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Challenges and potentials for territorial regeneration: The case of an emerging Chilean urban agglomeration

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The ongoing expansion of urban agglomerations has led to increasingly fragmented and dispersed urban-rural territories, especially where planning systems lack coherence and regulatory capacity. Growth occurs in isolation from spatial, environmental, and social frameworks and often transcends formal administrative boundaries. In this scenario, circular processes have gained significant attention in cities, although incorporating them into regional planning remains a significant challenge. This article positions territorial regeneration as a circular principle that supports regional planning by integrating urban and environmental dimensions across expansive territories. The study conceptualises territorial regeneration through a literature review, bridging circularity with spatial approaches at the local and regional levels. Subsequently, it illustrates the arguments through a Chilean case study, analysing how existing planning instruments shape urban and rural dynamics and their capacity to support or constrain circular and regenerative outcomes. The findings highlight the circular values of urban-rural areas across spatial scales of resources, their geographical proximity, and their capacity to regenerate, combining urban and ecological aspects. The article ultimately contributes to planning debates by demonstrating how territorial regeneration can inform the further development of integrated regional policies in Chile and Latin America.

Keywords: territorial regeneration, circular process, urban-rural areas, urban expansion, regional planning

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Please cite as: Gómez Sáenz, F. (2026). Challenges and potentials for territorial regeneration: The case of an emerging Chilean urban agglomeration. *plaNext – Next Generation Planning*. Online first (23 March 2026). <https://doi.org/10.24306/plnxt/124>

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Introduction

In many regions, urban expansion outpaces population growth, detrimentally affecting sustainability (United Nations, 2023). Urbanisation and associated resource extraction continue to drive the so-called “triple planetary crisis”, comprising climate change, biodiversity loss, and pollution (UNEP, 2024). Urban areas are key centres of consumption, accounting for 75 % of global resource use (UNEP, 2019).

Although defining urban sprawl is challenging due to its many aspects, its drivers include low density development and policy frameworks that promote it (OECD, 2018). These expansive areas manifest in various socio-spatial configurations, spanning conditions of dispersion, fragmentation and segregation. Urban expansion causes multiple environmental effects, including diminished ecosystem resilience and watershed damage (Kew & Lee, 2013). Economically, sprawl puts more pressure on local governments, which must finance public services in more distant, less densely populated areas (OECD, 2018), and strains agriculture through the loss of agricultural land (López-Goyburu & García-Montero, 2018). As cities grow more rapidly and resource demands increase, the socio-environmental pressures associated with urbanisation become difficult to manage.

Urban agglomerations host various systems that intersect, serving as spaces of both production and consumption (Williams, 2019). A few centuries ago, urbanisation was limited to the relationship between cities and the productive capacity of their hinterlands (Harvey, 1996). In today’s era of hyperconnectivity, urban agglomerations must strengthen their resilience by becoming resource-efficient, ecologically regenerative, and adaptable, which can be achieved through a circular development approach (Williams, 2023). Therefore, economic factors that enable production and consumption are closely linked to the development of the territory and, consequently, its planning system. Since natural resource consumption directly influences the global community’s capacity to achieve sustainability (UNEP, 2024), the circular economy has been considered a promising alternative to traditional linear production models. By emphasising waste reduction and resource recovery, circularity supports sustainability goals (European Commission, 2015). Lucertini and Musco (2022) highlight the strong links among circularity, resource efficiency, waste reduction, and zero land consumption, underscoring how circular strategies can reduce environmental pressures. Ultimately, adopting integrated frameworks that address the environmental, social, and spatial impacts of urban growth is crucial to advancing sustainable urban development.

In analysing urban expansion through the lens of the circular process, particular attention is paid to the resulting urban-rural areas that have reshaped the territory. Dymitrow and Stenseke (2016) observe that these interfaces have shifted from sites of production in a resource-based economy to landscapes of consumption. In this context, the discontinuity of use within the space, emphasising the distinction between open zones and built spaces, appears as a potential for a circular process.

Within the broader discourse on circularity, many authors highlight the persistent challenge of linking circular processes at the territorial level (Amenta et al., 2022; Furlan et al., 2022; Mazzarella & Amenta, 2022; Marin, 2019; Scarpellini et al., 2019; Williams, 2019). These challenges include: implementing circular processes on larger scales beyond sectoral and local levels (Amenta et al., 2022); strengthening the role of local and regional authorities through more effective environmental planning (Scarpellini et al., 2019); shifting from land consumption to land production (Marin, 2019); integrating urban design disciplines within circular approaches (Furlan et al., 2022); recognising the scale at which resources circulate (Williams, 2019); and including land and landscape as resources (Mazzarella & Amenta, 2022).

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Given the planning challenges of shaping regional development across extensive territories, particularly the tension between sustainable development and urban expansion, this article explores a circular principle to enhance regional planning. The study introduces territorial regeneration to strengthen integrated planning in urban-rural regions by integrating urban and environmental dimensions beyond administrative boundaries.

