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# What yerba are we talking about? Wild yerba mate: Knowledge and acceptability of conservation

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**Abstract.**
1. This study assessed the perceptions and acceptance of conservation strategies for native populations of yerba mate (Ilex paraguariensis) in Uruguay.
2. A total of 770 individuals (101 farmers and 669 members of the general public) participated in structured surveys.
3. Only 11.7% of respondents could identify the plant, with farmers demonstrating significantly higher recognition ability.
4. Willingness to conserve the species was high (92.3%), primarily driven by its cultural significance.
5. Four conservation strategies on private lands were evaluated: protected areas, conservation payments, species management and legal regulations. Acceptance varied among groups: farmers preferred voluntary measures (e.g., conservation payments), while the general public supported protected areas and regulations more strongly. The analysis indicated that acceptance depended on factors such as cost-benefit perceptions of protected areas and species recognition.
6. Implications. The cultural value of yerba mate may act as a key driver, and the findings highlight the need for participatory strategies that balance environmental protection with the interests of local communities.

[Keywords: social perception, *Ilex paraguariensis*, voluntary measures]

**Resumen. ¿De qué yerba estamos hablando? Yerba mate silvestre: Conocimiento y aceptabilidad de conservación.**
1. Este estudio evaluó las percepciones y la aceptación de estrategias de conservación para poblaciones nativas de yerba mate (Ilex paraguariensis) en Uruguay.
2. Participaron 770 personas (101 productores y 669 ciudadanos) mediante encuestas estructuradas.
3. Solo el 11.7% logró identificar la planta, y los productores mostraron mayor capacidad de reconocimiento.
4. La disposición a conservar la especie fue alta (92.3%), principalmente por su valor cultural.
5. Se analizaron cuatro estrategias de conservación en tierras privadas: áreas protegidas, pagos por conservación, manejo de la especie y regulaciones legales. La aceptación varió según el grupo: los productores prefirieron medidas voluntarias como los pagos, mientras que el público general apoyó más las áreas protegidas y las regulaciones. El análisis mostró que la aceptación depende de factores como el reconocimiento de la especie y la percepción costo-beneficio de las estrategias.
6. Implicancias. El valor cultural de la yerba mate puede ser un motor clave para su conservación, y se destaca la necesidad de estrategias participativas que equilibren la protección ambiental con los intereses de las comunidades locales.

[Palabras clave: percepción social, *Ilex paraguariensis*, medidas voluntarias]

## Introduction

Although nature is a public good, its management often falls to state agencies that must consider the perspectives of civil society (Flaherty et al. 2019). Consequently, securing social support has become a central objective for effective biodiversity governance (Berkes et al. 2000; Huntington 2000; Olsson and Folke 2001; Bennett 2016). Nature management embodies a social agreement among stakeholders, influenced by societal ecological knowledge, values and beliefs (Joa et al. 2018; Bennett 2016). Understanding public support for nature management practices is crucial for effective conservation (Garibaldi and Turner 2004; Houehanou et al. 2013; Bennett 2016; Cebrián-Piqueras et al. 2020), while neglecting it risks conservation efforts (Chase et al. 2004; Knight et al. 2010; Flaherty et al. 2019; Wallen and Bickford 2020).

The acceptance of management strategies correlates with their impact on individual interests (Haines et al. 2019). Protected areas are common for conservation, but can create tensions on private lands due to perceived

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land-use restrictions; this leads to increased importance for voluntary conservation strategies (Kamal et al. 2015). Top-down approaches generally face less acceptance (Haines et al. 2019), with varying acceptance among societal groups. Public support for species conservation typically exceeds that of farmers, who face more direct conflicts (Flaherty et al. 2019; Haines et al. 2019). Understanding public opinion is crucial for garnering political support (Schlegel and Rupf 2010). The potential conflict index ($PCI_2$) provides insights into potential stakeholder conflicts, thus supporting decision-making regarding conservation strategies (Vaske et al. 2010).

Historically, humans have linked their identities to certain species, fostering cultural and economic ties. Conservation plans focused on these species enhance their effectiveness and social systems (Garibaldi and Turner 2004). In the U.S., attitudes toward conserving the culturally significant *Panax quinquefolius* revealed dissatisfaction among farmers and buyers due to their exclusion from conservation strategies, viewed as ineffective (Burkhart et al. 2012). In Canada, a study on reintroduced bison (*Bison bison*) management indicated minimal conflict, attributing success to community inclusion and participation (Bhat et al. 2022).

