Journal of Prevention & Intervention in the Community

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/wpic20

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To cite this article: María Isabel Reyes-Espejo, Carmen Gloria Núñez Muñoz, Raúl Antonio Bustos González, Juan de Dios Oyarzún, Víctor Salinas Silva, Rukmini Becerra, Sara Joiko, Juan David Millán, Marjorie Tovar-Correal, Natalia Chiwaikura Bart & Javiera Núñez Tobar (24 Feb 2025): Rural territories in socio-environmental crisis: Challenges and opportunities for building sustainable schools and communities in Chile, Journal of Prevention & Intervention in the Community, DOI: 10.1080/10852352.2025.2463749

To link to this article: https://doi.org/10.1080/10852352.2025.2463749

Published online: 24 Feb 2025.

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JOURNAL OF PREVENTION & INTERVENTION IN THE COMMUNITY
https://doi.org/10.1080/10852352.2025.2463749

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Rural territories in socio-environmental crisis: Challenges and opportunities for building sustainable schools and communities in Chile

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ABSTRACT

The Chilean model of economic development, based on the extraction of natural resources, has had significant environmental and social impacts on the country, especially in rural areas. The research project "Towards the construction of sustainable schools and communities in rural areas in socio-environmental crises" studies the interaction between the unregulated exploitation of natural resources, the resulting socio-environmental crises and the responses of schools and communities in the affected rural areas. Based on a documentary and socio-bibliometric approach, identifying the main issues and research gaps related to the socio-environmental crises in the selected territories. The research showed that there are few studies on the role of rural schools and community organizations in the addressing of the socio-environmental crises of the territories and the fostering of long-term educational and community resilience. This reflects the low visibility that these communities are receiving, despite their significant potential on the matter.

KEYWORDS

Climate change; environmental sustainability; rural communities; rural schools

Introduction

Numerous studies worldwide show that the phenomenon of climate change has intensified the frequency and severity of extreme weather events, such as droughts, floods and heatwaves, which directly affect rural and indigenous communities. These groups face unique risks due to their geographical

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location and their sociocultural and environmental connection with nature (Intergovernmental Panel on Climate Change [IPCC], 2021, 2022). In particular, they are affected by the regions' extractive projects, facing a series of socio-environmental tensions and violations of their collective and individual rights (United Nations [UN], 2020).

This situation is particularly critical in Latin America, where extractive industries such as mining and logging directly impact the territories and their people. Thus, as socio-environmental crises intensify, communities also experience a significant loss of traditional knowledge that has been key to their adaptation and survival (Esmail et al., 2023). In this context, the Chilean case is a relevant scenario to analyze, as it is a paradigmatic example of countries that depend on extractive economic models for their livelihoods and are highly vulnerable to the effects of climate change.

Chile, known as the "laboratory of neoliberalism," has implemented a development model since the 1970s that prioritizes the exploitation of natural resources with little regulation, which has intensified socio-environmental crises (Goulden, 2021; Rodríguez, 2020). These have been aggravated by climate change and extreme phenomena such as water scarcity and changes in rainfall levels (Muñoz et al., 2020), generating a series of territorial conflicts and social demands (Berasaluce et al., 2021). Its development model perpetuates a vision of progress that marginalizes rural areas, historically associated with poverty and underdevelopment, in contrast to the urban ones, considered a symbol of modernity (Jashari, 2022).

Another perspective recognizes these rural areas have great potential to face socio-environmental crises due to their inseparable connection with nature, which, while making them more vulnerable, also promotes local adaptive responsiveness (Hayvon, 2024; Williamson-Castro, 2020). In this context, various global initiatives have shown that strengthening local capacities in rural schools improves resilience to climate change (Fondo de las Naciones Unidas para la Infancia [UNICEF], 2023; Salazar et al., 2022).

The project "Towards the construction of sustainable schools and communities in rural territories in socio-environmental crises" (ANID/ATE230053) is aligned with this perspective, studying locally the role these rural and indigenous schools and communities in northern, central and southern Chile play when it comes to these challenges. This article presents partial results from the first phase of the study, which involved a documentary review of data and secondary sources in the rural areas of Chile, aiming for the characterization of three local scenarios in socio-environmental crises, while identifying their main problems and the agents involved. Thus, the objective of this article is to highlight the most relevant issues, agents, and the possible research gaps on the socio-environmental crisis and sustainable education in the rural areas of Chile.