To examine socio-environmental and spatial aspects of planning systems, this study focuses on a rapidly growing Chilean urban agglomeration. Many Chilean cities have expanded significantly, with deregulated sprawl areas often developed independently, neglecting spatial, environmental, and social factors, even while attempting to mitigate environmental risks. Regarding planning systems, the ability to integrate urban and environmental development comprehensively remains limited. Furthermore, regional planning is not mandatory across all regions. In southern Chile, the cities of Puerto Montt and Puerto Varas have experienced rapid growth, resulting in fragmented urban forms and diverse settlement patterns that extend beyond their formal urban boundaries, compelling the planning system to adopt new regulations, such as establishing a metropolitan area.

This article conceptualises territorial regeneration as a circular principle, through a theoretical and practical framework with particular emphasis on urban-rural areas. The Chilean case study complements the analysis by examining the regulations that govern urban expansion and their capacity to support or hinder circular and regenerative outcomes in an emerging metropolitan area.

Building on the above, the article contributes to the planning debate by introducing a new planning approach through territorial regeneration for diffuse, segregated, and fragmented areas, positioning it as a new guiding principle for circularity. Additionally, the paper offers new insights into how urban-rural areas can be planned and revitalised circularly.

Conceptualising territorial regeneration

The theoretical discussion conceptualises territorial regeneration by examining the urban-rural dichotomy and the spatial dimension of resources, and exploring the potential of urban-rural areas to support circular processes. Subsequently, the discussion presents various circular concepts related to territory and regeneration.

Recent transformations in urban expansion areas have reshaped the relationship between urban and rural regions. Instead of being clearly separated, these zones increasingly blend into broad, diffuse areas, obscuring traditional boundaries between them (Brenner, 2013). Furthermore, the conventional urban-rural dichotomy has been dissolved, fostering interconnected spatial configurations (López-Goyburu & García-Montero, 2018). This transformation accentuated socio-spatial inequalities and new environmental and infrastructure pressures. The emerging morphologies are not only physical but are also reflected in daily mobility practices, evolving lifestyles, and the growing trend of remote work, showing how these areas operate socially and economically (Brenner, 2013). According to Schröder et al. (2018), metropolisation can be seen as the peaks and nodes of the digital flow era. This perspective helps bridge the physical transformations of sprawl with the socio-digital dynamics that reinforce them. As a result, planning systems with strict binary distinctions struggle to address these realities, which limits their ability to comprehend the interdependencies of contemporary urban-rural dynamics.

As urban expansion surpasses formal administrative boundaries, the urban-rural transition zone becomes a critical arena where ecological systems and socio-economic dynamics intersect. This intermediate space is often described as a fragmented, dispersed mosaic of

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natural, productive, and urban ecosystems, shaped by unique relationships and tensions arising from the physical proximity of diverse spatial, social, and economic factors (Allen, 2003). Balta and Atik (2022) observe that the periphery is an area where rural and agricultural zones coexist with increasingly intensive urban land uses. Rising land values driven by urban expansion further pressure farmers to sell their land or convert it into more valuable activities (Williams, 2019). Consequently, the interface becomes a space of negotiation, with competing interests and land-use decisions intervening.

The intermediate areas challenge the traditional understanding of sustainability, revealing the limits of planning frameworks. Campbell's (1996) sustainability triangle highlights the inherent tensions among environmental protection, economic growth, and social equity. Revisiting this framework, Campbell (2016) emphasises sustainability as an ongoing negotiation of these conflicts. Allen (2003) notes that the artificial distinction has limited the ability to address environmental dynamics and emerging challenges in peri-urban territories by preventing comprehensive environmental planning and management.

Reframing urban-rural areas as an evolving territorial configuration rather than simply an outcome of urban expansion highlights the potential for planning innovation and socio-ecological and economic integration. The inherent diversity, characterised by the coexistence of urban, rural, cultural, and natural areas, positions them as a resource-rich environment, a condition that should be strengthened and reconnected (Neglia, 2023). As a result, scholars widely emphasise the need for a renewed conceptual and operational framework to address the specificities and complexities of these territories (Allen, 2003; Balta & Atik, 2022; Furlan et al., 2022; Lopez-Goyburu & Gonzaga, 2018).

Planning for these extensive territories requires a shift toward approaches that recognise the unique characteristics of expansion areas within settlement patterns and natural resource flows that do not adhere to administrative boundaries (Allen, 2003; Balta & Atik, 2022). Approaching urban-rural areas through a renewed lens on the urban condition opens up strategies to reduce primary resource consumption and waste, including in urban and peri-urban production (Hausleitner et al., 2022). Building on this reinterpretation, the introduction of circularity redefines these urban-rural areas not only as zones of transition but also as dynamic interfaces capable of closing loops by linking local and regional levels. In advancing the circular transition, the spatial dimensions of resources, such as place-specific characteristics and the geographical proximity, are of considerable importance. Several scholars emphasise the importance of considering place particularities for developing sustainable and circular processes (Arsova et al., 2022; Gallopin, 2003; Gibbons, 2020; Thackara, 2019). These particularities are linked with the understanding that physical space is not only a context but also an agent that influences circularity (Lucertini & Musco, 2022).