Yerba mate (*Ilex paraguariensis* St. Hil., Aquifoliaceae) is a culturally significant species, providing the basis for the popular infusion known as 'mate' or 'tereré'. This beverage, deeply ingrained in South American tradition, is cherished in Uruguay, Argentina, Paraguay, Chile and Brazil (Brasesco et al. 2011). Historically valued for its medicinal properties (Vieira et al. 2008), yerba mate is now recognized for its health benefits, including antioxidant, anti-inflammatory and vasodilatory effects, as well as by reducing drowsiness and aiding weight loss (Turkmen et al. 2006; Markowicz-Bastos et al. 2007; Heck and de Mejia 2007; Bracesco et al. 2011).

Despite the cultural and economic significance of yerba mate, research on its ecology and conservation has been limited (Gonçalves and Valduga 2023), even though the species is classified as Near Threatened on the IUCN Red List (WCMC 1998). Its core distribution includes southern Brazil, southeastern Paraguay and the provinces of Misiones and Corrientes in Argentina (Giberti 1979). In Uruguay, *Ilex paraguariensis* is confined to the eastern region, where 14 isolated wild populations have been reported (Hernández 2019). These populations occur in marginal environments for the species and exhibit high genetic diversity and considerable differentiation compared to those in other parts of its range, raising questions about their long-term viability and adaptive potential (Gottlieb et al. 2011; Cascales et al. 2014). Despite their ecological importance, their conservation status has not been formally assessed at the national level, and no specific protection or management programs are currently in place. Studies in Brazil have shown that livestock production can reduce recruitment and alter demographic structure in wild populations (Stedille et al. 2019).

In this context, our aim was to analyze the level of knowledge about native yerba mate populations (NYMP) in Uruguayan society and the acceptance of four IUCN-proposed conservation strategies for private lands: a) protected areas (PA); b) conservation payments; c) laws and regulations, and d) species management (IUCN 2012). It is important to clarify that in Uruguay, these strategies focus on private lands, as the national system of protected areas is primarily developed on such lands (Cortazzo 2015).

Specifically, this study addresses the following research questions: 1) to what extent is *Ilex paraguariensis* recognized among different segments of the population?; 2) how is the willingness to support conservation of the species related to its perceived cultural value and ecological knowledge?, and 3) how do acceptance levels of different conservation strategies vary between farmers and the general public? Addressing these questions provides valuable insights for designing conservation policies for culturally significant species on private lands.

## Materials and Methods

### *Questionnaire design and data collection*

This study was conducted in Uruguay (Figure 1), using a structured questionnaire administered among farmers and the general public. Our sampling strategy included face-to-face interviews with farmers and an online questionnaire for the public. In-person interviews were carried out between May and August 2023 using cluster sampling, targeting groups of households located near native yerba mate populations (NYMP) in eastern Uruguay

