



Research, part of a Special Feature on [Challenges to Understanding and Managing Cultural Ecosystem Services \(CES\) in the Global South](#)

## Place attachment and perceptions of land-use change: cultural ecosystem services impacts of eucalyptus plantation expansion in Ubajay, Entre Ríos, Argentina

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**ABSTRACT.** In recent decades, the landscape in northeastern Entre Ríos Province, Argentina has undergone significant changes because of the expansion of eucalyptus plantations. These plantations have generated perceived socioeconomic and environmental impacts and changes in ecosystem services in this traditionally agricultural region of the Argentine pampas. This study draws on the concept of sense of place as a cultural ecosystem service to explore residents' perceptions of impacts from eucalyptus plantation expansion and to explain how place meanings can change in response to physical landscape change. Although scholars have posited an important link between sense of place and perceptions of land-use change impacts, there has been relatively little empirical work exploring these cultural, emotional, economic, and generational attachments to diverse landscapes, especially to working landscapes that are representative of broad land-use change occurring in many regions in the Global South. In-depth interviews and participatory mapping are used to document the range of place meanings and attachments for residents of the rural municipality of Ubajay, Entre Ríos, and to explore how residents have responded to land-use change. This research shows that sense of place may support community resilience, and thus, that place attachment may enhance adaptation to social-ecological change.

**Key Words:** *Argentina; cultural ecosystem services; eucalyptus plantations; Global South; monoculture plantations; participatory mapping; sense of place*

### INTRODUCTION

Following the publication of the Millennium Ecosystem Assessment (MEA) in 2005, the importance of classifying and measuring ecosystem services has grown tremendously in the ecosystem science and environmental policy literatures (Schaich et al. 2010, Gould et al. 2014, Pascua et al. 2017). The concept of ecosystem services has shifted from being an “academic backwater to the mainstream of conservation and environmental policy” as noted by Redford and Adams (2009:785). Ecosystem service assessments typically include the four main categories of services: provisioning, regulating, supporting, and cultural. A growing list of scholars highlight that although the importance of cultural ecosystem services (CES), or the benefits of non-material cultural services, is often mentioned, there are comparatively few assessments of CES (Schaich et al. 2010, Chan et al. 2012a, b, Gould et al. 2014, Fish et al. 2016, Hausmann et al. 2016, Pascua et al. 2017, Bremer et al. 2018, Wartman and Purves 2018). The majority of research on CES has occurred in Europe and the U.S., and focuses primarily on recreation and tourist landscapes; as such, CES outside of these regions have been little studied (Chan et al. 2012a, b, Gould et al. 2014, Fish et al. 2016, Hirons et al. 2016, Pascua et al. 2017, Bremer et al. 2018, Verbrugge et al. 2019). In addition, the predominant focus on recreation and scenic beauty neglects the value of landscapes to many communities worldwide with strong cultural, emotional, economic, and generational attachments to diverse landscapes, including to “working landscapes” on which resource production is a key objective (Bremer et al. 2018, Eaton et al. 2019).

Although 10 CES are delineated in the MEA, the most easily quantified (i.e., recreation, visual/aesthetic benefits) are most

often discussed, while others are rarely assessed (Hirons et al. 2016). This may be related to the positivist, hypothesis-driven approaches that have dominated in CES research (Pascua et al. 2017). Recent research has highlighted the importance but paucity of research that uses qualitative and participatory methods to capture the lived experiences and place-based meanings and values that characterize these more intangible CES (Gould et al. 2014, Pascua et al. 2017, Bremer et al. 2018). One of the most neglected CES is sense of place, despite the fact that scholars have asserted that sense of place is a concept that could effectively bridge existing gaps between ecosystem science and environmental management, linking ecosystem stewardship to human well-being (Hausmann et al. 2016, Hirons et al. 2016, Masterson et al. 2017, Pascua et al. 2017, Wartmann and Purves 2018). Reasons for the neglect of sense of place are numerous, including the lack of agreement about its definition and empirical approaches to its assessment, given the diversity of academic disciplines focusing on the concept (Trentelman 2009, Brown and Weber 2012, Masterson et al. 2017).

Scholars have posited an important link between sense of place and perceptions of land-use change impacts (Eisenhauer et al. 2000, Davenport and Anderson 2005, Soini et al. 2012), yet there has been relatively little empirical work exploring these linkages. Studies have also shown that sense of place may support community resilience, and that place attachment may enhance adaptation to social-ecological change (Marshall et al. 2012, Eakin et al. 2016, Masterson et al. 2017). Recent scholarship has used participatory mapping to identify important places, as well as to illuminate the reasons why people value those places (Black and Liljeblad 2006, Brown and Raymond 2007, Brown and Weber

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2012, Fagerholm et al. 2012, Plieninger et al. 2013, Ryfield et al. 2019). Building on this scholarship, we use participatory mapping to locate places that are important to residents of the rural Argentine community of Ubajay, Entre Ríos, a place undergoing landscape change because of the expansion of intensive eucalyptus plantations. The participatory maps complement in-depth qualitative interviews that explore the reasons that particular places are considered special for residents, and highlight how residents have responded to and accommodated land-use change.

### Literature review

Sense of place is a multidimensional construct, and has been defined in a variety of ways in recent literature (Trentelman 2009, Brown and Weber 2012, Masterson et al. 2017, Eaton et al. 2019). For Tuan (1974), although place is a center of meaning, or “field of care,” the concept of sense of place is inherent to human beings and develops with the accumulation of human experiences in a locality. Sense of place often refers to the intensity of experience of a place; this experience “is gained through the use of, attentiveness to and emotions towards the place” (Soini et al. 2012:125). Sense of place is also enhanced by the social relations developed in a setting. These social ties, which some scholars (e.g., Brehm et al. 2006) call community attachment, develop with time and have implications for well-being and social dynamics within a community. The meanings that individuals and groups attach to specific places provide insight into why different land uses are perceived as providing benefits and/or posing some risks for residents. Understanding residents’ views of the different impacts of land-use change has also been shown to aid in the anticipation and management of rural land-use conflicts (Black and Liljebld 2006, Soini et al. 2012).