Another crucial aspect for the spatialisation of the circular process is the scale of resource circulation. Amenta et al. (2022) note that circularity is usually implemented at a sectoral level and on a small scale. The scale of the circular process is a key factor, since proximity can vary widely depending on the location. Geographical proximity often leads to spatial mismatches between where resources originate, are processed and ultimately consumed or reused, challenging the efficiency of circular initiatives. Williams (2019) points out that strategies for implementing a circular economy often overlook the scale at which resources circulate. Recognising the spatial scales and locations of circular economy initiatives is essential for planning (Furlan et al., 2022). According to Scarpellini et al. (2019), the circular process should transition to environmental regional planning, involving a long-term reorganisation of the territory. A regional perspective is thus essential, as it connects peri-urban and rural areas that remain functionally integrated into broader metropolitan systems.

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Circular perspectives embodying regeneration

The idea of the *circular city* originates from the principles of the circular economy, embedding them throughout urban systems to create a framework that is inherently regenerative, accessible, and abundant by design (Ellen MacArthur Foundation, 2017). This shift from traditional urban systems to regenerative ones strengthens urban resilience and enhances residents' well-being. Central to this approach is the understanding of land as a valuable resource (Williams, 2019). Consequently, circular cities involve not only reconfiguring material flows but also redesigning development models and socio-economic relationships with the environment. Concerning the implementation of a circular city, Prendeville et al. (2018) highlight that policymakers find it difficult to define what a circular city is and to translate its concept into practice. By analysing different models of circular cities, one can say that circularity encompasses various disconnected spatial practice fields, integrating urban landscape design as an inclusive, multidimensional, place-specific, and multiscalar approach (Marin & de Meulder, 2018). Specifically, this approach aims to combine urban design and landscape architecture, emphasising the process over outcomes.

Deepening the link between territory and circular processes, the circular city concept has expanded into *circular development*. It offers a new normative model for urban growth, shifting the focus from economic to ecological concerns (Williams, 2022). Moreover, it closes loops across different scales and promotes greater sufficiency at the city-regional level (Williams, 2021). This broader framework, by including the regional scale, emphasises the spatial dynamics of resources and their linkages to planning. An applied example is Circular Amsterdam, which integrated the circular economy and circular development through a city-region strategy aimed at reducing construction and organic waste, and by adopting a bottom-up approach (Williams, 2021). Such initiatives illustrate how diverse circular activities can contribute to a more comprehensive understanding of circularity, especially when the importance of scale is acknowledged (Marjanović et al., 2022). In this context, embracing circular development encourages cities to go beyond isolated actions and strive for systemic transformations supporting long-term socio-ecological resilience.

To advance circular development within the territory, Marin (2019) presents the latter as a crucial element of circularity through the model of *territorial circular development*, examining new balances between human activities and the environment and prioritising land production over consumption. The author notes that restoring existing elements can serve as a starting point for a circular urban and regional system. For instance, allocating land for ecosystem services related to production can help regenerate the urban ecosystem (Williams, 2019). Within this perspective, resources circulate throughout the territory, emphasising socio-spatial functions and illustrating how circularity can be achieved across interconnected urban-regional systems.

Related to the spatial operationalisation of circularity and focusing on urban and rural dynamics, two projects are presented. One emphasises territorial functions, and the other explores the relationships among systems. Following the distribution of functions across the territory, the *horizontal metropolis* is presented as an innovative project that fosters a close relationship between urban and rural areas, resulting in a decentralised, cohesive, and self-organised system (Viganò et al., 2017). It conceives space as a renewable resource, with its porosity, connectivity, and horizontality as essential elements that encourage coexistence and generate new relations among people and other agents. In this sense, its polycentric spatial logic moves beyond traditional metropolitan characterisations by providing territorial support, particularly in urban-rural interfaces, to circular processes. Cavalier and Viganò (2019) describe how the scattered presence of metropolitan services encourages multi-directional and horizontal relations, urbanising the countryside, while enabling dispersed forms of living,

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working and producing. Moving forward, planning, design, and governance tools must align to develop long-term territorial resilience (Viganò et al., 2017). In Belgium, the city-countryside has historically served as a key framework for managing the continuous process of urbanisation since the Industrial Revolution (Cavalier & Viganò, 2019). However, this evolution has not been solely organic, since urban expansion has also been co-produced by government policies (Buitelaar & Leinfelder, 2020). By embracing horizontality and distributed centralities, territories can better support circular practices by leveraging the geographical proximity of resources.

Fostering relationships among systems, Magnaghi (2013) argues that reterritorialisation valorises shared heritage assets by re-establishing the ways of life of each place and community. Moreover, reterritorialisation converges in the *bioregion project* to produce sustainable, widespread wealth that values its territorial heritage equally sustainably (Magnaghi, 2013). A bioregion reconnects living systems through the places they inhabit, and its implementation requires circular-economy strategies to reduce environmental degradation caused by endless production cycles (Thackara, 2019). This concept also suggests the restoration and co-evolutionary relationships between human settlements and the environment, transforming them from a spatial unit into a framework for regenerative perspectives. The bioregion thus coordinates the network of small and intermediate cities, integrating them with their agroecological environment as nodes of socio-environmental balance (Magnaghi, 2023). In this model, growth is measured by improvements in land health, ecological carrying capacity, and community resilience (Thackara, 2019).

