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Italian Society of Vegetation Science (SISV)

ReSurveyChaMon: a dataset of resurvey vegetation plots of the Argentine drylands*

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Academic editor: Corrado Marcenò ♦ **Received** 28 October 2025 ♦ **Accepted** 17 November 2025 ♦ **Published** 8 December 2025

Abstract

The ReSurveyChaMon dataset provides a unique set of resurveyed vegetation plots spanning the sharp ecological transition between the Arid Chaco woodlands and the Monte steppe in central-western Argentina. The original plots were established in 1990 along a 300-km east-west transect covering a strong precipitation gradient, from xerophytic woodlands to desert shrublands, and were resurveyed in 2025 using the same protocol and plot size. In total, 104 vegetation plots are included in the dataset (52 original and 52 resurveyed). The dataset contains 164 vascular plant taxa from 113 genera and 41 families, with Poaceae, Fabaceae, and Cactaceae being the richest families. Species were assigned to life forms and chorotypes, and their native and endemic status (4 non-native and 39 endemic taxa) was also documented. All plots have been georeferenced, allowing integration with remote sensing and environmental data for future temporal and spatial analyses. ReSurveyChaMon offers an unprecedented opportunity to explore fine-scale vegetation dynamics across one of South America's least studied dryland regions and provides a valuable baseline for biodiversity monitoring, conservation planning, and assessment of climate- and land-use-driven changes in arid and semi-arid ecosystems.

Keywords

Argentina, Arid Chaco, biodiversity monitoring, drylands, long-term change, Monte steppe, resurvey, temporal dynamics, vegetation plots

Introduction

The southern part of South America is characterized by several contrasting phytogeographical provinces, among which the Chaco woodlands and the Monte steppe stand out for their remarkable biodiversity and distinctive vegetation and fauna (Roig et al. 2001; Oyárzabal et al. 2018; Zeballos et al. 2023; Morales et al. 2025). The Chaco woodlands represent the largest area of seasonally dry forests in South America (Bucher and Huszar 1999; Karlin et al. 2013; Zeballos et al. 2023), whereas the Monte constitutes one of the main woody desert ecosystems of the Americas (Morello 1958; Roig et al. 2009). In Argentina, these two phytogeographical provinces are connected by a steep east-west precipitation gradient that creates a transitional belt where taxa from both areas coexist (Morello et al. 1985; Cabido et al. 1993). Beyond climatic forcing, vegetation dynamics in the Chaco-Monte region are

* Topical Collection: "Diversity, dynamics, conservation, and restoration of European Vegetation". Edited by Corrado Marcenò, Alicia Teresa Rosario Acosta, Jorge Capelo, Alessandro Silvestre Gristina, Anna Kuzemko, Salza Palpurina, Salvatore Pasta.

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increasingly shaped by anthropogenic pressures (Rojas 2014). Different authors indicate that these ecosystems are highly degraded due to firewood extraction, overgrazing, and agricultural expansion, and that many communities represent transitional states (Natenzon and Olivera 1994; Villagra et al. 2009; Zeballos et al. 2023).

Vegetation resurveys, which involve re-sampling historically surveyed plots, are increasingly applied to detect temporal changes in plant communities across ecosystems worldwide (Knollová et al. 2024), particularly in the Northern Hemisphere, where vegetation plot data still severely under-represent regions outside Europe and North America. Resurveys are widely considered a reliable and cost-effective tool for analyzing vegetation changes and temporal dynamics, despite some degree of uncertainty associated with the relocation of historical plots (Hédl et al. 2017; Kapfer et al. 2017; Morrison 2021). In 1990, Cabido et al. (1993) surveyed the sharp transition from the Arid Chaco woodlands in the east to the Monte steppe in the west along a 300-km transect in order to describe vegetation changes along this gradient. In 2025, we revisited this transect, applying the same methodological approach after 35 years. Because the historical plots were located and distributed using route milestones as reference points, this resurvey was associated with an exceptionally low relocation error for a long-term analysis. As the Arid Chaco and Monte are among the regions with the highest need for effective nature conservation in Southern South America (Piquer-Rodríguez et al. 2015; Mosciaro et al. 2022), here we introduce ReSurveyChaMon — a new data resource of resurveyed Chaco and Monte vegetation plots. Our aims were to provide an overview of the currently available data, illustrating the structure and contents of the database and its potential future uses.