As follows, we present the frame of reference that underpins this phase of the study, which includes, on one hand, the description and understanding of the role of rural schools in Chile and, on the other hand, a proposal of a comprehensive perspective of the community response that arises locally in the face of socio-environmental crises.

The situation of rural schools in Chile

The relationship between education, sustainability and climate adaptation in rural schools has shown that strengthening local capacities can be an effective way to improve community resilience to the effects of climate change (UN, 2020; UNDP, 2020; UNICEF, 2023). Thus, rural schools are key agents in preserving the environment and promoting local development, encouraging the implementation of actions to adapt to and confront climate change.

The Chilean territory is distinguished by its geographical diversity, a factor that is reflected in the configuration of its education system. Under this approach, rural education seeks to guarantee access to education for all students, regardless of their location. According to the 2017 Census, 83% of the Chilean territory corresponds to communes classified as rural, which are home to 25.5% of the national population. In these territories, approximately 281,000 students attend one of the 3,130 establishments classified as rural, representing 28.4% of the total number of educational centers in the country (Ministerio de Educación [de Chile] [MINEDUC], 2024c). According to recent data (MINEDUC, 2024a), 73.8% of total enrollment in rural establishments correspond to basic education, while only 10.9% is concentrated in secondary education. Most of these establishments are public, representing 77.5% of the total, while only 22.3% belong to the subsidized private sector and less than 1% to the private paid sector (MINEDUC, 2024a).

The closure of rural schools has been part of an undeclared policy, but one that has operated de facto for many years in a systematic way throughout the country (Núñez et al., 2020). In essence, the closures respond to a profoundly neoliberal and urban-centric logic that positions rural schools as a "waste" of resources, ignoring the coordinating role they play in the territories (Núñez et al., 2020). In this context, rural establishments face significant challenges compared to urban ones, as many communities' schools act as spaces for community meetings and development (Núñez et al., 2016). Their closure not only threatens to disrupt their sense of community but also forces students to move to new educational centers, generating a process of forced mobility (MINEDUC, 2024a).

Through their educational projects and models, rural schools also contribute to a more inclusive understanding of rural realities and their role in sustainability (Oyarzún, 2020). As part of a public subsystem, they receive and respond to students from their local area, they coexist with the natural and productive environments of the area, and they influence rural inhabitants through their pedagogy (Salinas Silva et al., 2024). These characteristics are deployed in an educational model that provides the conditions for making qualitative leaps in terms of capacities, adaptation to crises and technological advances (Oyarzún, 2020).

We now know that socio-environmental conflicts in Chile directly affect rural schools (Arévalo Palma et al., 2023; MINEDUC, 2024b). It is common to find schools that face difficulties to access drinking water; 40.4% of rural schools lack it, often because of the economic activity of the sector (Fundación Amulén, 2022). In agricultural areas, there are studies that show cognitive deficits in children, because of the neurological alterations caused by the usage of unauthorized pesticides (Muñoz-Quezada & Lucero, 2019). In the Mapuche territory, the zones with the highest number of rural school closures (Muñoz et al., 2020) are also the areas where the forestry industry is most active.

Despite this background, there is currently no systematized information available that would allow us to characterize the socio-environmental crisis scenarios affecting the work of rural schools in Chile, nor is there data detailing the local particularities of these conflicts. Having a diagnosis that addresses climate crises and their impact on school communities would be essential to explore how these situations influence the formation and resilience of their environments, helping to incorporate environmental sustainability into the relationship between nature and the communities (MINEDUC, 2024b).

The community response to the socio-environmental crisis

In Chile, the traditional structures of social organization have been profoundly questioned in recent years, which has promoted reflections toward the political leadership and the impacts of the capitalist and extractivist model (Arteaga et al., 2021; Reyes-Espejo et al., 2022). This scenario has prompted organizational alternatives based on collective action, aimed at a more equitable distribution of resources and a joint response to crises such as natural disasters, epidemics and migratory flows (Arteaga et al., 2021; Salinas et al., 2022).