By adapting the principles of the bioregion within the territory, the *urban bioregion* emerges as a new approach for addressing ecological issues within territorial frameworks (Magnaghi, 2023). Thackara (2019) suggests that new approaches to reconnecting cities and their bioregions involve nurturing biodiversity patches, with relationships as the new priority. In this regard, Magnaghi (2023) emphasises that bioregions encourage territorial institutions to adopt a synergistic, multidisciplinary, and multisectoral approach, coordinating the network of small and intermediate cities integrated with their agroecological environment as nodes of socio-environmental balance. For instance, the creation of ecological corridors enables the development of a network that also benefits recreational and cultural areas for the population, while ensuring ecological viability amid land fragmentation (López-Goyburu & García-Montero, 2018). Allen (2003) notes that pursuing mutually supportive, environmentally sustainable relationships among urban, peri-urban, and rural systems requires a renewed examination of the urban bioregion concept.

Building on earlier analysis of various theories and initiatives, recognising local particularities, understanding resource flows across different scales, acknowledging land as an active agent, and strengthening links between local and regional dynamics are essential to establishing a regenerative territory. According to Garzilli et al. (2022), the shift from a linear to a circular loop involves reassessing urban-rural areas through the lens of regeneration. Approaching these areas from a regenerative perspective offers an opportunity to transition from a linear to a circular supply chain, replacing the term “expansion” with one of “recovery”. Furthermore, regenerative production in cities is recognised as a pathway to circularity, which can be achieved by conserving components via repair and renovation, as well as by improving the traceability systems of various urban components (Hausleitner et al., 2022). Looping, regenerative and adaptive processes generate enduring societal benefits that the market frequently underestimates (Williams, 2022). Together, these insights emphasise the need for frameworks and design practices that operationalise regeneration as a guiding principle for future sustainable development.

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Regeneration is a broad concept that can be viewed from many angles. In ecological terms, *regenerative development* means building proactive relationships between humans and various ecosystems (Girardet, 2015). While living systems inherently possess the ability to regenerate, human actions are increasingly turning these renewable systems into non-renewable ones. When discussing sustainability and regeneration, Girardet (2015) argues that attention should be placed on regeneration rather than on sustainable urban development alone. One approach that bridges sustainability and regeneration is *regenerative sustainability*, which considers an integrated global network of humans and the broader ecosystem, where processes reveal and reinforce the unique character of each place or community (Gibbons, 2020). This perspective involves creating site-specific solutions to regenerate the territory as a whole (de Meulder et al., 2022). In this regard, regeneration is highlighted as an active, place-based, and participatory mechanism, one that seeks not only to restore ecological dimensions but also to cultivate a resilient urban community.

In urban planning, regeneration usually involves specific initiatives for areas that are deteriorating and socially vulnerable, combining economic, social justice, and inclusion factors to reduce poverty and physical decay and support future sustainability (Turok, 2010). In this context, urban regeneration seeks to improve residents' quality of life, promote economic growth, and support sustainable development. While regeneration is often implemented in urban contexts through localised or individual interventions, expansive territories characterised by the overlap of urban and rural spaces require more comprehensive, integrated strategies.

The conceptual and practical elasticity of regeneration allows it to be examined from both urban and ecological perspectives, strengthening the link between regional and local planning. Within this context, territorial regeneration is proposed as an approach that integrates urban and environmental characteristics, aligning spatial strategies with ecosystem processes, resource cycles, and social dynamics. It is a transformative framework that leverages spatial, ecological, and socio-economic interdependencies to shift from linear growth patterns to circular, restorative development models.

Methodology

This research adopts a qualitative, theory-driven methodology that combines a comprehensive literature review with an illustrative case study to demonstrate and contextualise the main arguments. In a subsequent phase, a methodology will be developed to apply the theories addressed in the case study.

The initial phase involves an integrative literature review to clarify the conceptual foundations of territorial regeneration from a circularity perspective. The inclusion criteria for the review emphasise circular processes and territory; urban-rural dynamics and their implications for resource circulation; and planning systems with a particular focus on urban-rural areas. Literature solely focused on the circular economy is intentionally excluded to maintain the analytical emphasis on circularity and territory.

The review conceptualises territorial regeneration through three themes: (i) the urban-rural dichotomy; (ii) the spatial dimension of resources; and (iii) the challenge of urban-rural relationships in regional planning. Additionally, it recognises the theoretical development of the concepts of the circular city, circular development, and territorial circular development, as well as two initiatives, the horizontal metropolis and urban bioregion, that connect circularity and territory through regenerative approaches from diverse perspectives.