Study area

The Arid Chaco-Monte transect extending across 300 km in central-western Argentina (65°32' and 67°58'W – 31°44' and 31°17'S), is located in a sedimentary basin surrounded by mountains, within the western plains of Argentina (Fig. 1A, B). The basin originated during the Tertiary period as a result of the subsidence of the crystalline shield and the uplift of the Andes. Elevation gradually increases from approximately 400 m a.s.l. in the east to 620 m a.s.l. in the west. The region lacks permanent rivers and is instead traversed by temporary streams (Cabido et al. 1993).

Bioclimatically, the study area belongs to the (sub) tropical xeric bioclimate (Rivas-Martínez et al. 2011). Annual precipitation ranges from over 500 mm in the east to less than 200 mm in the west, with more than 70% of the rainfall occurring during the warm season (November to April) (Karlin et al. 2013). In contrast to the pronounced precipitation gradient, temperature variation is relatively low: mean annual temperature ranges from 21 °C in the east to 18 °C in the west (Cabido et al. 1993; Karlin et al. 2013).

From a phytogeographical perspective, the eastern part of the study area belongs to the Chaco Phytogeographical Province (Cabrera 1976; Oyárzabal et al. 2018). This sector corresponds to the Arid Chaco, representing the southernmost and driest extreme of the Great South American Chaco (Morello et al. 1985). The Arid Chaco is the most xeromorphic portion of the Chaco ecoregion, characterized by strongly drought-adapted vegetation (Morello and Saravia Toledo 1959; Prado 1993). The western portion of the transect falls within the Monte Phytogeographical Province (Cabrera 1976; Oyarzábal et al. 2018).

The zonal vegetation of the Arid Chaco consists of xerophytic species forming open woodlands, shrublands, and