The principle of the collective manifests itself as a key strategy for facing these challenges, highlighting the value of mutual support, cooperation and community resilience (Hernando-Arrese & Rasch, 2023; Olcese et al., 2024).

Examples of these practices include self-management initiatives and educational support networks around organizations such as neighborhood councils, community centers, schools, and cooperatives societies (Arteaga et al., 2021; Delamaza, 2016). These actions, in addition to reviving historical solidarity practices, foster new forms of organization adapted to current challenges, integrating perspectives of social and environmental justice to promote sustainability in these contexts of crisis (Mardones, 2022; Squella Soto, 2021).

These practices go beyond public policy and the traditional economy: while denouncing inequalities and injustices, they promote community coexistence, mutual care, local identity and the recovery of a collective memory (Arteaga et al., 2021; Delamaza, 2016). This is particularly relevant in rural areas, where tensions between rural and urban perspectives are manifested in different ways of relating to the territory and in extractive production practices.

Chile's past and recent history shows that community organization in rural and indigenous territories has been fundamental in facing socio-environmental crises, rescuing practices of mutual aid and collaboration that contrast with the individualism promoted by the neoliberal extractivist model (Oyarzún, 2020; Reyes-Espejo et al., 2022). These communities, far from adhering to a utilitarian logic, draw on their ancestral memories, preserving deeply rooted values of solidarity and reciprocity (Hernando-Arrese & Rasch, 2023).

In this regard, community organization is consolidated as a key tool for addressing the unequal effects of climate change, strengthening internal links and fostering collective environmental awareness (IPCC, 2021, 2022). This approach not only allows communities to exercise a greater control over the decisions that affect their environment but also facilitates the equitable distribution of resources and the implementation of sustainable strategies in line with local values, thus contributing to community resilience (Arteaga et al., 2021; Dittmer et al., 2023).

Furthermore, this organization is recognized as a form of resistance against systems of domination, promoting an emancipatory interest (Arteaga et al., 2021; Reyes-Espejo et al., 2022). According to Olcese et al. (2024), resilient communities are better prepared to resist, confront and recover from various stressors and disturbances, which underlines the need to investigate socio-environmental conflicts as a key element. These conflicts profoundly contextualize the life of communities, where schools position themselves as active agents that catalyze local and community solutions to face this complex reality. Knowing the characteristics of socio-environmental conflicts at the local level will make it possible to strengthen collective actions that promote the protection of the environment and the ecological care of the territories (Dittmer et al., 2023).

Method

The general outline of the project is developed from the structuring of a research device composed of three complementary phases to be implemented during the period from 2023 to 2026, considering the three macrozones of the country: north, center and south. In this paper we present results from the first phase, implemented during the fourth quarter of 2023 and the first quarter of 2024. This work included a documentary review of data and secondary sources, with the purpose of characterizing the socio-environmental crisis scenarios of each territory investigated.

This method was implemented from a mixed-cut socio-bibliometric perspective, that is, it combines quantitative techniques with interpretive analysis, which is intended to semantically contextualize the thematic categories (Ninkov et al., 2022). By reviewing secondary sources, we seek to identify the advances in the literature of this field, that means, the role that research has played in facing the challenges derived from the environmental crises in Chile (Gutiérrez-Salcedo et al., 2017). In this sense, this article aims to emphasize the most relevant issues and research gaps on these socio-environmental crises and sustainable education in the country's rural areas (Usta, 2023; Zahra et al., 2021). Bibliometric techniques have proven to be useful for identifying the underlying themes in each academic corpus and detecting future research perspectives and/or establishing necessary relationships with different sectors (Mejia et al., 2021).

To obtain a reliable overview of the state of the art, the present study used Scopus and Web of Sciences as data sources, as they are two of the most comprehensive and highest quality bibliographic directories, specializing in abstracts and citations of peer-reviewed literature (Jing et al., 2024). The selection and exclusion criteria are presented below.

As shown in Figure 1, the data collection process was carried out on October 20, 2024, starting with a general search for articles including ("socio-environmental crisis" + "Chile") and ("sustainable schools" + "Chile") in the period 1998 to 2024. The databases were downloaded in csv. format from Scopus and Web of Sciences, and subsequently, Zotero software was used to eliminate duplicates and to create a unified file (McAllister et al., 2022). The next step consisted of homogenizing the data, an essential task for the analysis, given that the original files exported from both directories presented inconsistencies in the organization of the information, which impeded any type of systematized analysis.