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To illustrate and contextualise the theoretical arguments, the research includes an exploratory case study of the urban agglomeration comprising Puerto Montt, Puerto Varas, and the town of Alerce in southern Chile. The study examines how existing planning instruments shape urban and rural dynamics, and their capacity to support or constrain circular and regenerative outcomes. This agglomeration was chosen for its rapid growth, complex urban-rural interface, and increasing tensions among urban expansion, planning, and sustainability.

Puerto Montt's unique mononuclear reticular system articulates relationships with surrounding settlements (MINVU et al., 2020), and it forms the most socially segregated functional urban system after the three largest metropolises (Ilustre Municipalidad Puerto Montt, 2017). Together with Puerto Varas, located 22 km to the north, the two cities have an urban population of 329,982 inhabitants (INE, 2024). To strengthen the urban system formed by Puerto Montt and Puerto Varas, which already functions in a coordinated and interdependent way, the establishment of a new metropolitan area¹ was approved (SUBDERE, 2024). However, its implementation remains pending.

Over the last few decades, Puerto Montt has experienced explosive growth driven by the development of the salmon industry. This shift in the region's productive model had economic and social impacts, as well as effects on the forms of occupation of the territory (Montero, 2004). In the early 2000s, the mega housing project in Alerce responded to labour demand, resulting in highly segregated, infrastructure-deficient urban growth (Castro et al., 2015). Alerce expanded by 104 % in terms of surface area between 2003 and 2013 (BID et al., 2020). In response, a new regulatory plan for Puerto Montt was introduced in 2008, which projected a conurbation with Alerce. More recently, post-pandemic aspirations to live closer to nature have intensified urban expansion in this urban agglomeration. Thus, Puerto Varas and its surrounding areas have become popular destinations for residents across the country (Reyes et al., 2022). This has been driven by low-density growth (Ilustre Municipalidad Puerto Montt, 2017), characterised by dispersed, fragmented development along various mobility routes.

Planning responses have struggled to enable integrated, sustainable development. In 2008, Puerto Montt extended its urban limits by 2,717 hectares. A new Regulatory Plan, under development since 2016, maintains its boundary, as there is still room for further growth. In contrast, the new Puerto Varas Plan from 2025 substantially expands the urban area, increasing it from 546 hectares to 2,213 hectares. Nevertheless, the municipality clarified that, after excluding built-up areas outside the current urban limit, the actual expansion would be 1.4 times the previous urban area (Ilustre Municipalidad de Puerto Varas, 2019).

Planning system in Chile shaping urban-rural dynamics

The story of regulatory instruments that shape urban-rural dynamics originated in the military dictatorship, where, from 1973 to 1989, it embodied a neoliberal agenda that promoted the privatisation and liberalisation of land and other natural resources (Alvarado & Elgueta, 2021). With the state adopting a subsidiary role, market and planning instruments became key in shaping territorial expansion, primarily through two planning tools introduced during this period.

One was the social housing policy, conceived as a market good with the private sector responsible for its production (Hidalgo, 2007). Specifically, Article 55 of the General Urbanism and Construction Law (LGUC in Spanish) prohibits subdivisions and the opening of streets beyond the urban limit, except for the construction of social housing that meets the

¹ In Chile, metropolitan areas are defined by a territorial extension linked together by a continuum of buildings that share functions and have more than 250,000 inhabitants (BCN, 2020).

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requirements for obtaining a state subsidy. In this manner, and with the aim of providing private developers with access to cheaper land in rural areas, the current regulation permits the construction of streets and subdivisions of lots outside the urban limit to develop social housing or housing complexes that meet the conditions for obtaining a state subsidy. Another key regulation was Decree Law² No. 3516 of 1980, which permitted the subdivision and commercialisation of agricultural land by subdividing up to 5,000 m². Although the regulation stipulates that the agricultural use of these rural lands must be maintained, in practice, many of these subdivisions are used for urban development³. The above has led to an extension of land for development in rural areas that lack infrastructure, equipment, and services (Vicuña, 2013).

The phenomenon of detached houses on agricultural land has become evident in the peripheries of almost all Chilean cities, regardless of their size. It is a profitable business for sellers and an excellent long-term investment. Discussions have arisen concerning the interpretation of the regulation, and in 2022, the Minister of Agriculture imposed stricter criteria for authorising subdivisions. By the end of 2025, subdivision applications were at their lowest level (Baeza, 2026), manifesting a lethargy in this form of urban sprawl. The expansion driven by this regulation has had numerous impacts. Environmentally, it has led to reduced agricultural land, deforestation of native forests, destruction of wetlands, ecosystem fragmentation, and increased pressure on water resources (Blake & Gomez, 2022). Additionally, there has been a growing demand for waste collection services and increased pressure to develop energy and road infrastructure (Comunicaciones SAG, 2022).