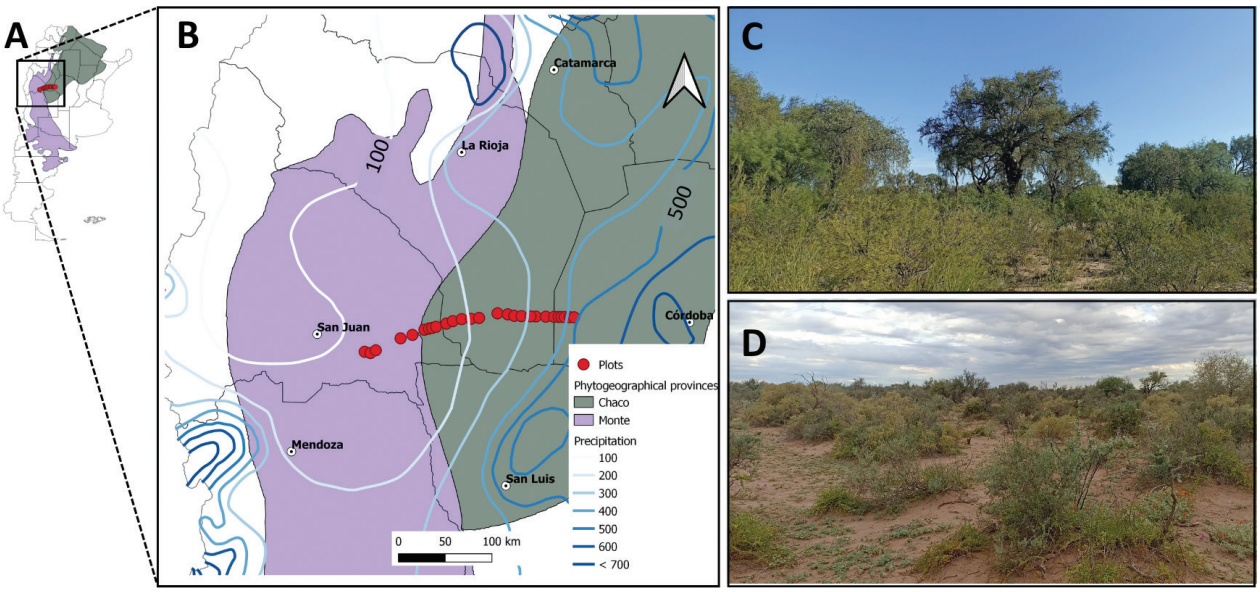

Figure 1. **A)** Location of the study area in central-western Argentina; **B)** Spatial distribution of the ReSurveyChaMon vegetation plots along the Arid Chaco-Monte transect; **C)** Arid Chaco landscape at the eastern end of the transect, Córdoba Province, Argentina; and **D)** Monte landscape at the western end of the transect, San Juan Province, Argentina.

scrub communities (Cabido et al. 1994) (Fig. 1C). The most emblematic tree species is *Aspidosperma quebracho-blanco*, accompanied by low trees such as *Neltuma flexuosa* and shrubs including *Larrea cuneifolia*, *Larrea divaricata*, and *Mimozyganthus carinatus*. The Arid Chaco represents a gradual transition between the Chaco and Monte provinces (Cabido et al. 1993), extending across broad intermontane plains ("bolsones" or "llanos") (Morello 1958).

The zonal vegetation of the Monte steppe is dominated by Zygophyllaceae, particularly *Larrea cuneifolia* and *Larrea divaricata*, together with other shrubs such as *Senna aphylla* and *Zuccagnia punctata* (Roig et al. 2009) (Fig. 1D). Physiognomically, it appears as a moderately dense to open shrubland (1.5–2.5 m tall), with abundant patches of *Geoffroea decorticans* and scattered individuals of *Bulnesia retama* and *Neltuma flexuosa*, occupying relatively low and ancient alluvial plains.

Data collection

All vegetation plots of ReSurveyChaMon meet the following requirements: (i) a complete list of vascular plants within defined plots, including information on species cover; (ii) elevation, (iii) plot location data, including longitude and latitude; (iv) sampling date; and (v) plot size (Table 1).

Table 1. Contents and structure of the dataset ReSurveyChaMon.

	Description
List of vascular plants	Complete list of vascular plants with cover values using Braun-Blanquet scale for each plot
Chorotype	Distributional ranges species following Zuloaga et al. (2025)
Life Form	Growth form following Zeballos et al. (2023)
Family	Taxonomic family of each species following Zuloaga et al. (2025)
Plot ID	Plot identification number
Coordinates	Geographic coordinates (latitude and longitude) of each plot
Elevation	Elevation above sea level of each plot (in meters)

Vegetation sampling in 1990

The original vegetation survey was conducted in 1990 along National Route No. 20, which runs almost straight from east to west across the Arid Chaco-Monte transition (Fig. 1B). Sampling sites were selected in areas with relatively low disturbance levels, avoiding locations strongly affected by fire, grazing, or logging. Milestones placed at approximately 1 km intervals along the route were used as reference points to distribute the plots regularly across the gradient.

A total of 67 plots (400 m^2 each, Cabido et al. 1994) were surveyed (Cabido et al. 1993). In each plot, all vascular plant species were recorded, and their cover-abundance was estimated using the Braun-Blanquet scale (Braun-Blanquet 1964).

Resurvey in 2025

In 2025, we repeated the sampling using the same methodological protocol, including the same plot size, and the same season (February-March). As in 1990, milestones served as reference points to relocate the historical plots (Fig. 2), although some had disappeared over time. When milestones were missing, the corresponding kilometre distances were measured along the route to approximate the original plot locations. It is also worth noting that two of the original surveyors from 1992 participated in the 2025 resurvey, which further contributed to reducing relocation and identification uncertainties. A total of 52 plots were successfully relocated and resurveyed, whereas 15 could not be retrieved due to uncertain location or loss caused by human activities. As in the first survey, all vascular plant species were recorded, and their percentage cover was visually estimated using the same Braun-Blanquet scale.