Phenomenologically oriented approaches to sense of place consider landscape as socially constructed or as lived experience (Tuan 1977, Soini et al. 2012, Masterson et al. 2017). Greider and Garkovich (1994) assert that people confer meaning on the environment in ways that reflect their social and cultural experiences, and that landscapes are the reflection of cultural identities. Other scholars have studied the interactions between sense of place and landscape perceptions, focusing on the importance of the physical characteristics of the environment in contributing to a sense of place. Stedman (2003) argues that research focused on studying place meaning and place attachment based primarily on shared behaviors and cultural processes has overlooked the important role of the physical environment, and that place meanings may also change in response to physical landscape change.

Understanding the type of attachment that individuals have to different places can help explain the varied perceptions of environmental and socioeconomic impacts expressed in response to uses of the land. Devine-Wright (2009) asserts that the level of attachment to a place influences how varying groups perceive landscape change and adopt specific attitudes and behaviors in response. Anderson et al. (2013), for example, find that different social groups in Tasmania, Australia, had varied perceptions of plantation forestry, depending on the meanings and uses they associate with the landscape. Recent scholarship that calls for improving understanding of sense of place in working landscapes, such as agricultural land or plantation forests, suggests more attention to conceptualizing place dependence by distinguishing

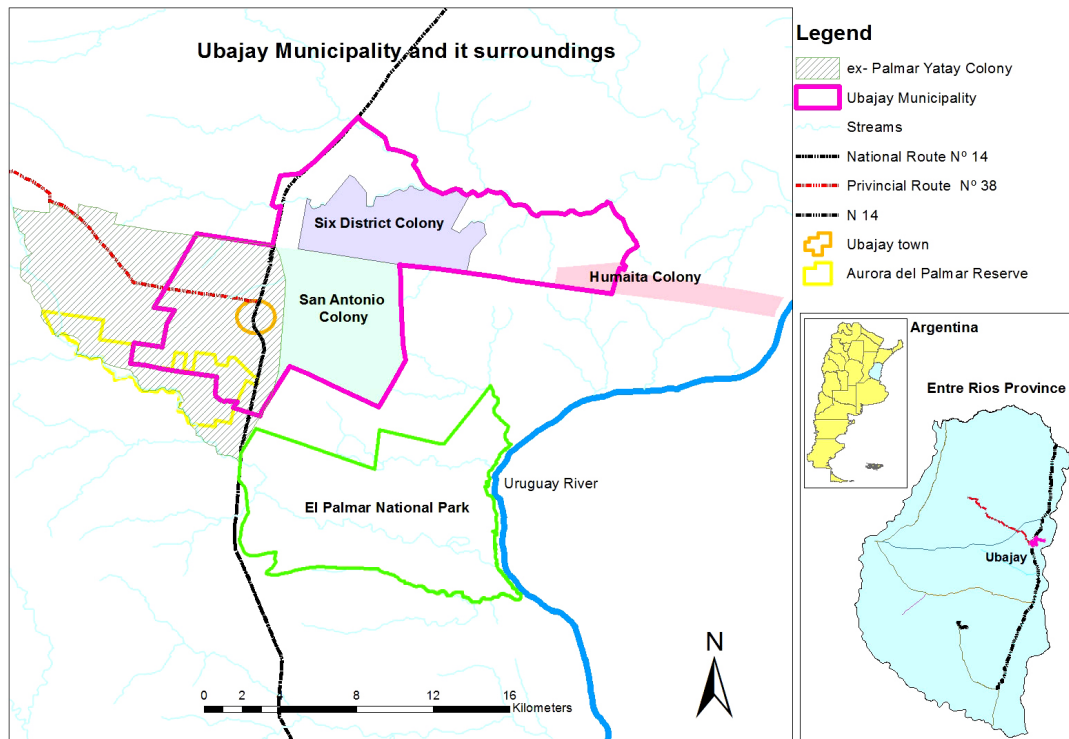
between economic dependence and the lifestyle dependence that is more characteristic of amenity landscapes (Eaton et al. 2019).

Spatial analysis is also increasingly being used by social scientists to document changing patterns of land use (Goodchild et al. 2000), landscape values (Brown and Weber 2012, Fagerholm et al. 2012), and social values of ecosystem services (Nahuelhual et al. 2014). Scholars have mapped the density of special places (Brown and Raymond 2007), identified areas where cultural values converge with valued biophysical resources (Plieninger et al. 2013), and mapped hot spots and cold spots of CES based on perceptions of the local population (Alessa et al. 2008).

Despite a substantial literature touting the economic benefits of intensively managed plantations (see Silva et al. 2019), other literature has documented that land-use change from grassland to monoculture tree plantations has adverse environmental and social impacts, including negative effects on water resources (Jobbágy et al. 2006) and soil carbon storage (Jackson et al. 2002) and mixed impacts on biodiversity (Brockeroff et al. 2008, Phifer et al. 2017). Socioeconomic impacts have also been documented with the expansion of tree plantations, including increased poverty and the displacement of agricultural activities (Andersson et al. 2016), a decrease in quality of employment and conflicts over land tenure (Schirmer et al. 2015), new forms of land ownership, and a decline in rural populations (Charnley 2005). Plantation forestry has also been linked to poor working and living conditions in some locations (Bardomás 2009). Negative health impacts resulting from the processing facilities associated with forest plantations also have been found, such as the increase in respiratory ailments among sawmill workers (Cormier et al. 2000) as well as health issues related to hypertension due to noise exposure (Sbihi et al. 2008).

However, it is clear that peoples’ experience of landscape change is complex and multidimensional, as the kinds of negative impacts detailed above may occur in tandem with new opportunities, resulting in trade-offs (Milcu et al. 2013, Howe et al. 2014). Further, people may experience changes to both tangible (e.g., scenic beauty) and less tangible (e.g., sense of place) CES (Roux et al. 2020). As noted previously, relatively little scholarship to date has attempted to empirically examine these more intangible CES. In particular, there is a dearth of such research in the Global South, where many landscapes are currently being transformed by the installation of novel, intensive production models such as non-native forest plantations (Malkamäki et al. 2018), oil palm plantations (Castellanos-Navarrete et al. 2021), and a variety of “flex crops” (Borras et al. 2016). This study draws on both the phenomenological and social constructionist perspectives on sense of place to explore residents’ perceptions of impacts from eucalyptus plantation expansion and to examine how place meanings and attachments can change in response to physical landscape change. Using participatory mapping and in-depth interviews, we document the range of meanings and attachments that residents have in the region, the overlap between special places and eucalyptus plantations, and residents’ response to landscape transformation brought by plantations. This study investigates the following questions: (1) How do residents’ sense of place explain perceptions of environmental and socioeconomic impacts and ecosystem services related to fast-growing tree plantations? (2) How do sense of place and place meanings change over time in response to dramatic social and landscape change?

