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# A tale of two greens: Sense of Place drivers and pro-environmental behaviours

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# ABSTRACT

Investigating individuals' perception and connection with places and green spaces around them can contribute to promote environmental stewardship and enhance communities well-being. This thesis aims at exploring the drivers underlying such connections in the Italian municipalities of Cartigliano and Nove. The integration of categorical mapping and questionnaires enabled spatially based evaluations on Sense of Place, which was found to be positively correlated with the presence of municipal green spaces. The research uncovered how socio-cultural dynamics like public initiatives for ecological conservation can influence perceptions and attitudes toward local environment. Sense of Place was indeed found to be positively linked to residents' pro-environmental attitudes. These findings can help landscape planners and policy makers in figuring out how to motivate people's approval of conservation projects and plan green infrastructures. This thesis thus revealed reasons on why some individuals or communities engage in the efforts against environmental degradation while others neglect it.

# PREAMBLE

*On some winter days, when the breeze clears up the air around Venice, white Alpine peaks appear glowing at the horizon. In the local vocabulary this phenomenon is called stravedamento (over-seeing) and is characterized by the extraordinary sight that forms the illusion of the nearby wavy lagoon layering and merging with the snowy mountains, in an almost surreal 'bi-landscape'.*

*This 'bi-landscape' is emblematic of Venice, as it almost represents the very nature of the city. The bridge 'della Libertà' from which one can sometimes witness this unusual scenery unifies the two dissimilar landscapes that compose the city of Venice. On one side with the historical city-centre and its many surrounding islands, and on the other with the mainland composed by residential Mestre and the industrial site of Marghera, thus bridging two sides of a same coin, that appear to be physically different but together constitute the essence of the city.*

*This doubleness also applies to the Ca' Foscari University Venice, which is structured in many buildings and classes distributed on both sides of the city. The university's departments that deal with environmental issues, for example, are split between the scientific campus of Via Torino in Mestre and the many locations that host the Environmental Humanities classes on the main island. It frames the environmental bodies of the university in a division between two main coexisting but disjointed clusters, that are brought closer by those professors and students that crossing the bridge attempt to intermingle its sides.*

*The notion of a 'bi-landscape' particularly suits this con(division) among the different environmental souls of the university. Not simply due to the separation of its campuses, but also for the relevance that it assumes on both sides of the bridge in the discussions on environmental processes and sustainability. Depending on which side, the definition and perception of what a landscape is may change and assume diverse perspectives. On the mainland with the studies in Landscape Ecology, for instance, by objectively investigating its structure and ecological dynamics while using aerial images. And through the Venetian canals with the Environmental Humanities, that integrate these processes in a framework of social and cultural dimensions with human gazes.*

*In crossing the bridge one can shift angle of observation, which allows to delve deeper, comprehend and connect the environmental 'bi-landscape'. Just like that of Venice. This environmental 'bi-landscape' provides the ideal stage for exploring people-environment*

*relationships, as it incorporates interdisciplinary knowledge on human-cultural perceptions and considerations.*

*This thesis aims at embracing this interdisciplinarity, in an attempt to walk the bridge that forms and connects this 'bi-landscape,' to fuse its two sides and create a single entity. By converging two ways of understanding our environment and the landscapes around us, I hope to contribute to a further rapprochement of two academic realities that would greatly benefit by fostering and widening their dialogue.*

# 1. INTRODUCTION

The relationship that individuals establish with the places they encounter or inhabit influences their wellbeing and plays a crucial role in affecting their degree of care for the environment. The concept of Sense of Place tries to express this relationship, that is generated by the emotional and material bond that individuals have with a particular physical and social setting (Manzo, 2003). This thesis investigates its main drivers in the municipalities of Cartigliano and Nove, located in the northeastern Italian province of Vicenza, by assessing its relationship with green spaces in their municipal landscapes.

Generally, the ways in which a Sense of Place is developed are numerous, and are driven by socio-cultural factors, biological inclinations, and by the physical structure of the landscape in which it takes place (Barbiero and Berto, 2016). The sum of such factors influences at the individual and community level the attitudes that people adopt toward policies and plans for the management of municipal areas. Sense of Place (SoP) is thus site-specific and differs in every person or community, as it is closely related to the type of environment in which it generates.

This thesis investigates residents' Sense of Place in Cartigliano and Nove, and seeks to understand its relationship with the structure of their landscape and individuals' pro-environmental behaviours. One of the central purposes of this thesis is to illustrate that assessing individuals' Sense of Place at a community level can be an effective tool for understanding how people perceive and value their territory, which can assist landscape planners and policy makers of similar municipalities in figuring out how to motivate people's approval of ecological conservation plans. The underlying idea is that in settings like these municipalities, there is a strong relationship between Sense of Place and people's level of interest and care for their environment, and that by figuring out how to encourage this demeanour can help environmental conservation strategies. This may also facilitate an understanding of those social mechanism that drive some individuals or communities to engage in the fight against environmental degradation, while others overlook it.

The way each person relates to the environment is unique, hence it is challenging to generalize on why individuals become really bonded to a place if not through the implementation of a specific study. For such reason, in this thesis Sense of Place will be analysed through the comparative study of Cartigliano and Nove: two neighbouring Italian municipalities that have

shown different degrees of interest towards ecological conservation. This will enable to assess what factors produce resident's connections to places and see if there is a consistency with their environmental attitude. Specifically, it investigates to which extent the physical attributes of the municipalities landscape contribute to Sense of Place, and whether there is some correspondence with the degree of heterogeneity and biodiversity of the landscape. I thus intend to show that as the ecological functionality of an area increases, the ecosystem services provided by it and, consequently, the benefits and attachment obtained by individuals increase too.