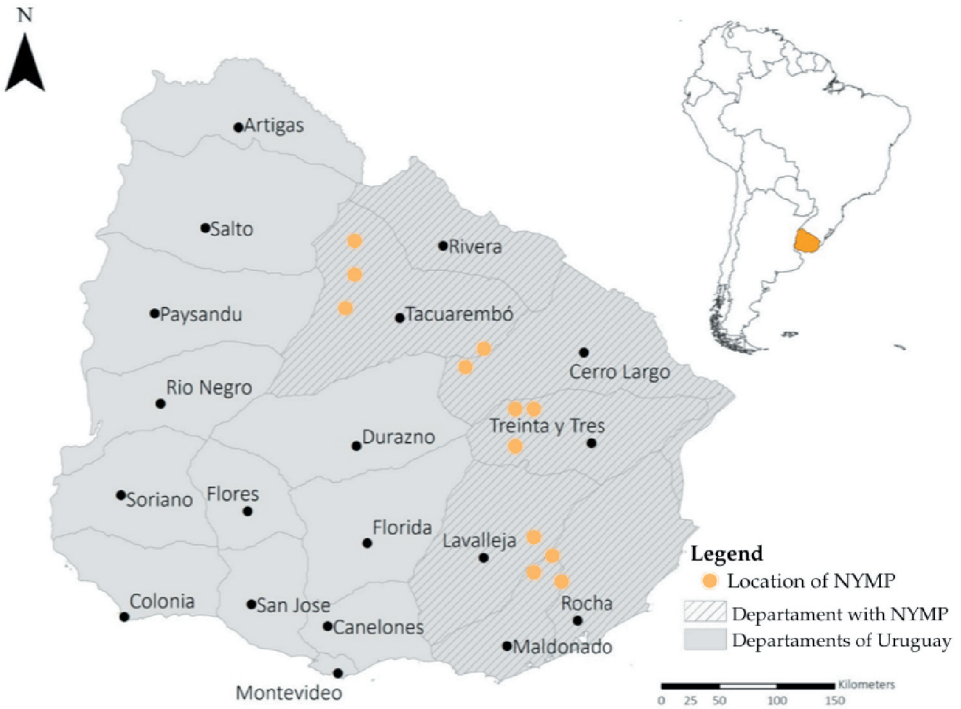


**Figure 1.** Political Division of the Republic of Uruguay. In hatched, the Uruguayan departments with known native populations of yerba mate and the orange dots indicate the location of native populations (Hernández 2019).

**Figura 1.** División Política de la República del Uruguay. En sombreado se muestran los departamentos uruguayos con poblaciones nativas conocidas de yerba mate, y los puntos en naranja indican la ubicación de las poblaciones nativas (Hernández 2019).

(Figure 1). We visited a total of 105 farmers, residents of the towns of Aiguá (department of Maldonado), Capón da Yerba (Tacuarembó), Quebrada de los Cuervos (Treinta y Tres) and Paso Centurión (Cerro Largo).

The online survey was distributed via social media and was open for responses during the same period. It was self-administered using a Google Form identical to the one used in the field. As no specific sampling strategy was applied for the online survey, responses reflect a non-probabilistic, self-selected sample. This approach facilitated efficient and accessible data collection, ensuring that the responses from both modalities were comparable.

The structured questionnaire was composed of four sections. The first section gathered demographic information from respondents, including age, gender, location and duration of residence, last year of schooling completed, and whether the household's main income came from agricultural production. The second section assessed knowledge of NYMP, focusing on: 1) the ability to recognize the plant (through direct observation or images); 2) understanding of its growth form, and 3) awareness of its natural distribution in Uruguay. This section also included perception ratings of the costs and benefits of PA and their management, both using a five-point scale.

The third section explored general willingness to conserve NYMP and the motivations behind it, offering two main reasons: cultural and economic. Willingness was rated on a five-point ordinal scale (1=strongly disagree, 5=strongly agree).

The fourth section assessed the acceptability of four separate conservation strategies for *Ilex paraguariensis* on private lands. These strategies were based on IUCN (2012) guidelines and included: a) establishing new protected areas; b) implementing conservation payment schemes; c) including the species in active management within government conservation plans, and d) enforcing laws and regulations to ensure protection. Each strategy was presented with a brief, clearly defined description, and participants rated their level of agreement using a five-point Likert scale (1=strongly disagree, 5=strongly agree). Responses were analyzed independently for each strategy, as they were presented as separate scenarios. The full questionnaire,

including the wording of each scenario, is available in the supplementary material. Informed consent was obtained from all participants in both the online and in-person surveys.

### *Data analysis*

To evaluate which demographic variables explain the recognition or knowledge of the species, a chi-square test was performed for categorical variables such as face-to-face or online survey, public or farmers, educational level, level of mate consumption and gender. A logistic regression analysis was made for recognition or knowledge as a function of continuous variables such as age, years of residence in a locality close to a NYMP and the distance of each respondent to the nearest wild population. The distance of each respondent to the nearest population (NYMP) was calculated using the reported residence of each respondent and georeferenced population data provided by Hernández (2019). This calculation was performed using QGIS 3.36.3, utilizing the Distance to nearest entity tool.

To compare the level of acceptance of conservation actions, a one-way analysis of variance (ANOVA) was used. The means of the groups (i.e., farmers and general respondents) were compared, and a Welch test was applied for the specific comparison between the means of two groups with different variances. The resulting F statistic from the ANOVA was used to assess the overall significance of differences among the means of all groups.