**Fig. 1.** Limits of Ubajay Municipality and its surroundings.



**Background: the development of the forestry industry in Argentina and study area**

Argentina’s forestry policy dates back to 1880 with the development of National Law 1054 that aimed at restricting harvesting from native forests. In the 1970s, new laws were enacted to foster the growth of the forestry sector, including Law 20628 in 1972 that provided tax deductions for tree planting and Law 21695 in 1977 that provided a direct subsidy covering between 40% and 70% of the costs of plantation. Throughout the 1990s, the production of wood and wood products, especially pulp and paper, increased dramatically through foreign investment, the use of new genetic lines, and more modern, efficient forestry practices (Espach 2009). In 1999, the Argentine government passed Law 25080 that encouraged investment in forestry by providing tax benefits for forest enterprises, including a direct subsidy for projects of less than five hundred hectares. In December 2015, the forestry budget was increased through extending Law 25080, aimed at increasing the supply of wood through the expansion of new forests, the installation of industrial forestry projects, and expansion of existing ones (Ministry of Agroindustry 2016).

Although the aim of Law 25080 was to stimulate domestic production of timber, it also resulted in dramatic social and landscape changes (Brizuela and Milera 2002, Bardomás 2009). The largest concentration of these fast-growing tree plantations has always been in the “Mesopotamia” region of northeastern Argentina, which includes Entre Ríos, Corrientes, and Misiones Provinces (Bercovich 2000; see Fig. 1). The most important plantation species in this region are exotic pines such as slash (*Pinus elliotii*) and loblolly (*P. taeda*) pine from the southeastern

U.S. and eucalyptus species (primarily *Eucalyptus grandis*) native to Australia. Eucalyptus is especially important in Entre Ríos province, whereas pine is more common in Corrientes and Misiones to the north. The expansion of these intensively managed plantations not only impacted the environment by replacing natural and agricultural ecosystems but also resulted in increased urbanization and in-migration to some communities because of employment opportunities in the sawmills established in the region (INTA 1995).

*Study area*

Eucalyptus and pine plantations are concentrated in the northeastern part of Entre Ríos Province; 2016 data show 131,600 ha of plantations within the province (Ministry of Agroindustry 2017). Our study was conducted in the rural town of Ubajay, a municipality with 3507 inhabitants (Census data 2010) surrounded by eucalyptus (and, to a lesser extent, pine) plantations. Ubajay has the largest concentration of sawmills within the province and has seen some of the highest rates of conversion of land to plantations (INTA 1995, Brizuela and Milera 2002). Despite its forest industry development, Ubajay still conserves remnants of its natural landscape, which also play a key role in the identity of the region. The Uruguay River, which flows from north to south and forms parts of the borders of Brazil, Argentina, and Uruguay, is connected to the numerous streams and wetlands located in this area. The landscape includes native *espinal* woodland as well as palm trees known as *yatay* (*Syagrus yatay*). Moreover, these palm tree savannahs host an incredibly rich herbaceous understory (Atlas de Los Bosques Nativos Argentinos 2004) and recognition of their significance led to the

creation of El Palmar National Park in 1965. Although Ubajay is known as “the wood capital,” its inhabitants also claim that El Palmar National Park belongs to them. This park, with an area of 8500 ha, was created to preserve the remaining groves of *yatay* palm trees and to protect other significant natural heritage environments that provide a unique ecosystem (Rodríguez [date unknown]).

Most of the current inhabitants of Ubajay are descendants of European settlers who established various agricultural “colonies” in Entre Ríos in the early decades of the 20th century: San José Colony, San Antonio Colony, Humaitá Colony, and the Six District Colony (see Fig. 1). As the population in these colonies dwindled, people concentrated in the town of Ubajay, in part because of its location along a now-defunct rail line. In recent decades, Ubajay has received migrants from other nearby provinces of Argentina (especially Misiones and Corrientes) and immigrants from bordering countries (e.g., Paraguay) because of the growth of the forestry industry (Bardomás 2009). All of these changes have contributed to an increase in the number of residents and different cultures in Ubajay in recent decades, even as other nearby rural communities have experienced population decline and economic stagnation. Ubajay has experienced a mix of changes because of growth in forest plantations, including transformations of the rural landscape, changes to local industrial and economic activities, and demographic shifts associated with patterns of domestic and international migration. Our interest here is to understand how Ubajay residents’ sense of place has been affected by these multiple, intersecting dynamics. This research helps to fill a research gap on the cultural impacts of plantation expansion (Payn et al. 2015, Schirmer et al. 2015) and contributes to a deeper understanding of sense of place as a cultural ecosystem service in working landscapes in the Global South.

### RESEARCH DESIGN AND METHODS

The research design followed a mixed-methods approach that includes the use of qualitative and spatial data to explore the relationship between landscape changes and sense of place. We used exploratory and grounded theory techniques for sampling, data collection, and data analysis (Creswell 2012:85). The target population was adults above 35 years old because we wanted to interview residents who had experienced the local land-use change to forest plantations during their lifetime. Both a stratified random sampling method and a snowball sampling method were used. The sampling frame was the Ubajay voters’ list for the Presidential elections of 2011, which was a census of all the adults in Ubajay, as voting in Argentina is mandatory. To ensure that a broad range of environmental values and perceptions of eucalyptus plantations were represented, based on gender, age, length of residence, and type of job, a snowball sampling process was also used to identify key respondents relevant to the study (Creswell 2012). We sampled 13 residents older than 60, along with 19 residents between 35 and 60 years old. This latter group (35–60 year olds) included eight men who worked in sawmills, some of whom had previously worked in plantations. An additional two key informant interviews were conducted to gain information regarding the broader history of forest plantations in Ubajay. The key informants were recommended by interviewees because of their in-depth knowledge of this history. Interviews were not conducted with large plantation landowners because none lived in Ubajay. See Table 1 for details on the sample.