With this, the current state of research on socio-environmental crises in Chile and sustainable schools was examined, characterized and diagnosed, using indicators of academic production and contrasting them with policy provisions and/or public planning instruments (Millán et al., 2017).

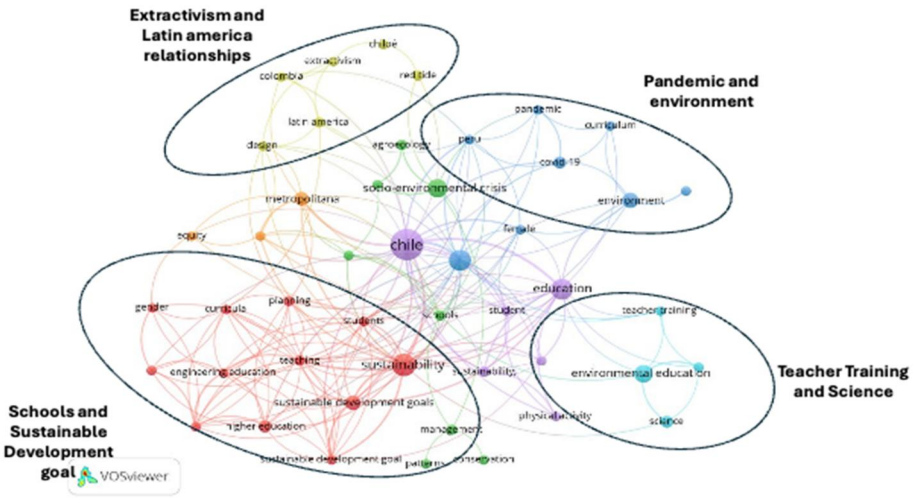

Figure 1. Thematic clusters of academic production on the socio-environmental crisis in Chile.

In the first stage, the socio-environmental conflicts present in Chile were systematically and qualitatively characterized through the analysis of national government documents and instruments (Khaile et al., 2021). Subsequently, in a second stage, the academic production on the socio-environmental crises in Chile was analyzed descriptively through the Web of Sciences and Scopus databases. Both the socio-bibliometric and documentary analyses were carried out jointly and in depth in the results section. These are presented in three emerging narrative categories that synthesize the characteristics of the rural educational contexts, and the socio-environmental crises present in the three fields of study: the Norte Grande; the Petorca, Valparaíso Region and the Araucanía-Los Ríos Zone.

Sample

First stage

To understand the public policies adopted in the three regions to address the impact of the socio-environmental crises, the following documents and digital tools were used.

Table 1 shows four different types of government documents analyzed for each region. The first, PADEM, is a document and/or "planning instrument that defines the action plans of the Educational Policy municipalized on an annual basis" (Observatorio Santiago [de Chile], 2024). The second and third are digital tools that allow visualization of the disputes between different actors – natural persons, organizations, public and private companies, and the State – publicly manifested and expressing divergences of

Table 1. Government documents and tools.

ID	Item	Institution	Type
1	Annual Plan for the Development of Municipal Education (PADEM)	Municipality	Annual document
2	Map of socio-environmental conflicts	INDH	Virtual platform
3	Environmental and disaster risk map	Ministerio de Educación [de Chile]	Virtual platform
4	Water shortage decrees	General Directorate of Water	Documents audiences

opinions, positions, interests and demands related to the affectation (or potential affectation) of human rights, derived from the access and use of natural resources, as well as the environmental impacts of economic activities (Instituto Nacional de Derechos Humanos [INDH], 2015, p. 5).

Finally, the fourth document refers to the water shortage decrees, which allow "the application of instruments aimed at reducing the impact of drought on people's lives, especially in rural areas" (Ministerio de Obras Públicas [de Chile], 2024).

Second stage

To establish a state of the literature on the socio-environmental crisis and schools in Chile, a bibliometric model was applied using Co-word and Co-occurrences techniques. These are used to identify texts with large academic corpora, since a considerable number of relevant terms are not usually visible in the keyword fields or in the keywords of the author index in the databases (Ahadi et al., 2022). The Co-word technique identifies the number of documents in which a keyword appears. In this study, the Vosviewer software was configured to perform a complete binary count, which indicates the total number of occurrences of a term in all documents (Van Eck & Waltman, 2022).