To assess which variables influence the willingness to conserve NYMP and the acceptability of the four proposed management actions, we employed generalized linear models with ordinal distribution. Prior to defining the explanatory variables, a variable preselection process was conducted to determine which variables would be included in the models, involving correlation analysis to eliminate redundant covariates. The reference r value used was 0.7. For the overall willingness to conserve, different additive models were tested, with age, plant recognition, educational level, mate consumption, and motivations for conservation as explanatory variables. For the acceptability of conservation actions, models were evaluated with demographic variables, plant recognition, perception of PA management, and the perceived trade-off between costs and benefits of PA. For best model selection, we used the Akaike information criterion (AIC). The latter is based on the difference in AIC between a null model and an additive model (ΔAIC). A higher ΔAIC indicates stronger support for the respective additive model. A ΔAIC between 3 and 10 provides moderate support for the additive model, whereas a ΔAIC exceeding 10 strongly favors the additive model as more explanatory (Posada and Buckley 2004). The evaluated models and their parameters are available in the supplementary material.

Finally, we used the $PCI_2$ (Vaske et al. 2010) to determine levels of consensus within the two groups for acceptability of different management options. $PCI_2$ values range from 0 to 1, where 0 represents the highest amount of consensus (least potential for conflict), and 1 represents the highest potential for conflict (Vaske et al. 2010; Vaske 2017). Complete consensus ($PCI_2$=0) occurs when responses are 100% distributed on one side of the spectrum (e.g., when all respondents accept a management option). The greatest potential for conflict ($PCI_2$=1) occurs when responses are equally divided between two extreme response values (e.g., 50% strongly disagree and 50% strongly agree with an option).

## Results

We visited a total of 105 farms; from them, four farmers refused to be interviewed. Therefore, we got 101 face-to-face responses from the farmers group. 26 interviews were done in the department of Maldonado, 17 in Tacuarembó, 40 in Treinta y Tres and 18 in Cerro Largo. Through the online form we obtained a total of 669 responses from the public. Henceforth, our survey sample consists of 770 participants, including representatives from across the country (Figure 2). For both in-person and online surveys, participants provided informed consent before completing the questionnaire.

### *Social characterization of the sample*

Most farmer respondents were men (64.4%). Mean age was 55.3±15.3 years, and the mean time of residence in the region was 34.9±24.8 years. Among the respondents, 14.9% (n=15) completed a higher educational level, leading either to a technician, undergraduate or graduate degree; 44.6% (n=45) and 32.7% (n=33) completed primary and secondary

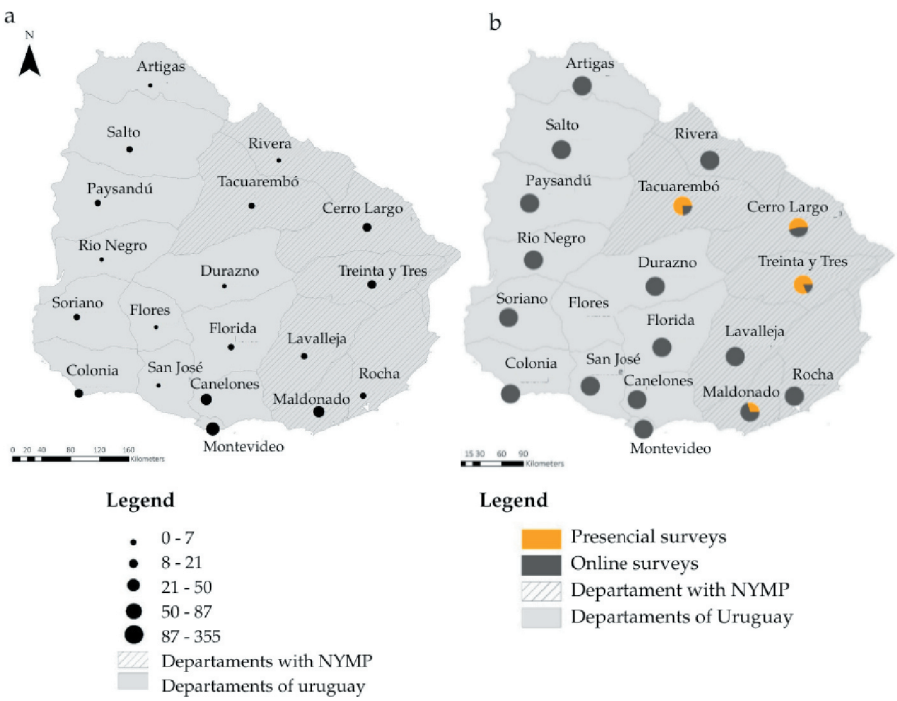


**Figure 2.** A) Number of responses per department in Uruguay. B) Proportion of online and face-to-face responses by department.