**Table 1.** Characteristics of the interview sample.

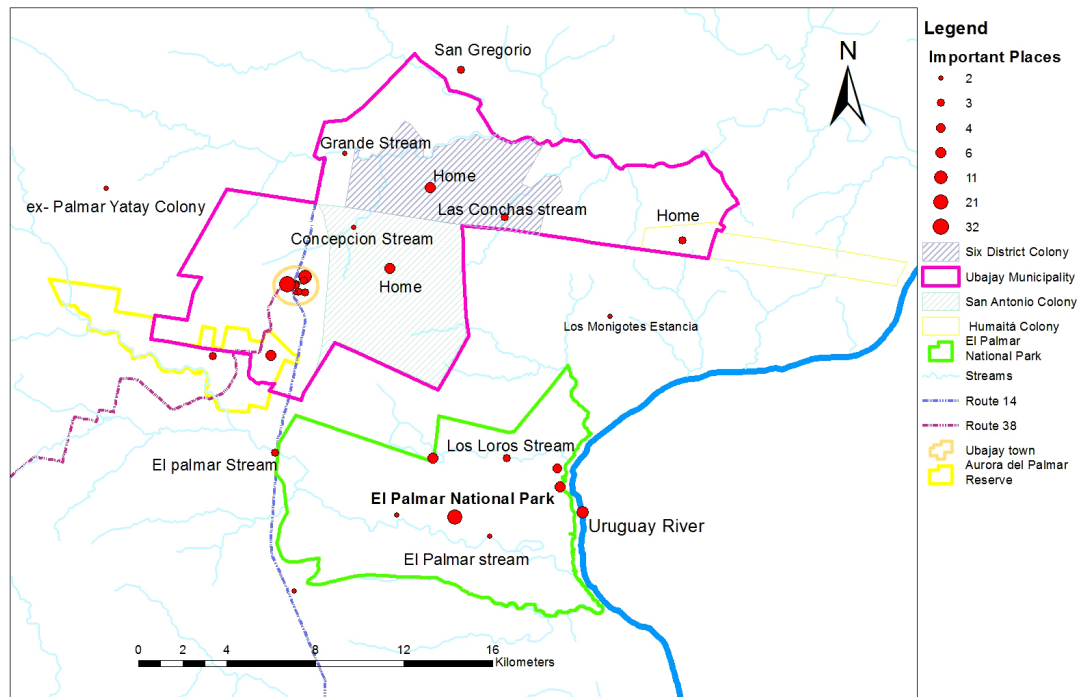
Characteristics	Interview Sample
Number of Respondents	34 individuals
Gender	20 men 14 women
Role	32 residents 2 key informants
Age	19 (35–60 year old) residents 13 (60+) year old residents 2 (60+) year old key informants
Place of Birth	13 residents native to colonies 20 residents non-native to colonies 1 native to colonies, not resident (key informant)

Interviews were administered face-to-face in the interviewees’ natural surroundings, such as their houses or other places suggested by the respondent. We chose face-to-face interviews because of the characteristics of the study population, as 33% of the adults in Ubajay have not completed elementary school (Steinberg et al. 2011). In-person interviews also facilitated the participatory mapping component and allowed for greater rapport to be built between interviewer and interviewee. The semi-structured interview questions were pre-tested and modified slightly before interviews began. The interview questions are found in Appendix 1; the research was approved in 2015 by the Institutional Review Board at the University of Oregon (RCS #9242012.011). All interviews were conducted in Spanish during June of 2015, and the average length of each interview was one hour. Interview excerpts included below have been translated to English by the authors.

Interview questions focused on (1) why interviewees valued the places they did, and the activities pursued there; (2) which places, if any, had lost special meaning because of physical landscape change in the area; (3) the interviewee’s opinions about eucalyptus plantations in the area; (4) the benefits, if any, that the interviewee received from eucalyptus plantations; and (5) suggestions for how to improve the area. Closed-ended demographic questions were also asked (age, place of birth, length of residence in the area, and type of job).

During the interviews, participants were given a Landsat image (i.e., paper map) of the surroundings of the study area with major streams, roads, and other landmarks to assist interviewees in identifying their important places. In order to provide participants with a paper map that showed forest cover, we used a raster image from Landsat Mission, downloaded from the U.S Geological Survey (USGS) website (<http://landsat.usgs.gov/index.php>). This dataset was taken on 12 May 2015 and comprised a satellite image from Landsat 8, OLI TIRS. This mapping exercise was conducted during the interview because most of the questions were linked to the interview guide. The goal of this method, following Black and Liljebld (2006), was to capture the full range of attachments to place and to map out special places afterward. Points and polygons identified by interviewees were later entered into Google Earth for analysis.

**Fig. 2.** Places most frequently mentioned as being important near the Municipality of Ubajay.



### Interview and map analysis

All interviews were transcribed, translated, and coded using QSR International's NVivo software. Data analysis involved both organization and interpretation techniques, working inductively from particulars to more general themes (Creswell 2012). The coding scheme was developed in an iterative manner, looking for emergent themes in the data as suggested by Charmaz (2014). These emergent themes embedded in the narratives were given a representative name and then grouped into categories and subcategories. The entire analysis process was highly iterative, involving multiple rounds of analysis and theory-building, similar to the modified grounded theory approach used by Gould and Lincoln (2017) in their study of CES. The results are structured around the themes identified.

Map data analysis required further spatial data collection. Interviews revealed that some special places were inside historic administrative boundaries that no longer exist, such as former colonies that are now part of the Municipality of Ubajay. Identifying these administrative and historical divisions proved to be important to understand the overlap between locally important places and eucalyptus plantations. However, these data were not available online. Boundaries of the historical colonies were obtained with the help of a key informant who provided historical paper maps of the area and had expert knowledge of these boundaries. Current administrative boundaries were obtained with the help of the staff of the Municipality of Ubajay who provided a paper map with municipal boundaries.