Subsequently, the co-occurrence technique was used to develop the terminology maps, presented below. These maps operate in two dimensions, so that the distance between two terms is interpreted as a measure of the relationship between them (Van Eck & Waltman, 2011). The smaller the distance between two terms, the greater the relationship between them, determined by the co-occurrences in the documents (Bednarik & Mileff, 2024).

As can be seen in Table 2, after detecting a total of 167 documents, these were analyzed with the Vosviewer 1.6.2.0 software, which made it possible to identify the most studied topics and thus determine the existing gaps in a large corpus of scientific articles, books and book chapters (Klarin, 2024).

Figure 1 shows that academic production can be grouped into four main thematic clusters, namely: Schools and Sustainable Development Goal

Table 2. Sample and bibliometric analysis.

Selection of databases with bibliometric data	Scopus and Web of Sciences
Selection of query and Boolean operators	"Socio-environmental crisis" OR "sustainable schools" AND "Chile."
Selection of timespan and documents	1998–2024 (Scopus) = 98 documents 2012–2024 (Web of Science) = 67 documents
Bibliometric analysis-Vosviewer software	Using co-word and co-occurrences techniques

(red), Teacher Training and Science (dark blue), Pandemic and Environment (light blue), and Extractivism and Latin American Relations (yellow). This last cluster highlights the absence of research related to rural schools, even though they are an essential agent in communities facing these socio-environmental crises, as will be analyzed in the results section. Next, a characterization of the socio-environmental crisis scenarios in each territory is presented, together with the community actors potentially active in each area.

Results

Socio-environmental and migratory crisis in rural schools in the far North of Chile

The regions of Arica and Parinacota and Tarapacá, in the far North of Chile, have arid climates and a predominantly urban population. In the Arica y Parinacota region, 97.9% of its 226,068 inhabitants reside in the urban district of Arica (Instituto Nacional de Estadísticas [INE], 2018), while the rural districts, which make up 71.6% of the territory, have a high indigenous population, mainly Aymara, exceeding 70% in some areas. In this territory, there is a gap in schooling between urban and rural areas, with almost one year less of average education in rural areas.

In Tarapacá, with 330,558 inhabitants, the majority reside in the urban communes of Iquique and Alto Hospicio. The urban communes also have a high proportion of indigenous population, reaching up to 80% in some communes. Although the regional average for schooling is higher than the national average, the rural communes have an average that is lower than the urban one, with a difference of 0.8 years and an average of less than eight years of schooling.

The socio-environmental conflicts in the north are rooted in two contrasting production models: that of the indigenous communities, based on agricultural, livestock and ritual activities, and the economic model prevailing on a national scale, centered on the exploitation of mining, yareta, queñua and water resources for the different industries in the area (Yampara & Soto, 2019). Mining has caused problems of access to and contamination of water, affecting indigenous territories. According to the National Human Rights Institute (INDH, 2024), all the conflicts are related to mining, while

in Tarapacá more than half of these conflicts are due to this cause. In Arica and Parinacota, 67% of active conflicts are in indigenous territories, while in Tarapacá, this figure reaches 50%.

Northern Chile, as a border gateway, is also experiencing a major migration crisis due to the large influx of people, especially Venezuelans, who enter the country through unauthorized crossings (Stefoni et al., 2023). This region faces certain paradoxes, since, on one hand, multicultural aspects coexist with manifestations of nationalism and, on the other hand, there is a persistent resistance to recognizing the most recent migratory flows as part of the region's cultural identity.

Although in rural areas recent migrants tend to be passing through, residents include people from Bolivia and Peru with ancestral links to the territory. The enrollment of foreign students is significant: 10.3% in Arica and Parinacota and 13.6% in Tarapacá, compared to the national average of 5.3% (Servicio Jesuita a Migrantes (SJM) & Educación 2020, 2021). Added to this situation is the presence of the indigenous population, where 29.1% of the population in Arica and Parinacota belong to an indigenous people, while in Tarapacá this percentage corresponds to 20.5% (Ministerio de Desarrollo Social y Familia [de Chile], 2020).