**Figura 2.** A) Número de respuestas por departamento en Uruguay. B) Proporción de respuestas en línea y presenciales por departamento.

education levels, respectively. The remaining 7.8% of the respondents (n=8) did not complete primary education. Within the public, most respondents were female (78.3%); mean age was 37.5±12.66. In this group, 19.4% (n=130) completed a higher education level, while 1.3% (n=9) and 79.3% (n=530) completed primary or secondary education levels, respectively. Everyone in this group has completed some level of formal education.

### *Mate consumption and knowledge of the species*

Regarding mate consumption, differences were observed between farmers and public, being significantly higher for farmers ($X^2$=31.5, df=7, P<0.01). Among farmers, only 13.0% reported not consuming mate, 6.5% consumed mate between one and three times a week, 6.5% consumed between four to six times per week and 74.0% reported consuming mate every day. For the public, 11.4% reported not consuming mate, 20.7% consumed mate between one and three times per week, 23.4% consumed between four to six times a week and 44.5% reported consuming mate every day.

In terms of the knowledge about the species, of the 770 interviewees, only 11.7% were able to recognize the yerba mate plant and capable to identify the plant as a tree. Statistically significant differences exist between the groups ($X^2$=14.0, df=1, P<0.01). Farmers group was the most likely to recognize the species. Additionally, 32% of the interviewed recognized the area of occurrence of the species in the country, mainly people from the public ($X^2$=6.2, df=1, P=0.013). The socioeconomic variable most related to the recognition of the yerba mate plant was gender ($X^2$=6.92, df=1, P<0.01), with 16.9% of men and 9.11% of women recognizing the species. No significant relationship was found between the ability to recognize the mate plant and educational level ($X^2$=13.75, df=8, P=0.089), level of mate consumption ($X^2$=7.122, df=7, P=0.416) or age of the respondent (coefficient=0.012, P=0.11).

Regarding the logistic regression, plant recognition was mainly explained by years of residence (β=0.014, P=0.02), and minimum distance between the respondent residence and is closest NYMP (β=-0.067, P<0.01). The first variable shows that longer residence near native yerba mate populations increases species recognition. While the second suggests that people living closer to native populations are more likely to recognize the species (Figure 3).

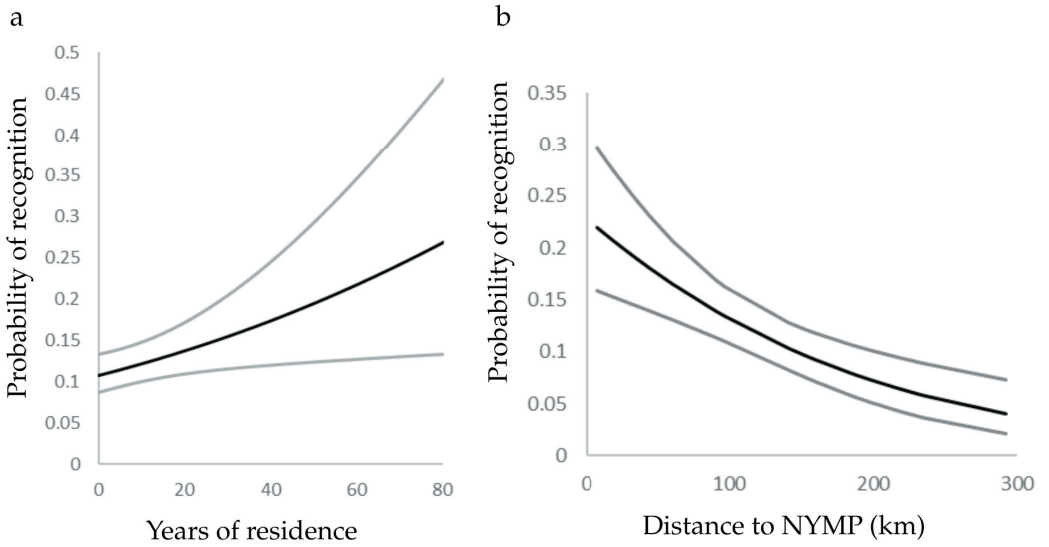


**Figure 3.** Significant predictors of yerba mate recognition among the respondents. A) Probability of recognition as a function of years of residence in a rural area. B) Probability of recognition in terms of distance in kilometers to the native yerba mate populations. Black line represents best fit line, and gray lines represent the confidence interval at 95%.