In addition to the mentioned regulations, different plans organise urban growth at different scales. The Municipal Regulatory Plan establishes an urban limit—an imaginary line separating urban from rural areas—where only urban areas are subject to zoning and regulatory frameworks. Meanwhile, rural areas are governed by the regulations' exceptions for urban areas (Article 55 of the LGUC and Decree Law 3516), as well as by the designation of natural protected areas. For larger, more functional interactive urban agglomerations, the Metropolitan or Inter-municipal Plan can be implemented to regulate the physical development of urban and rural areas. These are currently the only binding instruments for establishing zoning in rural areas. At a subnational level, the Regional Land Use Plan aims to adopt a territorial perspective that encompasses both urban and rural areas; the plan has among its objectives the promotion of an integrated system of human settlements, encouraging functional collaborations between urban and rural areas, as well as urban-rural transition areas (COMICIVYT, 2017). However, it has yet to evolve from an indicative to a normative character.

When analysing the presence of the circular economy concept in land-use planning instruments at national, regional, and municipal levels, several references appear, mainly at an indicative level. One of them, the National Landscape Restoration Plan 2021–2030, includes promoting the circular economy among its objectives (MINAGRI et al., 2021). Likewise, Chile's Long-Term Climate Strategy notes that implementing sustainable policies across sectoral and territorial levels requires a significant effort to change consumption habits and to emphasise the importance of the circular economy (MMA et al., 2021). This involves reusing waste, shifting to carbon-neutral production methods, and restoring natural systems to enhance resilience. The National Tourism Strategy for 2030 proposes the creation of tourism services that promote the regeneration of declining areas, reduce environmental

² In Chile, a decree law refers to a legal norm with the force of law, issued by the executive in the absence of a functioning legislature during the military dictatorship (1973-1990).

³ As illustrated in Figure 1.

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impact, and promote a circular economy (Ministerio de Economía, Fomento y Turismo, et al., 2022).

Circularity in Chile is in its early stages, as outlined in the Roadmap for a Circular Chile by 2040, which presents a vision for a circular transition that prioritises people's well-being and a sustainable society across production and consumption (MMA et al., 2021). This roadmap also introduces the concept of circular territories, emphasising the importance of local governments in driving the transition toward circularity. In line with this approach, the Methodological Guide to Orient the Transition Towards a Circular Economy at the Municipal Level highlights that this shift will depend on each municipality's specific context, ensuring that the most vulnerable groups are not left behind (MMA, 2023). Additionally, the RCD Circular Economy Roadmap under Construction 2035 advocates for the recovery and reuse of construction and demolition waste, highlighting another key area of circular innovation in the country (Construye2025 et al., 2020).

Given the socio-spatial segregation of cities, the National Council for Urban Development in Chile (CNDU in Spanish) indicates that current regulations are insufficient to reverse urban inequality and considers regeneration as a key tool for overcoming urban segregation (CNDU, 2015). In 2006, the Ministry of Housing and Urbanism introduced a new housing policy to enhance the design quality of social housing developments. This new policy involved considering existing dwellings through the Family Heritage Protection and Neighbourhood Recovery programmes, which address regeneration following the deterioration of housing and neighbourhoods. A subsequent milestone in promoting regeneration was achieved in 2022 with the approval of the Law on Social Integration in Urban Planning, Land Management, and Emergency Housing Plan, which continued the effort to create a less fragmented and segregated territory. One of its objectives is to encourage, through incentives, the integration of social housing in areas with good accessibility and connectivity. It also includes a Regeneration Plan for deteriorated social housing complexes and establishes a Regeneration Master Plan for severely deteriorated or irrecoverable housing complexes.

Some changes have been noted in environmental issues since the 1990s. The National Commission for the Environment in Chile (CONAMA in Spanish) highlights how the debate on environmental sustainability emerged with the return of democracy in the 1990s (CONAMA, 1998). The National Strategy on Climate Change and Vegetation Resources sets a goal to regenerate vegetation resources (CONAF & MINAGRI, 2016). Additionally, the National Urban Parks Policy identifies the creation of new urban parks as a land-regeneration strategy (MINVU, 2021).

With the continued growth of emerging urban agglomerations, it's important to consider how planning these regions can support a circular transition. The varied uses and dynamic interactions between urban and rural zones lead to closer geographical proximity, improving resource production efficiency.

Planning knots in implementing circularity within an emerging Chilean urban agglomeration

Spatial planning in Chile continues to be structured around a rigid and artificial division between urban and rural areas, with the former receiving most of the attention and, therefore, more regulations. These institutional designs perpetuate the urban-rural dichotomy, and certain regulations even favour the market. As observed by de Mattos (2010), the commodification of urban development, driven by its high profitability, has led real estate businesses to influence uncontrolled urban land expansion.

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Despite existing planning instruments, none have been effective in controlling urban expansion. As shown in Figure 1, urban expansion has increased considerably between 2010 and 2025, despite the new Plan for Puerto Varas and the unbuilt areas in Puerto Montt. This suggests that municipalities are at a crossroads in establishing urban boundaries. Furthermore, modifying them is more a consequence of ongoing urban expansion than a deliberate planning strategy. In practice, as urban sprawl and new settlement patterns develop, new urban limits are drawn, prompting the city's expansion.