Government regulations and public policies related to these crises in rural schools in the far north are influenced by international agreements on migration, although Chile has not adhered to the 2018 Global Compact framework, the Servicio Nacional de Migraciones (2024) has established strategies that include responses to the migratory effects caused by emergencies and climate change and seeks to cooperate with major organizations to mitigate the climate impact in the migratory context. This policy prioritizes a gender focus in terms of emergency responses and guarantees the right to education to the migrant child population (MINEDUC, 2024a). However, this policy also makes no specific reference to education in rural areas.

Nevertheless, the National Policy on Rural Education (MINEDUC, 2024b), developed after participatory discussions, seeks to integrate migrant families and expand the concept of intercultural education beyond indigenous languages and cultures, representing an additional challenge for rural schools in the north, where greater attention to the needs of migrant populations is required.

In this regard, Figure 1 shows that the migration crisis is not one of the most prominent issues in current research. The few studies available focus mainly on urban schools in the Metropolitan Region and address two main objectives: to measure and statistically analyze the academic performance of migrant students in basic and higher education institutions; and to identify the factors that favor or hinder the adaptation of foreign students to Chilean classrooms (Céspedes et al., 2024).

In relation to the community dimension, some articles highlight that the school can function as a key space for fostering resilience in the face of acculturative stress and other negative effects on mental health (Pinto-Cortez et al., 2024). However, none of these address rural schools as a relevant area of study. In this context and considering the migration crisis in the northern part of Chile from an intercultural perspective, significant challenges arise. Several authors point to the need to implement curricular reforms that integrate more solid content related to migration and interculturality. These reforms would make the needs of migrant families more visible and contribute to the construction of an educational and discursive *habitus* that recognizes and values the alterity of the migrant population (Cortés Saavedra, 2022; Pinto-Cortez et al., 2024; Sanhueza et al., 2024).

Water and socio-environmental crisis in Petorca, Valparaíso Region

Chile is one of the countries with the highest risk of water scarcity in Latin America (Muñoz et al., 2020), with the Valparaíso Region being the most vulnerable to climate change due to rising temperatures, decreased rainfall levels and conditions conducive to forest fires. In particular, the province of Petorca has been declared a water shortage zone since 2008 (Dirección General de Aguas [de Chile], 2024).

The neoliberal economic model implemented during the dictatorship (1973–1990) privatized water through the 1981 Water Code, legally separating land from water resources and favoring access to large companies. This shifted the use of water from local agriculture to industries such as mining, agro-export and hydroelectric energy generation (Tamayo Grez & Carmona López, 2019). These intensive practices have led to overexploitation of river basins, environmental degradation and rural impoverishment, affecting the cohesion and adaptive capacity of local communities (Gayo et al., 2022; Muñoz et al., 2020; Salinas Silva et al., 2024).

In Petorca, the expansion of intensive crops such as avocados and citrus fruits since the 1990s has increased water consumption, depleting surface and groundwater sources. The lack of access to water has forced rural communities to limit their basic usage, affecting their quality of life and fundamental rights (Guerrero Rojas & Fragkou, 2021). This has led to further rural impoverishment and internal migration: 90.1% of migration cases in the region are attributed to water scarcity (Bolados García et al., 2017; Santos Velázquez, 2022).

In the field of Education, rural schools in the region face serious problems of access to water. In the Valparaíso region, according to data from the 2017 Census, 21.8% of rural schools access water through informal

means, with frequent interruptions (incidence of 33.9%) and quality problems such as odor, turbidity, taste, excess scale or chlorine (Fundación Amulén, 2022). This affects the functioning of the establishments and compromises the minimum conditions for education.

In response, organizations such as MODATIMA and Agua Potable Rural (APR) systems have emerged, seeking to guarantee access to water and manage its distribution (Bolados García et al., 2017). Although the Committees or APRs have an essential role to play, they have historically faced difficulties in supplying the localities. In the face of increasingly precarious supply methods, rural women have played a key role, organizing themselves to face shortages through strategies such as buying purified water, accumulating water in family ponds, bottles and canisters, reusing greywater, transporting water in different means of transport, among others (Bolados García et al., 2017; Saravia et al., 2022).