**Figura 3.** Predictores significativos del reconocimiento de la yerba mate entre los encuestados. A) Probabilidad de reconocimiento en función de los años de residencia en una zona rural. B) Probabilidad de reconocimiento en función de la distancia en kilómetros a la población nativa de yerba mate. La línea negra representa la línea de mejor ajuste y las líneas grises representan el intervalo de confianza del 95%.

### *General willingness to conserve*

The willingness to conserve NYMP was high, with an average Likert scale score of 4.5. Among the respondents, 92.3% (n=711) showed a positive attitude towards conservation actions for the species. Of these 711 supporters, 82.2% were motivated by cultural identification and 59.0% by the species' economic potential. The general willingness to conserve the species was explained by two variables, the recognition of the plant and the motivation given by the cultural identification with the species (Table 1).

### *Acceptability of hypothetical conservation scenarios*

On average, all proposed conservation scenarios received a positive evaluation (mean score >3 on a five-point Likert scale) from both farmers and the general public. However, not all scenarios reached a strong consensus (mean score of 4 or higher). Among the public, protected areas and conservation payments exceeded this threshold, while among farmers, only conservation payments reached an average score above 4. Statistically significant differences between the two

**Table 1.** General disposition to conserve native yerba mate populations.

**Tabla 1.** Disposición general a conservar poblaciones nativas de yerba mate.

| General disposition to conserve (ΔAIC=290)<br>Variable | Coefficient | Std. Err | LR Chisq | DF | Pr(>Chisq) |
|---|---|---|---|---|---|
| Age | -0.0012 | 0.0058 | 0.0412 | 1 | 0.824 |
| Recognize the plant | 1.025 | 0.3006 | 9.776 | 1 | 0.001** |
| Education level | -0.0041 | 0.0479 | 5.523 | 8 | 0.931 |
| Mate consumption level | 0.0552 | 0.0310 | 5.308 | 6 | 0.075 |
| Motivation by economic potential | 0.0938 | 0.0729 | 2.246 | 4 | 0.198 |
| Motivation by to cultural identification | 0.8194 | 0.1020 | 39.290 | 4 | 0.001*** |
| Notes: *P<0.05, **P<0.01, ***P<0.001 | | | | | |

groups were found in the acceptance of PA and laws and regulations (Table 2). The level of consensus also varied between and within groups. For instance, the $PCI_2$ for PA was low among the public, but moderate among farmers. For conservation payments, the $PCI_2$ was low in both groups. Overall, the potential for conflict was consistently higher among farmers (Figure 4).

Generalized linear models for each conservation strategy indicated that different predictors explained its acceptance. PA acceptance was significantly explained by people's ability to recognize the yerba mate plant and the perception of the cost-benefit relationship of PA. The acceptance of conservation payments was mainly determined by educational level, and the management of species was more accepted by those capable of recognized the species. In the case of laws and regulations, no variable was significantly explanatory (Table 3).

Regarding PA, 28.7% of farmers had a negative perception about them. The three most frequent reasons for their negative perception were: land use restrictions (40%), issues with invasive species (33%) and a lack of tourist development opportunities that could promote local growth (26%). Between the public, only 3.6% had negative perceptions about PA.

**Table 2.** Means for each conservation action on a 5-point Likert scale and results of one-way ANOVA with Welch test.

**Tabla 2.** Medias de cada acción de conservación en una escala Likert de 5 puntos y resultados del ANOVA de una vía con prueba de Welch.

| Conservation actions | Farmers | Public | F | P |
|---|---|---|---|---|
| Protected areas | 3.62±1.3 b | 4.25±0.75 a | 40.41 | <0.01 |
| Conservation payments | 4.01±0.88 a | 4.12±0.88 a | 1.08 | 0.30 |
| Species management | 3.63±0.93 b | 3.67±0.99 b | 0.13 | 0.72 |
| Laws and regulations | 3.51±1.15 b | 3.76±0.91 a | 4.79 | 0.029 |

Different letters between groups for the same conservation mean indicate significant differences (P≤0.05)

