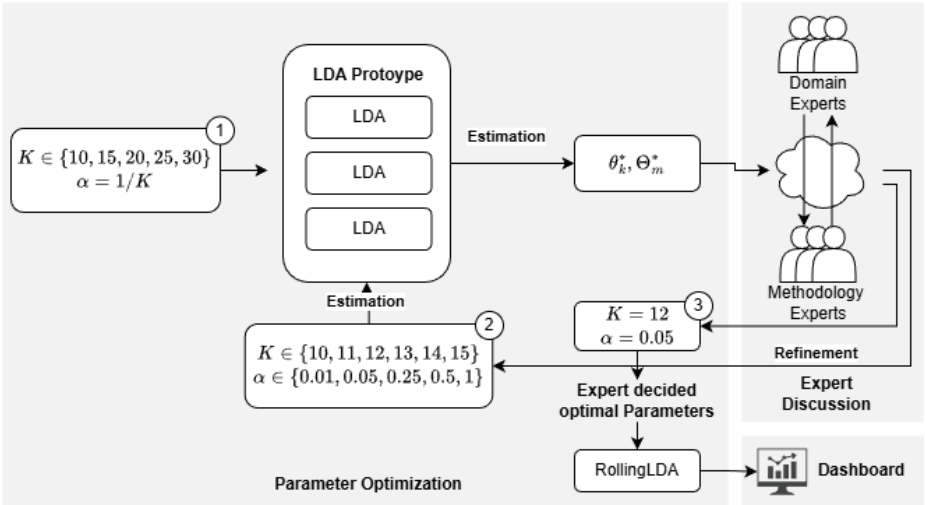


Figure: Parameter Decision Process and Temporal Modeling

Framework III: Postprocessing & Dashboard Creation

Postprocessing & Dashboard Creation

- Claude Code $\leftrightarrow$ Human Evaluation used for topic, cluster descriptions and dashboard creation
- Spatial Modeling via localization inside the articles
- Temporal Modeling via article year
- Expert Analysis: Possible on the whole corpus, topic clusters and specific topics
- Temporal per Topic Analysis via LOO Word Impacts

$$\cos(t_1, t_2, k, V \setminus v) - \cos(t_1, t_2, k, V)$$

Dashboard Features

- Top words per topic*
- Number of documents*
- (Overall) topic prevalence*
- (Overall) cluster prevalence*
- Gini coefficient: inequality of topic prevalence*
- Interactive filtering by space and time
- Option to download individual graphics and tables

*across locations (spatial) and over time (temporal)

Results I: Identified Topics and Expert Clustering

1. Water resources & mining operations

- Hydroelectric & Indigenous rights
- Lithium mining
- Copper mining & water

2. Environmental impacts & energy projects

- Glaciers & wind impacts
- Environmental court proceedings
- Green hydrogen development

3. Industrial pollution & decarbonization

- Coal & decarbonization
- Industrial pollution / sacrifice zones

4. Environmental institutions

- Environmental impact assessment
- Government & environmental legislation

5. Local impacts & communities

- Everyday community impacts
- Local perceptions and lived effects

Results II: Clustering Shifts

- Cluster Prevalence 20%
- 2012: Strong news coverage in Aysén (HidroAysén project)
- 2016: Shift towards the central parts due to small run-of-river hydroelectric plants in Mapuche territory and Alto Maipo mega-hydroelectric project
- 2025: Renewable energy projects in regions of Antofagasta and Maggallanes

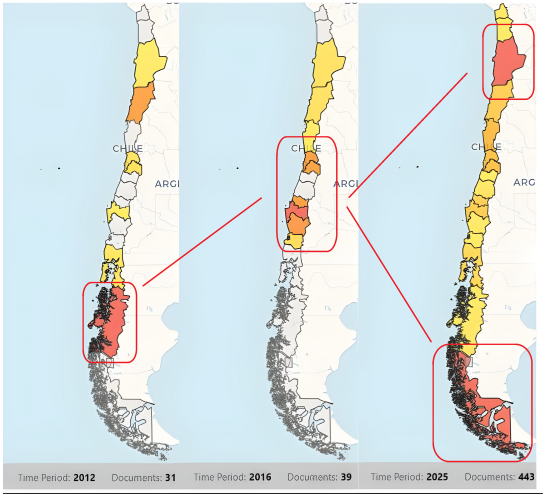


Figure: Spatial Prevalence of Cluster 2 for 2012, 2016, 2025

Results III: Dashboard

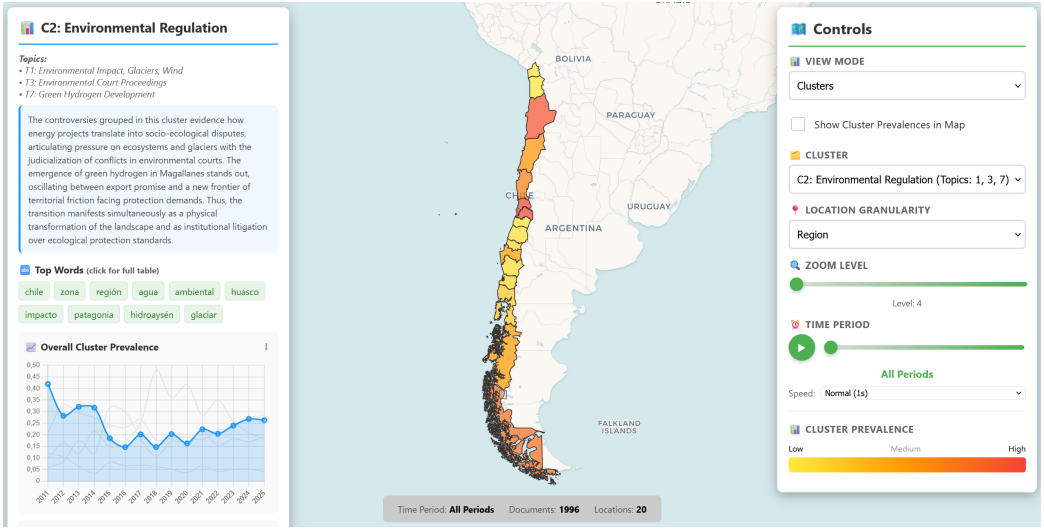


Figure: Preview on the created Dashboard

Discussion & Next Steps

- **More Sources**: Integrate high-quality digital archives from selected Chilean newspapers
- **Metadata-aware Topic Model**: Incorporate temporal and spatial information
- Extend RollingLDA for **emerging and fading topics**
- Enhance Visualizations to capture **narrative evolution**