The women who work in defense of water have pointed out the impact of participation in local discussions, the search for common solutions and other management strategies for Petorca, highlighting as main strategies the spaces for community and neighborhood organization, as well as the role of the Union of APRs of the Petorca River Basin (Bolados García et al., 2017). These mobilizations have prompted legislative changes, such as the 2021 reform of the Water Code, which recognizes water as a human right and prioritizes domestic over industrial use, although its implementation remains a challenge (Celume Byrne, 2022).

In relation to the production of literature, Figure 1 shows that the most prominent cluster focuses on the role of the school as a means of addressing climate change (Salazar et al., 2022; Salinas et al., 2022). Numerous studies highlight that Chilean schools have emerged as key spaces for fostering critical thinking, encouraging students to actively participate in solving environmental problems from a scientific perspective and based on the ethics of care and interdependence (Sepúlveda Hernández, 2024). However, despite the predominance of this cluster, there is a notable absence of research on the relationship between rural schools and their communities in addressing problems arising from the socio-environmental crises. There is also a lack of studies analyzing their ability to mobilize the social capital necessary to promote rural development.

The results of the case of the central macro-zone contribute to a field of study that highlights resilience to climate change as a condition of the system. This implies that, by integrating diverse perspectives and actors in their local and professional roles, such as organizations and schools, it will be possible to more effectively absorb the impacts of extreme natural phenomena such as water scarcity. This challenge is particularly relevant in the context of climate change, where such phenomena are expected to increase

in intensity and frequency (Gayo et al., 2022). Thus, Muñoz et al. (2020) warn that this challenge must be addressed in an integrated manner, considering the nature-society relationship. Drought, beyond being a meteorological phenomenon, must be understood as a problem linked to human management, in which water shortage is determined by decisions on water distribution and the prioritization of certain uses over others.

Socio-environmental and historical crisis in the territory of Wallmapu

Wallmapu, the Mapuche territory, extends from the Biobío River to the South, covering the regions of Araucanía, Los Ríos and Los Lagos. This territory combines both urban and rural areas, with an outstanding ecological and landscape diversity. Araucanía region has the highest concentration of Mapuche people, representing 10% of its population according to the 2017 Census. Indigenous communities maintain a close relationship with the land and face higher rates of poverty and social vulnerability, which fuels their struggle for the recognition and protection of their ancestral territories (Pinto, 2021).

Socio-environmental conflicts have their origin in the historical exploitation of indigenous lands by forestry, agricultural and energy companies, which has led to environmental degradation and loss of the territory (Escalona Ulloa & Barton, 2020). Furthermore, the criminalization of protests has intensified tensions, affecting social cohesion and limiting constructive dialogue between the communities, the government and the companies (Reveco Lempi, 2021). In some cases, the conflict has escalated into situations of violence and repression, carried out by both Mapuche groups and state security forces, reflecting the deterioration of relations and the lack of effective responses (Escalona Ulloa & Barton, 2020).

Analyzing these conflicts in a timeline, it is possible to identify several processes that have progressively marked the territory: land dispossession, deforestation, expansion of forestry and agricultural monocultures, development of the forestry industry, construction of hydroelectric plants, proliferation of garbage dumps and fish farms, mining exploitation and, more recently, the parceling out of indigenous territories (Andrade, 2019). In addition to these processes, there are local interventions that further aggravate the situation in the region, such as aggregate extraction, land subdivision and the appearance of micro-landfills.

According to the INDH (2024) map of socio-environmental conflicts, in the Araucanía region there are 10 socio-environmental conflicts on indigenous territories, of which three are active, three are considered latent and four have been classified as closed. In the Los Ríos region there are 13 conflicts, of which seven are active, three are latent and three are considered

closed. However, although "closed" conflicts are defined by the absence of recent events, their impact over time has left deep scars on the social fabric, affecting community cohesion and their dynamics. This shows that past conflicts can have lasting repercussions that transcend their apparent resolution. In this sense, the records of the Environmental Tribunal, between 2014 and 2021, report a total of 48 cases related to claims for reparations for environmental damage, which contrasts significantly with the data presented by the INDH (Reveco Lempi, 2021).