In order to map interviewees' sense of place, as well as the reasons why places were considered important, we developed a table analyzing the places most frequently mentioned inside the limits

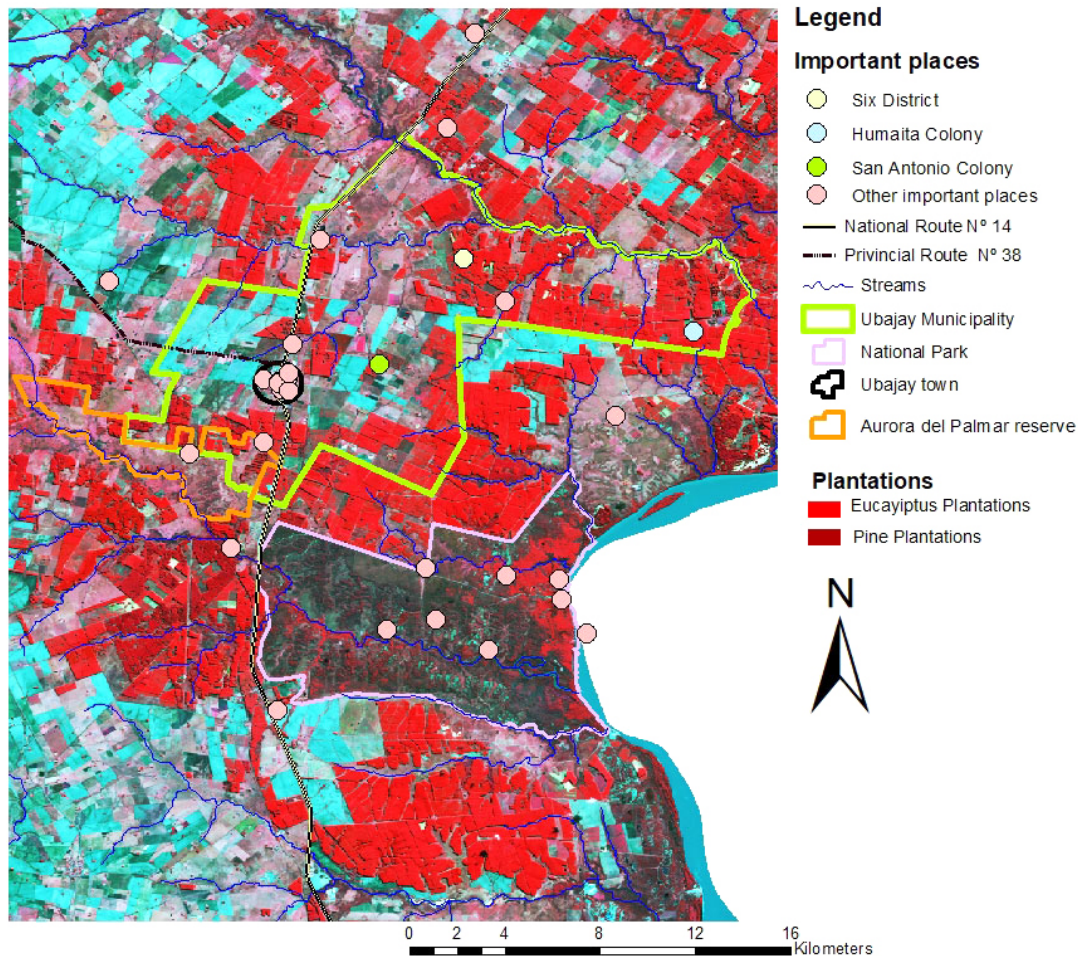
of the Municipality of Ubajay. This table was divided in terms of level of interaction (individual, family, and community) and according to the different dimensions of sense of place (place characteristics, social interactions, and individual characteristics, i.e. length of residence and place of birth). It also included information about the frequency with which each dimension was mentioned. The data were then mapped (see Fig. 2) and then overlaid with a digital image that shows the eucalyptus plantations (see Fig. 3).

### RESULTS

#### Places of importance

Consistent themes in the interviews were that respondents saw themselves as inextricably linked to their places and that they believed their places were unique. Interviewees valued places that represented a strong attachment to their past as well as to their present. Although different places were mentioned, four places were most important for almost every respondent: the town of Ubajay itself (all 32 interviewees mentioned it), El Palmar National Park (21 interviewees), the Uruguay River (11 interviewees), and different tributary streams of the Uruguay River (11 interviewees). Figure 2 illustrates the locations of the most important places mentioned by respondents, and the size of each red dot correlates with the frequency with which each place was mentioned. This map was then overlaid with a digital image to provide visual information about areas that have been impacted by the eucalyptus plantations. Figure 3 shows in red the eucalyptus and pine plantations that were in the vicinity of Ubajay in 2015 (image acquired in May 2015). Figure 3 also shows the overlap between the location of some of these special places mentioned by interviewees and the eucalyptus plantations. Other important

Fig. 3. Monoculture plantations and special places in 2015.



places mentioned were the former colonies that surround Ubajay. These historical colonies no longer exist because of the establishment of the municipality of Ubajay and the extensive landscape transformation by eucalyptus plantations, but were still especially important to older people who were native to these places (see Fig. 1).

Interviewees who had lived in the colonies before they became part of the Municipality of Ubajay identified more strongly with the communities that existed within the geographical boundaries of those colonies but no longer exist. However, these same respondents, as current inhabitants of Ubajay, had also developed a sense of community based on the shared identity and icons that this new landscape provides. That is, they identified with the natural landscape of El Palmar National Park as well as with the local forestry industry located within Ubajay. Similarly, all other interviewees who were born in Ubajay town shared these same values for the new landscape.

It is important to emphasize the value of using both qualitative interviews and participatory mapping to elicit residents' special places as well as the meanings ascribed to those places, and their perceptions of the eucalyptus plantations, as suggested by Ryfield

et al. (2019). The use of mapping not only allowed for visually documenting the overlap between eucalyptus plantations and important places, but also aided in understanding how the geographic locations of places are influential in developing a sense of community and a sense of place, and the nature of place attachment. However, maps alone provide little in-depth information about the value and meaning of places (Ryfield et al. 2019). The narratives elicited through interviews with respondents provided insight into how the sense of community is dependent on the place, and the emotional connections to place. Thus, by listening to Ubajay residents' stories and mapping their important places, we more clearly understand the reasons for their perceptions, and how the social is also spatially constructed.

#### Sense of place and perceptions of eucalyptus plantations

Our results show how place characteristics, social interactions, and individual characteristics that shaped interviewees' sense of place strongly influence their perceptions of the varied impacts of eucalyptus plantations. In addition, demographic factors (place of birth and length of residence) also proved to be very important in shaping these perceptions. In light of these differences, the interviewees are split into two different groups for analysis: (1) those who were born in the agricultural colonies and

later moved to Ubajay town, i.e., native to colonies; and (2) those who were born in and/or grew up in Ubajay town, i.e., non-native to colonies.