Database structure, content and limitations

The ReSurveyChaMon dataset currently includes 104 vegetation plots, comprising 52 original plots surveyed in 1990 and their 52 resurveyed counterparts from 2025. These plots are distributed across three Argentine administrative provinces: Córdoba, La Rioja, and San Juan

Figure 2. Example of a milestone along National Route No. 20, Córdoba Province, Argentina, used as reference points to locate vegetation plots during both the historical and the resurvey campaigns.

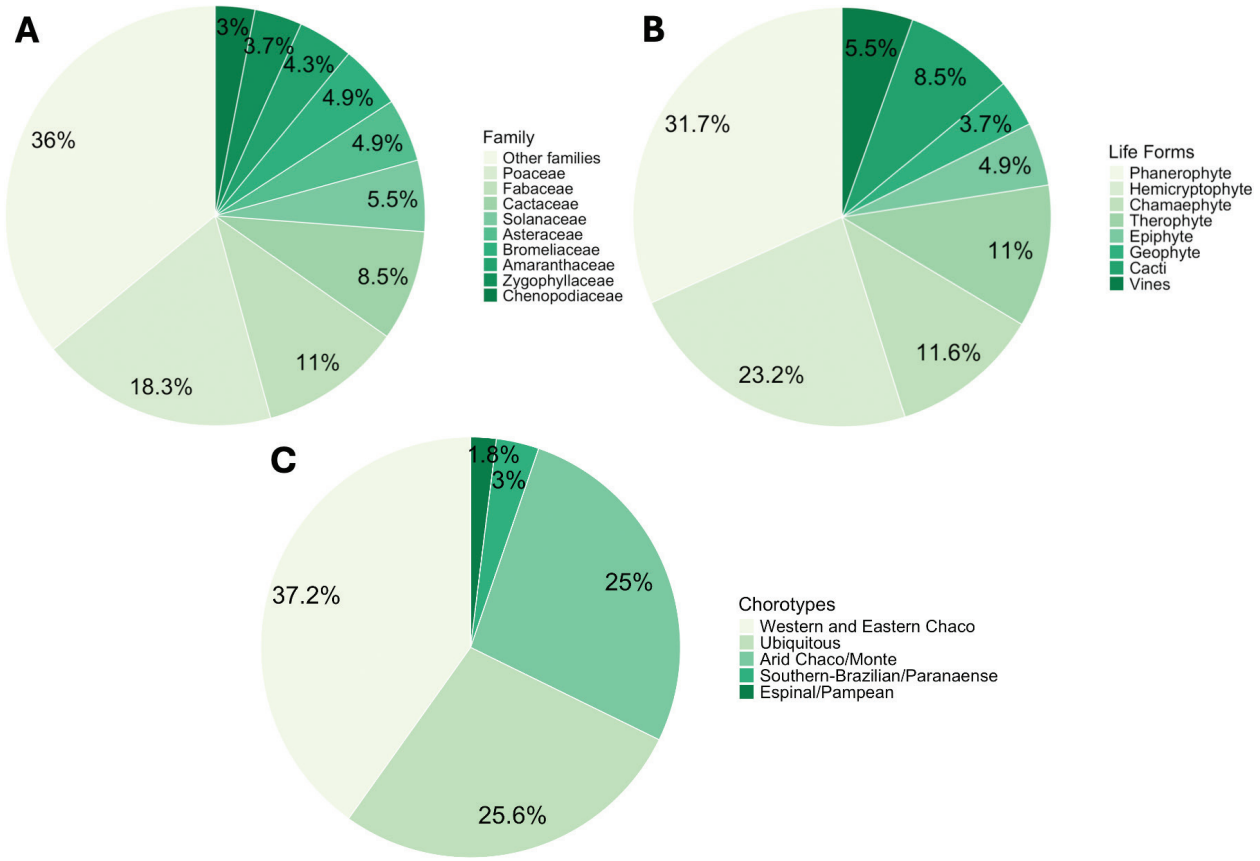

Figure 3. **A)** Proportion of the most common vascular plant families recorded in the ReSurveyChaMon database, based on the number of taxa per family; **B)** Proportion of plant life forms recorded in the ReSurveyChaMon database; and **C)** Proportion of plant chorotypes recorded in the ReSurveyChaMon database.