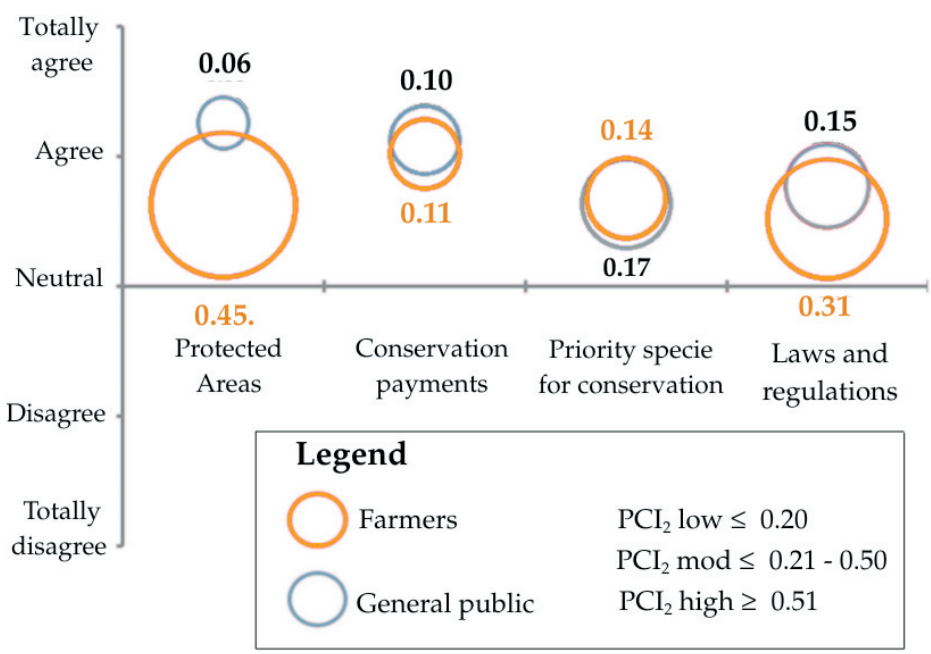


**Figure 4.** Bubble graphs of mean values and scores for conflict potential ($PCI_2$) for the four management actions proposed for the conservation on NYMP for the public and farmers.

**Figura 4.** Gráficos de burbujas de valores medios y puntuaciones del potencial de conflicto ($PCI_2$) para las cuatro acciones de gestión propuestas para la conservación de las poblaciones para el público y los agricultores.

**Table 3.** Ordinal logistic regression models for the four conservation strategies proposed for the conservation of native yerba mate populations selected based on the largest ΔAIC with de null model.

**Tabla 3.** Modelos de regresión logística ordinal para las cuatro estrategias de conservación propuestas para la conservación de poblaciones nativas de yerba mate seleccionadas con base en el ΔAIC más grande con el modelo nulo.

| Establishing protected areas (ΔAIC=1031) Variable | Coefficient | Std. Err | LR Chi sq | DF | Pr(>Chi sq) |
|---|---|---|---|---|---|
| Recognize the plant | 1.725 | 0.666 | 6.71 | 1 | 0.010** |
| Education level | 0.131 | 0.137 | 0.92 | 8 | 0.339 |
| Perception on the management of protected areas | 0.178 | 0.216 | 0.68 | 4 | 0.410 |
| Perceived cost-benefit ratio | 1.260 | 0.304 | 17.18 | 4 | 0.001*** |
| Conservation payments (ΔAIC=12.37) | | | | | |
| Recognize the plant | 0.233 | 0.213 | 1.20 | 1 | 0.271 |
| Age | 0.004 | 0.005 | 0.54 | 1 | 0.461 |
| Education level | 0.136 | 0.040 | 11.35 | 8 | 0.001** |
| Mate consumption level | 0.0358 | 0.027 | 1.8 | 6 | 0.179 |
| Species management (ΔAIC=14) | | | | | |
| Recognize the plant | 0.528 | 0.204 | 6.65 | 1 | 0.010** |
| Age | 0.004 | 0.005 | 0.57 | 1 | 0.449 |
| Education level | 0.022 | 0.040 | 0.31 | 8 | 0.581 |
| Mate consumption level | 0.042 | 0.026 | 2.56 | 6 | 0.109 |
| Laws and regulations (ΔAIC=8.06) | | | | | |
| Recognize the plant | -0.004 | 0.005 | 0.54 | 1 | 0.459 |
| Age | 0.305 | 0.205 | 1.20 | 1 | 0.135 |
| Education level | 0.048 | 0.040 | 11.35 | 8 | 0.230 |

Notes: * P<0.05, ** P<0.01, ***P<0.001

## Discussion

Our results reveal an important paradox: despite the widespread and daily consumption of mate in Uruguay, knowledge about its botanical origin —the wild *Ilex paraguariensis* plant— is extremely low. Only 11.7% of respondents were able to recognize the species, demonstrating a clear disconnection between intensive cultural use and associated ecological knowledge. Hence the title of this article, "What Yerba Are We Talking About?". Although the online sample was non-probabilistic, recognition of *Ilex paraguariensis* was consistently low across a large and diverse sample (n=770). However, it is important to acknowledge that online surveys may overrepresent individuals with greater internet access, higher education levels and younger age. These factors could have influenced both the level of knowledge about the species and the acceptability of the evaluated conservation measures.