### **Direct impacts: expansion of plantations**

#### *Physical landscape changes*

The narratives of some older interviewees revealed how plantations were perceived as having changed their livelihoods, traditions, and customs completely. Interviewee 3 emphasized, “For me, eucalyptus plantations changed everything. It changed nature and the view. I loved when landscapes were cultivated fields with corn, wheat, and flax. In my house, we used to grow vegetables, and we would help with that. Also, we used to have lots of fruit trees.” Interviewee 22 explained how the “invasion” of eucalyptus plantations took away the beauty of the natural landscape and the citrus plantations; the eucalyptus plantations made him feel “imprisoned” because of the loss of features such as the horizon, the flora that used to grow by the streams, the birds, and the native forest.

The responses of older residents born in the colonies, when asked about important places, illustrate that their social and cultural experiences and their emotional ties provide a framework for constructing a sense of place, which in turn influences their perceptions (Anderson et al. 2013). For these respondents, their current negative perceptions are influenced by experiences developed in the landscapes that used to exist before the expansion of plantations. These responses also illustrate how their sense of place has been affected by their perceptions of land use and community change, such that a reciprocal relationship between sense of place and perceptions has been created. For example, interviewee 11 said,

*When I think about San Antonio Colony, it reminds me of my childhood experiences and how I used to enjoy those natural landscapes. However, this landscape has changed so much that I can hardly recognize it. It is over. All that is left are my memories. For this reason, whenever I want to find nature, I go to the national park. The national park is what I mostly like.*

Seven of the interviewees mentioned the negative visual impacts of eucalyptus plantations, although the reasons the visual impact was considered negative varied between those who had previously lived in the colonies and those who had always lived in the town of Ubajay. For instance, five interviewees native-born in the colonies emphasized how plantations had completely changed the landscape. Interviewee 16 explained, “The expansion of eucalyptus plantations, I see it because I suffer [because of] them. You lose the horizon. You are around those big plantations, and you feel locked up.” Two interviewees who had grown up in Ubajay town explained how these plantations were uninteresting and lack beauty. Thus, these responses illustrate how their sense of place influenced their perceptions, as responses differ according to their level of attachment and the meaning attributed to those landscapes.

#### *Water impacts*

Concerns regarding water, particularly water quantity, were volunteered by many respondents when asked about their perceptions of tree plantations in the area. Ten respondents expressed concern that eucalyptus plantations absorb too much

water. Seven of these respondents felt that plantations impacted this natural resource negatively, while the other three had a neutral position. Interviewee 31 made it very clear:

*Plantations took all the water. They absorbed all the upland groundwater. In my land, we have a stream called Las Conchas stream. That stream used to have a constant flow as well as crystalline water. The change is very obvious. When we were younger, we used to swim and play inside the stream, and you cannot do that any longer [she cried here]. You cannot tell your grandsons about this because we no longer have that amount of water there. Those were great times.*

Interviewee 22 also explained, “For example, small streams with low flow have dried up. I did not do research on water consumption but that I can tell. The change is very evident.” This subgroup of seven people included four people who were native-born in the colonies and three non-native to the colonies. All of these people described the physical attributes of the water resources of the area. However, people native-born in the colonies also expressed how they emotionally identified with these water resources, illustrating how their emotional connection to the physical attributes that enhanced their sense of place caused them to perceive this impact as negative. Although many respondents identified with the water bodies of Entre Ríos province, only interviewees who were born there and resided for many years in this area and had developed a strong emotional attachment mentioned the impact of the plantations on the water.

### **Indirect impacts related to timber industry expansion**

#### *Changes in population*

Six interviewees identified land consolidation and rural depopulation as negative impacts of land-use change. Regarding the former Six District Colony, Interviewee 31 explained, “Eucalyptus plantations have taken every space. There is no place for people there anymore. Before, each property had 30 or 40 hectares so there were many neighbors, but now each property is of 600 hectares, and they do not even have a watchman.” Interviewees described nostalgia and a feeling of loss about the colonies; interviewees born in the colonies were more attached to pre-plantation landscapes and expressed a less welcoming attitude toward in-migrants. Nonetheless, for many of these interviewees, Ubajay town was now their most important place.

Five interviewees lamented changes associated with in-migration of people from other provinces because of the available jobs. Three said that things were better before the in-migration because everybody knew their neighbors. Interviewee 31 said, “I don’t know if I identify with Ubajay anymore. There are too many people from other provinces and countries so I no longer know everybody anymore.” The other two interviewees emphasized the fact that jobs in the plantation are temporary and that many people who come to the town are transients. This generates a feeling of insecurity because they do not know who these people are. However, this negative perception was only mentioned by interviewees native-born in the colonies because they had resided in Ubajay for around 40 years on average and had experienced this increase in population.

On the other hand, six people non-native to the colonies (four of whom were migrants to the municipality and two native-born in

Ubajay) considered the growth in population due to in-migration as being positive because it helped the area to develop. Again, responses of interviewees native-born in the colonies as well as those native to Ubajay show how the role of place of birth, length of residence, social interactions, and their overall collective identity that influenced their sense of place impacted the perceptions of this group of people. Natives of Ubajay town generally welcomed this change because it was seen as supporting businesses and services in the town. On the other hand, interviewees born in the colonies were more attached to pre-plantation landscapes and were less welcoming toward in-migrants. In the case of responses of people native to the colonies, length of residence in the town explains the different responses. Those who considered in-migration as negative had resided in the area for more than 40 years on average, whereas those considering it as positive had resided in Ubajay for shorter periods.

#### *Health impacts*

Eight people expressed concerns about the potential health problems associated with the amount of particulate matter in the air produced by local sawmills, although most respondents did not report any respiratory problems. Four respondents were concerned with the noise that the activity of this industry generated (noise caused by the machines of the industry as well as the delivery trucks) and potential health problems. These respondents all lived in Ubajay, and near sawmills. These responses illustrate the reciprocal relationship between sense of place and perceptions of social impacts. On the one hand, there is a shared perception that the place where they live and work is actually a threat to their health and well-being, something that inevitably affects their sense of place. On the other hand, these responses also show how community attachment influenced these perceptions because there is a general concern that these issues affect the whole community.