(Fig. 1). Taxonomic harmonization was performed following the Flora Argentina online database, which provides the most up-to-date list of accepted names and synonyms for the region (Zuloaga et al. 2025). Species were classified into life forms according to Raunkiaer's (1934) scheme, using partly the classification of Ellenberg and Mueller-Dombois (1967), adapted to the Chaco-Monte vegetation. The following categories were used: chamaephytes (low shrubs, sub-shrubs, some perennial herbs); epiphytes; geophytes; hemicryptophytes; phanerophytes; therophytes; cacti; vines. In addition, species were assigned to different chorotypes (groups of species with a similar distribution), following the criteria of Cabido et al. (1998): Southern-Brazilian/Paranaense, Western and Eastern Chaco, Espinal/Pampean, Arid Chaco and Monte, and Ubiquitous (widely distributed in all Argentina and neighbor countries).

Species were classified as native or non-native based on the Flora Argentina online, and endemism within Argentina was determined using the same database and following Salariato et al. (2021).

A total of 164 vascular plant taxa (163 species and one variety), belonging to 113 genera and 41 families, were identified. Among these, 38 families are angiosperms, one family (Ephedraceae) represents gymnosperms, and two families (Pteridaceae and Selaginellaceae) are pteridophytes. Poaceae is the richest family with 30 taxa, followed by Fabaceae and Cactaceae (Fig. 3A).

At the genus level, *Tillandsia* is the most diverse, represented by 6 taxa. Other well-represented genera include *Lycium* and *Pappophorum* (5 taxa each), *Neltuma*, *Portulaca*, and *Sporobolus* (4 taxa each), and *Alternanthera*, *Atriplex*, *Chloris*, *Gomphrena*, *Gymnocalycium*, *Justicia*, *Setaria*, *Strombocarpa*, and *Tephrocactus* (3 taxa each).

Regarding life forms, phanerophytes (31.7%) and hemicryptophytes (23.2%) are the dominant types, whereas epiphytes and geophytes are the least frequent (Fig. 3B).

The biogeographical distribution of taxa indicates that Western and Eastern Chaco taxa (37.2%) and Ubiquitous taxa (25.6%) are the most common chorotypes represented in the dataset (Fig. 3C). Moreover, the dataset includes four non-native species (*Cenchrus ciliaris*, *Portulaca oleracea*, *Talinum paniculatum*, and *Tribulus terrestris*) and 39 taxa endemic to Argentina, such as *Atriplex lampa*, *Larrea cuneifolia*, *Lycium elongatum*, *Neltuma pugionata*, and *Tephrocactus aoracanthus*.

Application and future perspectives

By bridging historical and contemporary vegetation records, ReSurveyChaMon provides the first long-term empirical datasets available for the Arid Chaco-Monte region.

As all plots are now georeferenced, ReSurveyChaMon can be readily integrated with complementary sources of information, such as remote sensing data, to investigate a wide range of environmental impacts, including human pressures and climate change effects. Furthermore, the dataset, like other similar databases (de Francesco et al. 2025; Gholizadeh et al. 2025; Santoianni et al. 2025), can support the identification of priority areas for conservation and serve as a valuable reference for future monitoring and ecological research, contributing to evidence-based habitat management and policy decisions in arid and semi-arid ecosystems of southern South America.

Data availability

ReSurveyChaMon is an independent resurvey database. Data will be available by contacting the authors. We plan to integrate this database into sPlot or other larger data repositories to ensure easy access and interoperability of the data.

Acknowledgements

The authors acknowledge the support of the Williams foundation which funded A.T.R. Acosta for travelling to Argentina. Moreover, A.T.R. Acosta acknowledge NBFC, funded by the Italian Ministry of University and Research, PNRR, Missione 4 Componente 2, "Dalla ricerca all'impresa", Investimento 1.4, Project CN00000033. This work was supported by the Grant of Excellence Departments 2023–2026, MIUR Italy.

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