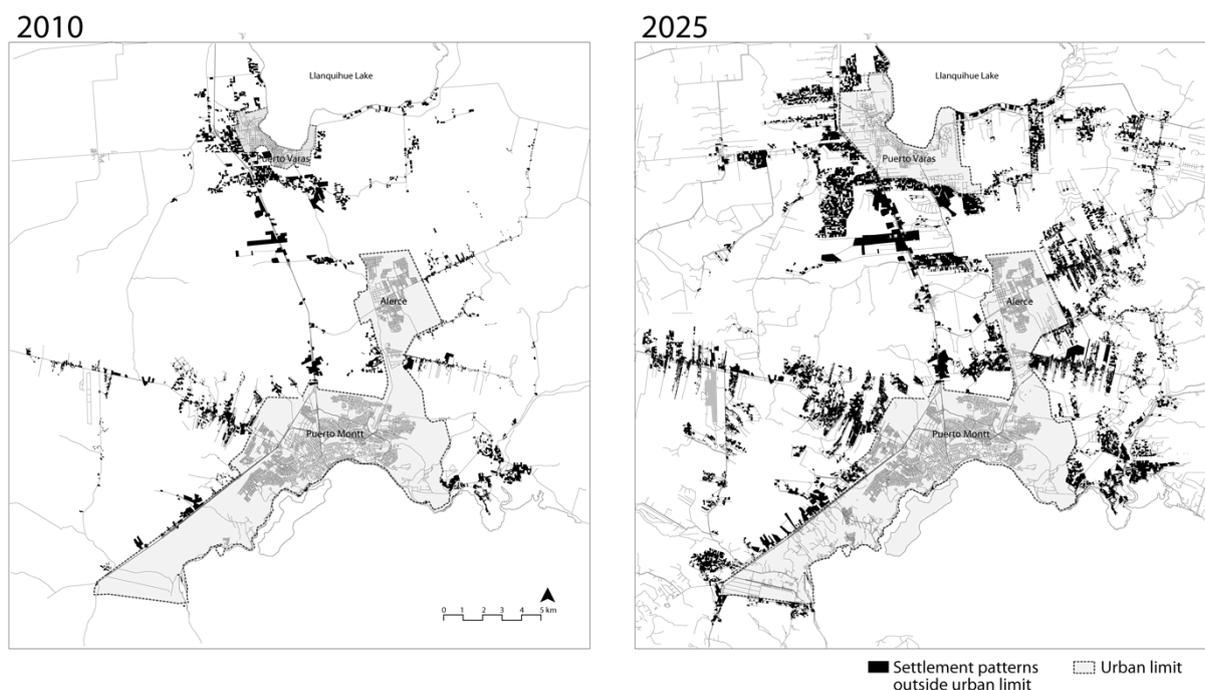


Figure 1. Evolution of urban expansion and modifications of urban limits in Puerto Montt and Puerto Varas. Source: author

Nevertheless, efforts have been made to address rural-urban areas in an integrated manner, encompassing environmental aspects related to climate change adaptation, ecosystem restoration, and biodiversity promotion. However, the evidence shows that they remain at the stage of declarations of principles without proper statutory regulations. The Regional Strengthening Law marks a significant advancement in regional planning. The resulting Regional Land Use Plan adopts a more careful consideration of each territory, serving as a vital tool for integrated territorial planning. Nevertheless, it must be statutory to make an impactful implementation.

Furthermore, many sectoral planning instruments lack both horizontal and vertical integration. Transport infrastructure investment, for example, is often pursued through a strictly sectoral approach and is frequently undertaken in isolation from spatial planning (Comisión Presidencial, 2013). The challenge is compounded by the Ministry of Public Works' role as the principal source of public investment at the regional level (Salamanca, 2022), which reinforces centralised, sectoral decision-making. A similar fragmentation is evident between the National Rural Development Policy and the Regional Land Use Plan, the closest mechanism to rural planning (Bergamini & Rasse, 2022). Overall, Chile's planning system is characterised by sectoralisation and centralisation, which undermine coherence and limit the capacity to address territorial dynamics comprehensively.

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The limited intersectoral coordination between environmental and urban planning fields is also reflected in the differing approaches to regeneration pursued in the country. Although urban regeneration has gradually adopted a more holistic perspective—incorporating social justice and sustainable development principles—these efforts remain confined to specific neighbourhoods or localised intervention areas. In contrast, environmental regeneration focuses on resource recovery, emphasising landscape restoration and biodiversity enhancement. Consequently, regeneration efforts in Chile tend to be either environmentally driven or urban-focused, with little convergence at a broader regional level. This disconnection raises concerns about the coherence and effectiveness of regeneration strategies, as Bustos (2020) argues, with current regeneration programmes often failing to deliver integrated, coordinated, and sustainable actions across the territory.