This lack of knowledge not only implies limited information about the species, but also represents a direct barrier to its conservation. The three research questions that guided this study were clearly answered by the data. We found that species recognition remains low overall, but significantly higher among farmers and individuals living near native populations. Perceptions and attitudes toward management measures depend largely on recognition of the plant and cultural identification also plays a central role in explaining willingness to conservation. Finally, acceptance of conservation strategies varies between stakeholder groups, highlighting the need for differentiated policy instruments.

This finding is consistent with other studies on culturally important species (e.g., Pretty et al. 2009), showing that cultural or use value alone does not guarantee a species' protection unless it is accompanied by a basic understanding of its ecology. The situation is especially critical for wild yerba mate populations in Uruguay, which, in addition to being located at the southernmost point of the species' natural distribution, exhibit the highest levels of genetic differentiation (Gottlieb et al. 2011). These populations are an essential source of genetic diversity, necessary for future crop improvement and its resilience to changing environmental conditions (Cascales et al. 2014). The conservation of these populations is even more urgent in the context of climate change. Recent models project a reduction in habitat suitability for the species in its

marginal areas, which could particularly affect southern populations (Chacón-Fuentes et al. 2024). These populations, due to their local adaptations, could contain key traits for the species' future adaptation and therefore require priority attention in conservation policies.

Despite its low ecological recognition, we found a high willingness to conserve *Ilex paraguariensis*, driven primarily by its cultural value. This supports the idea that it functions as a keystone cultural species (Garibaldi and Turner 2004), whose symbolic and social relevance can mobilize conservation support even in the absence of ecological knowledge. It may also act as a flagship species for native forest conservation. The willingness to conserve NYMP and the overall acceptability of the proposed strategies were generally high, similar to findings for other culturally significant species (Burkhart et al. 2012) and higher than in cases involving species without such cultural relevance (Zorondo-Rodríguez et al. 2014, 2019).

However, as noted by Mastrángelo et al. (2023), general support for biodiversity does not imply uniform acceptance of all conservation measures (acceptability often depends on perceived costs, fairness and clarity). Our results align with this: while both groups showed good acceptance of payments for conservation, farmers were more supportive of this voluntary measure, whereas the general public expressed greater support for PA and legal regulations. These differences reflect distinct perceptions of the costs and benefits associated with each type of strategy, particularly regarding potential land-use restrictions (Haines et al. 2019; Kamal et al. 2015; Antoneli et al. 2020). Therefore, the effectiveness of any conservation strategy will depend on its ability to adapt to the social realities of the territory. While each measure was presented with a brief and accessible explanatory text (see Supplementary Material), it is important to clarify that some conceptual overlap between strategies may have influenced responses, particularly among participants without prior experience with conservation terminology. Recognition of the plant predicted greater acceptance of PA and active management, highlighting the importance of strengthening the connection between people and the environment they inhabit (Pereira et al. 2016). In this sense, environmental education, participatory projects, and local involvement should be central components of any policy aimed at protecting culturally important wild species (Vodouhê et al. 2010; Bennett 2019).

This study provides evidence that effective conservation of *Ilex paraguariensis* requires bridging the gap between the cultural use of mate and knowledge about its natural source. Uruguayan populations, due to their genetic uniqueness and threatened status, should be prioritized in regional conservation strategies, integrating tools such as education, adaptive management, and incentive schemes compatible with local production practices (Reyes-García et al. 2006; Reyes and Useche 2019).

## Conclusions

This study raises a strong disconnection between the use of a culturally important species and local knowledge. It also suggests that the cultural value of *Ilex paraguariensis* can improve the acceptance of conservation strategies, even when ecological recognition is low. Uruguayan populations —genetically unique and threatened by climate change— should be prioritized through participatory approaches and appropriate incentives. In rural and developing country contexts, combining culture, social perception and voluntary schemes such as payments for conservation can be key to promoting sustainable and effective management.

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