#### *Economic impacts*

The most frequently mentioned positive impact was that the sawmills created jobs, mentioned by all residents (32). However, only half of the interviewees (17) mentioned the importance of the eucalyptus plantations as a source of jobs, while other interviewees mentioned that eucalyptus benefited them because they produced honey from their flowers. Of these 17 respondents who emphasized the economic importance of the plantations, only one person was native-born in the colonies. Although those native-born in the colonies had positive opinions about jobs brought by the sawmills, and the overall development of the town, they did not identify any positive economic impact from the eucalyptus plantations because they disliked the resulting landscape change that had impacted their overall sense of place.

The positive perceptions of sawmills' economic benefits were influenced by a shared common group economic identity. For instance, Interviewee 1 said, "the sawmill feeds many people. [It] gave life to the town. I don't know if Ubajay would still exist if it weren't for the sawmills." Interviewee 5 stated "the eucalyptus plantations are part of the landscape. They are natural capital. They generate all the economic movement of Ubajay because one person provides the seeds, another plants the trees, another harvests the trees, another transports the wood to the sawmills, other people work for the sawmill, then you need the mechanics, and so on. It is amazing how this industry works." Moreover,

when respondents were asked to describe changes in the landscape, many first spoke of the increase in urbanization before mentioning broader landscape changes. For example, Interviewee 24 said that when he moved from San Antonio colony to Ubajay in 1983, there was little residential or urban development. Although not all interviewees enthusiastically embraced the wood products economy, many expressed a sense that the changes were inevitable in light of broader transformations of the Argentinian countryside. Interviewee 11 said, "I have a melancholic feeling toward this landscape change, but this is the future. We belong to a sawmill town and we must adapt."

However, concerns about the lack of employment diversity emerged in several interviews. Six people mentioned that economic opportunities were limited, and most residents depend on plantations and sawmills for employment. One interviewee born in Ubajay explained that every time the wood market declines, there is a marked decline in the local economy. In contrast, people native-born in the colonies were more concerned with the landscape transformation and the lack of landscape diversity than with the lack of employment diversity. Overall, despite the fact that local inhabitants of Ubajay have some negative opinions regarding the impacts of the forestry industry, all interviewees noted the economic benefits that the sawmills provided for them as individuals and as a community, again illustrating a reciprocal relationship between sense of place and perceptions of impacts, and how this relationship was deeply rooted in their community economic identity.

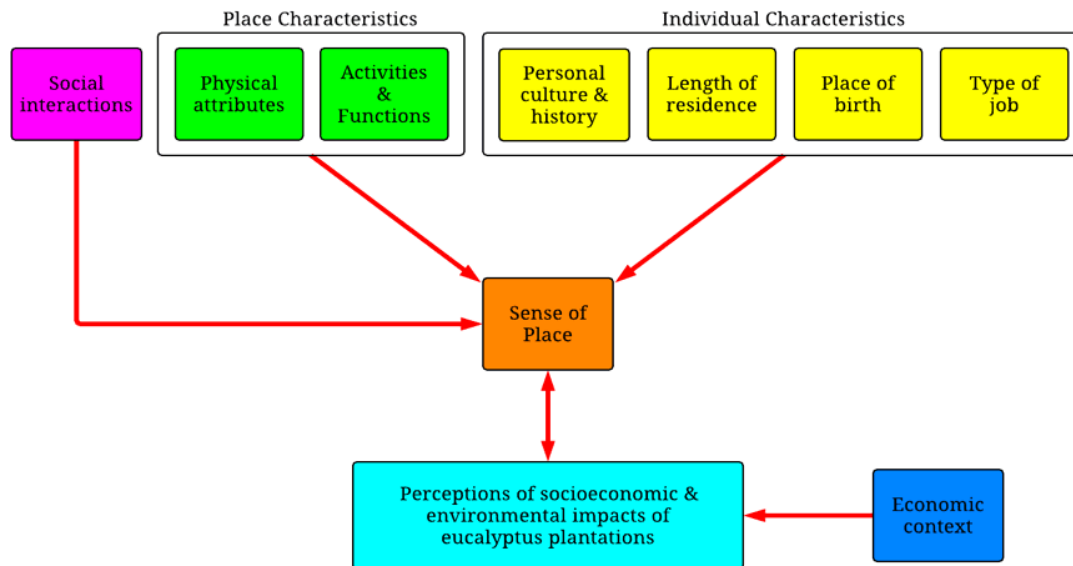
#### **DISCUSSION AND CONCLUSION**

Sense of place is a CES that emerges in unique and often subtle ways through human interaction with landscapes, and is co-constitutive of—rather than neatly separable from—other ecosystem services, including many of those classified as regulating, provisioning, and supporting. Sense of place has been described as an "emergent property of a social-biophysical interaction" in a recent review article synthesizing sense of place and social-ecological systems research (Masterson et al. 2017). Our research brings to light the benefits of using qualitative research methods in investigating the different concerns that community members have regarding the landscape change brought by the plantation forestry and the relationship between these concerns and the meanings attributed to important places in the landscape. To date, most of the work on sense of place has used quantitative sense of place measures, and has focused on high-amenity "natural" landscapes in the Global North. This paper responds to the recent call for more research on sense of place in working landscapes using qualitative and ethnographic methods to "explore complex relationships across people and landscapes" (Eaton et. al 2019:837).

We find that although there is a shared collective attachment regarding the forestry industry, there are different meanings attributed to the eucalyptus plantations based on the interviewee's sense of place. The diversity of meanings resulted in different perceptions regarding the forestry industry, confirming Anderson et al.'s (2013) contention that different groups equally attached to a place can attribute different symbolic meanings to that place, and thus, have quite different ideas about the kinds of activities considered appropriate. For example, although there was a general concern regarding the dominance of the forestry



**Fig. 4.** Relationship between sense of place and perceptions of socioeconomic and environmental impacts of eucalyptus plantations.



economy, the concerns differed among respondents depending on their sense of place, illustrating the value of exploring the nature and type of attachment through in-depth interviews. Although all respondents shared an attachment to the community identity that resulted from the sawmills installed in the area, place meanings and the nature of concerns differed dramatically among respondents.