Among the most significant conflicts currently are deforestation, the expansion of monocultures, the installation of hydroelectric and salmon farms, and mining. In Los Ríos region, projects such as the Pullinque hydroelectric power station have altered ecosystems and ancestral cultural spaces, affecting both the environment and the Mapuche spirituality, which is deeply connected to the territory and its bio-culturalism (Hernando-Arrese & Rasch, 2023).

These extractive interventions transform social, economic and cultural structures, aggravating inequalities and threatening traditional ways of life (Hernando-Arrese & Rasch, 2023). In this sense, the Mapuche spirituality, linked to sacred places such as the *gillatuwe* (ceremonial space) and the *eltuwe* (cemetery), has been profoundly affected by the destruction of these spaces, putting their cultural identity and spiritual practices at risk. In response, the communities are organizing themselves collectively under traditional leadership, promoting *küme felen* (good living) as an alternative model to extractivism (Reveco Lempi, 2021).

Rural schools have the potential to become key spaces for promoting a harmonious relationship between society and nature, as well as strengthening cultural identity and critical education. Nevertheless, the closure of these institutions in the Mapuche territory represents a significant risk to the development of sustainable and culturally relevant forms of education (Muñoz et al., 2020). As can be seen in Figure 1, there is a notable conceptual distance between the terms associated with the extractivism cluster and those linked to sustainable schools. This again highlights an absence of research addressing the historical, current and potential role of rural schools in territories affected by historical territorial conflicts, such as *Wallmapu*.

Conclusions

The results of the first phase of the analysis reveal that the diversity of territories brings with it diverse socio-environmental crises, which require localized interventions rather than standardized approaches. In Latin America, territorial issues are often treated in a homogeneous way, ignoring the historical and political contexts that shape and specify their socio-

environmental conflicts. Although migratory waves, water scarcity and land disputes with native peoples may be global phenomena, in each country the normative regulations not only shape but are often part of the origin of the conflict. This calls into question the usefulness and meaning of standardized intervention programs, and highlights the importance of local strategies, especially in rural territories, which tend to be subsumed by dominant urban-centric logics.

Environmental challenges affect essential domains such as education, causing migration that destabilizes rural schools and communities, deepening inequalities. Migration crises and extractive activities, especially in indigenous and rural territories, amplify vulnerabilities, but they also offer opportunities to reimagine rural schools as centers of sustainability and community resilience.

In addressing these crises, rural territories can take advantage of educational and community practices to establish support and collaboration networks that not only respond to the environmental crisis, but also develop greater awareness and joint action, based on good living. In this way, the construction of sustainable schools and communities becomes a fundamental pillar for the revitalization of rural territories in crisis, making education a central axis in the struggle for sustainability and environmental justice.

The northern macrozone faces socio-environmental and migratory challenges exacerbated by extractive development, which erodes traditional indigenous livelihoods. The integration of "new migrants" in rural schools and the limitations of current policies reveal the urgency of adapting educational approaches to local complexities. In the central macrozone, resilience to climate change is essential, with initiatives such as the APR systems, which illustrate community-led adaptation models, albeit limited by local capacities. In the southern macrozone, extractive industries have caused significant environmental degradation and cultural tensions. Mapuche communities, through their traditional organization, promote sustainable development and resist environmental damage. However, the closure of rural schools threatens the preservation of Mapuche culture and the development of sustainable educational practices.

Although this study provides critical perspectives on the intersection between socio-environmental crises and rural education, its findings are limited by the scope of the analysis, which focuses mainly on case studies in specific macro-zones. This localized approach, although valuable, may not fully capture the systemic and national implications of these issues.

The findings emphasize the importance of strengthening school-community networks to promote rural development and resilience to climate change. Future efforts should focus on building inclusive and stable institutions, rooted in local contexts, to ensure adaptive capacity and justice for

vulnerable communities. Rural schools can become the sustainable institutions of the future, fostering a critical resilience that not only adapts to crises, but learns and grows stronger from them.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

Project "Hacia escuelas y comunidades sostenibles en territorios rurales en crisis socioambiental (Towards sustainable schools and communities in rural territories in socio-environmental crisis)" (ANID/ATE230053), is being funded by the Agencia Nacional de Investigación y Desarrollo (ANID, Chile) through the "Programa Anillos de Investigación en Áreas Temáticas Específicas" (Research Rings in Specific Thematic Areas Program).

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