Circular transition and regional planning are interdependent forces for sustainable development. Integration into planning and development strategies is still in its early stages. Recently, the circular economy has been integrated into Chile's sustainability dialogue. As part of a circular transition, the efficient use of resources and the potential for adaptation are highlighted through strategies to regenerate natural systems and restore degraded soils, create green infrastructure to minimise risks from natural disasters, and promote biodiversity (MMA et al., 2021). The Roadmap for a Circular Chile by 2040 emphasises the importance of recognising the particularities of each territory and implementing local actions. The roadmap stresses the following gaps in the transition: a lack of infrastructure and resources for the circular economy, as well as a concentration of investment in research, development, and innovation in a few specific locations. Another example is housing, where Chilean Housing Policy has shifted from focusing on quantity to prioritising quality. The document, Circular Economy Strategy for Chile: Sustainable Housing Solutions, notes several systems for material innovation and urban regeneration. While valuable, these efforts are limited in scale and lack links to broader city and territory initiatives. Furthermore, by planning to connect urban and rural areas through a circular approach, the geographical proximity of resources, the scale of flows, and systems interactions should be strengthened to spatialise circularity.

Regarding circular local actions, the Regional Climate Change Action Plan for the Los Lagos Region emphasises the importance of promoting regional management to implement the circular economy instead of traditional waste management, for example, by optimising energy, raw materials, and services (Delegación Presidencial, 2023). The Municipality of Puerto Varas declares in its 2022–2030 Community Development Plan that its goal is to foster sustainable regional competitiveness through the development of a circular economy (Ilustre Municipalidad de Puerto Varas, 2022). Likewise, the intention to restore and regenerate the territory's biodiversity and environmental heritage is declared. It should be noted that Puerto Varas is currently a member of the BiodiverCiudades Network, a group of cities aiming to transform themselves through nature and incorporate biodiversity into land-use planning as a core element of their socio-economic development, based on principles such as healing the urban-rural connection and reintegrating biodiversity into the urban fabric, among others (CAF, n.d.). Puerto Montt, meanwhile, recently formalised the establishment of a Circular Economy Technology Centre, aiming to improve productivity and social and economic outcomes (Bustamante, 2025). Among the aspects to consider when integrating circularity and territory is the supply chain scale, as the geographical proximity of resources and production lines helps reduce transportation costs. As underscored by Lucertini and Musco (2022), land should no longer be characterised merely as a passive container for development, but as an active agent that entails the efficient use of resources, the reduction of waste, and zero land consumption.

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Since the urban agglomeration is an emerging metropolitan area, municipalities can develop a Land Use Metropolitan Plan, providing an opportunity to plan both urban and rural areas between Puerto Montt and Puerto Varas. Due to their dispersed territory, they seem to be an interesting hub for developing innovative planning that considers territorial regeneration as a circular principle. As Bolay and Ravinovich (2004) note, the urban-rural interface therefore serves a strategic function as an intermediary space for territorial cohesion in regional development.

While typically applied at a neighbourhood level, regeneration can be scaled up to a broader territorial level to address the diverse systems that shape urban-rural areas. Thus, to consider regeneration as a circular principle in Chile, it is necessary to overcome the current division between urban planning and environmental planning.

Conclusions

The article presents territorial regeneration as a circular principle that links spatial planning with ecological, social, and economic factors at the regional level. Focusing on the Chilean case of the emerging urban agglomeration between Puerto Montt and Puerto Varas, the study illustrated how existing planning tools, through their environmental and urban dimensions, support or hinder regenerative and circular outcomes.

By conceptualising territorial regeneration, the research highlighted resource flows, land-use changes, and governance structures as decisive factors in promoting circular and regenerative outcomes. By examining concepts such as circular city, circular development, and territorial circular development, territorial regeneration emerges as a tool for engaging with these ideas, particularly within the planning framework. Moreover, projects such as bioregions or horizontal metropolis can foster dialogue within territorial regeneration, emphasising the urban-rural dynamics. Territorial regeneration can oscillate between theory and practice, showing how circular principles can be incorporated into regional planning and enable regenerative transformations.

Positioning territorial regeneration as a circular principle thus advances by: (i) integrating environmental and urban dimensions at a regional scale, surpassing the urban-rural dichotomy; (ii) reweaving dispersed and fragmented territories by restoring ecological continuity and fostering spatial structures that evolve with circular resource flows; and (iii) providing a mechanism for long-term sustainable development, even where regional planning frameworks remain limited.

The Chilean planning system underscores broader debates on circular regions and regenerative planning, highlighting the importance of translating circularity from sectoral policies into regional strategies that acknowledge the scale of circular processes. Territorial regeneration provides a space for the intersection and integration of urban-rural transition zones with circular principles, being the dynamics of this interface capable of closing loops. In contexts where regional planning tools are still evolving, territorial regeneration offers a practical entry point for embedding circularity into planning practice. By focusing on urban-rural transition areas, it shifts attention from administrative boundaries to the variety of uses and systems that intertwine and intersect. These expansion areas, characterised by overlapping social, environmental, and economic dynamics, have the potential to enhance circularity through proximity-based resource cycles and multifunctional land uses, fostering innovative planning perspectives. Moreover, the dispersion of the emerging metropolitan area of Puerto Montt and Puerto Varas can be a key factor in resource flow efficiency. Therefore, adopting territorial regeneration as a circular principle offers a pathway to shape territories that optimise resource use and boost ecological and social resilience.

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