This research also documents the value of participatory mapping for capturing and illustrating sense of place, contributing to the few studies that have represented place-meanings in the cartographic space (Black and Liljeblad 2006, Brown et al. 2007, Brown and Weber 2012, Fagerholm et al. 2012, Plieninger et al. 2013, Ryfield et al. 2019). Because geographic locations require spatial thinking, the use of participatory mapping helped to better assess the spatial distribution of important places identified by interviewees and thus to understand how the monoculture plantations have impacted them.

Importantly, our results demonstrate how sense of place is not a static phenomenon but is affected by landscape change. Our study documents how a transformed sense of place emerged that attempted to reconcile the community's past—including the importance of colonies that no longer exist and a national park that preserves a vignette of the area's "natural" landscape—with its contemporary identity as a regional hub for wood products manufacturing. Our case study illustrates how place "meaning and attachment are dynamic and are in a constant state of creation and recreation" (Masterson et al 2017). As exemplified by interviewees whose colonies had disappeared, the transformation to eucalyptus plantations brought changes in their landscapes, places, culture, and community. Although their past memories of and attachment to the former colonies endure, Ubajay town is now the most important place to many residents. This new sense of place and place attachment are, at the same time, rooted in the community and in the economic activities developed locally.

Although intrinsically a sense of place does not favor change, we show that it can evolve and support adaptation to new landscapes or opportunities that benefit the larger community.

This research contributes to the literature examining the relationship between sense of place and perceptions of land-use change, adding a case study that investigates this relationship outside the Global North and in a working landscape that is representative of broad land-use change occurring in many regions in the South America and the Global South (Bremer et al. 2018, Malkamäki et al. 2018, Castellanos-Navarrete et al. 2021). This research suggests that demographic, economic, physical, sociocultural, and emotional dimensions of sense of place influence the perceived ecosystem service impacts that resulted from the eucalyptus plantations (see Fig. 4). Interviewees born in the now-vanished colonies and from nearby places outside the municipality were particularly sensitive to the loss of visual landscapes of open grassland and to perceived reductions in water quantity. These were also the subpopulations most likely to have negative views of population changes to the local community because of in-migration for wood products work. On the other hand, the economic opportunities the town provides facilitates attachment; sense of place is shaped by the activities and functions that a place provides. Despite the differences in the demographic characteristics of interviewees, a new community identity has been created by the eucalyptus landscape and associated economic activities. In the face of this landscape change, interviewees embraced the new cultural and natural expressions of themselves as symbolized in the new icons that the plantation landscapes have provided. They expressed pride about the forestry industry and about Ubajay, as both the "wood capital" and as the "Heart of the El Palmar National Park." Although different perspectives were expressed among interviewees, it is clear that the forestry industry has become part of their new collective identity.

Seamon and Sowers (2008:47) argue that, “regardless of the historical time or the geographical, technological, and social situation, people will always need place because having and identifying with place are integral to what and who we are as human beings.” This research shows that sense of place is a cultural ecosystem service that is subject to substantial change as land cover and land use in an area are altered. Far from being simple or easily disaggregated, sense of place is complex and multidimensional, grounded in memory, and reflective of perceptions of intertwined ecological, social, and economic characteristics. It is also, at least to some extent, dynamic: capable of incorporating new understandings of place even while mourning the loss of older landscapes.

*Responses to this article can be read online at:*  
<https://www.ecologyandsociety.org/issues/responses.php/12870>

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#### Data Availability:

*Our interview data are protected by human subjects provisions through the University of Oregon. We have included as an appendix the interview protocol used to gather the data, and the IRB approval information in the manuscript.*

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## Appendix 1: Interview Guide

What is your name and occupation?  
Have you had previous agroforestry related jobs?  
What is your age?

### Part 1: Use History

I would like to begin by showing you this map of the area.  
[Orient person to the study site map and where we are]

1. Where do you live on this map? (mark a dot/line/polygon on map in distinct color if possible)  
If you cannot locate your residence, what is the closest landmark?
2. How many years have you lived in the Ubajay? \_\_\_\_\_
3. Is this your primary residence? Y N  
If NO, how many months per year do you spend in this residence? \_\_\_\_\_

### Part 2: Mapping Landscape Meaning

4. Why do you choose to live here? Probe:  
What is it that drew you or keeps you in this area? What do you like about the area?  
What does it mean to you to live in the Ubajay? Could you explain what you mean by...?

I want to draw out both their type of physical and social/emotional connection to these places...so if answers are social, probe for level, such as family, friends, solo, community, etc.

5. Can you show me places on the [rural landscape] portion of this map that are particularly important to you? Use this pen to draw these areas. We'll number these too, so we can associate your comments to each correctly.

I will repeat the following sequence of questions for each of the places specified, preferably at least 3.

6. What is it about this place that is important or special to you?
7. Do you go there most often alone or with others? Like who?
8. If you couldn't go here, are there other places you can go for the same experience?  
Probe:  
Is this other place just as good? Why?

If did not address in the former questions then ask Q9, Q10, Q11, Q12, Q13:

9. Are there places that you like to go to be alone, to think or daydream?
10. Can you tell me about some places that you like to go to do physical activity

Other places:

11. Are there places (by places I mean rural landscape) that remind you of past events that are important to you (and your community)?

12. Are there special places that are important to your sense of identity or the identity of the group to which you see yourself as a member?

13. Do you think of the surrounding landscape and your own quality of life as being connected in any way? If so, can you describe that link?

General questions regarding changes in landscape (without the use of the map):

14. Can you describe any changes in the landscape that you have noticed over time?

15. Are there places (rural landscape) that you used to go but have now changed physically and they have lost that special meaning for you? (were once important to you but no anymore)

Now we would like to talk about eucalyptus plantations:

1) Do you see plantation forestry having a role within the rural landscape?

2) What is your opinion about eucalyptus plantations in this area? How do you feel about them?

3) Do you think eucalyptus plantations are beneficial for the environment? Why?

4) What benefits, if any, do you receive from eucalyptus plantations? (social and/or economic)

5) How do you feel about the forestry management in this area?

6) Is there anything that could be done to protect what you value about your rural landscape?

7) Is there anything that could be done to protect the social well-being of the inhabitants?

8) Was it successful or should we be more incentivizing other production? Or other?