This chapter introduces this study by first exploring what Sense of Place is and explain why it can be considered an important tool in research for environmental conservation. This lays out the foundations to explore why Sense of Place has been overlooked in academic research on landscape management and clarify what are the main objectives and research questions of this dissertation. The purpose of this chapter is to retrace the logical steps that led to the maturation of the idea that Sense of Place should be considered beyond it being an ecosystem service, and that it can be adopted as a model of study for finding policy and social mechanisms to encourage communities' care for their environment.

## 1.1 The origins of Sense of Place

Each individual experiences the world as immersed in an intricate network of relationships that constantly shapes its existence. Beyond inter-personal affiliations, we establish connections with the elements that make up the environment around us and learn how to navigate the world through the dynamic interaction we have with them. Already since childhood, we begin drawing information about how to interact with, and react to external stimulus and take advantage of the affordances in our surroundings (McCarthur and Baron, 1983; Barbiero and Berto, 2016). As we grow up, we learn to recognize and prevent dangers, play with who or what is around us, and form emotional and physical connections with them. Our life develops in constant tension with our environment, as there is an unceasing mutual influence that determines both our habits and opportunities; and defines the way we leave an imprint on it.

At different stages of our lives, we tend to establish different preferences for the kind of environment we like to be in. There are specific physical features of our surroundings that are fit for capturing our various needs and desires for safety, comfort, mystery, or adventure (Berto, 2007). As children, for instance, there is a tendency to appreciate those components of an environment that make us feel safe but include a slight degree of thrill and play, like in an

outdoor park with bushes, trees, and sticks. While we prefer avoiding those ones that are associated with danger or excessive mystery, like in a dark city alley (Loukaitou-Sideris, 2003; O'Brien, 2008). This inclination forms at a very young age and marks our preferences in terms of places to be in, the colours we prefer, and the emotional connections we develop with it (Mahidin and Maulan, 2012).

The places in which we make significative experiences help us create our personal identity through the connections we establish in our interactions with them. Already as teenagers, we want to develop our own magical places like a treehouse or a shelter under an improvised rag tent. Being in these places reinforces our positive self-image and make us feel autonomous and belonging to somewhere (Berto and Barbiero, 2012). From these ages there is a predisposition to find the right affordances that can satisfy our character growth and give us meaningful experiences. In some environmental conditions these are mostly provided by elements of vegetation in green areas, which provide us with benefits to which one can remain bound for years to come.

## 1.2 Environmental Preferences

Overall, in communities living in westernized settings such as those in which many of the studies cited here were conducted, like Cartigliano and Nove, people's general preference for places tends to favour 'natural' environments. Offering the best conditions and possibilities to meet one's personal needs, settings that contain vegetation or natural elements, such as meadows, trees, rivers etc., can increase our satisfaction and foster our connection with them.

Studies have shown that the prevalent environmental preference across different populations consists of spaces with a wide view, that contain vegetation like trees and meadows where one can explore safely while keeping a little bit of mystery (Kaplan and Kaplan, 1989, Kaplan, S., 1995; Kaplan R., 2001). Our predilection in this regard have indeed been inspected through biological patterns, that have evidenced how a Savanna type environment is preferred across various ages and cultures for its legibility and sparse vegetation (Balling and Falk, 1982; Coppens, 1988).

The right degree of satisfaction we can derive from an environment determines the physical and mental conditions for being able to connect with it. If we can enjoy the possibilities that it offers us, such as material and identity benefits, then it is more likely to establish a connection to it. In this regard, one of the preconditions of becoming fond of a place is related to the extent to

which we are satisfied with the benefits we can derive from it. If a location like a country house or an urban park is associated with good times, experienced in a pleasant social ambience and general well-being, then it will be easier to feel bonded to it. Indeed, the degree of familiarity, sociability, and naturalness of a place leads toward a general environmental bias. The ability to safely navigate through natural environments, combined with the *soft fascination* (Berto, Massacesi, Pasini, 2008) of its components, provides the right conditions for managing to appreciate all the services that it offers (Kaplan, Kaplan, Ryan, 1998), which in turn affects emotional associations.

The satisfaction, identity, and familiarity that a place evokes in us are directly related to our degree of attachment with it and can thus influence the way we conduct our lives and the way we behave toward it. Our surroundings shape our perception and can impact whether we feel a Sense of Place or adopt a certain type of attitude. Indeed, specific structural settings, that contain green spaces and sparse vegetation are more likely to increase both individuals' Sense of Place and a positive demeanour of care for the environment.

Participation in places we encounter and connect throughout our growth affects the way we perceive and relate to our daily environment. The places to which we feel most attached to while growing up tend to create general environmental preferences that may last throughout our whole lifespan and influence the way we perceive and interact with all the other places we encounter. The structural qualities of a landscape like that of the case study, for instance, which are a key component in one's Sense of Place, are reflected into people's general predilections. This would explain why among the new places we encounter in life some make us feel more at home than others. Indeed, we tend to find a setting more familiar and pleasing if it echoes the physical and cultural characteristics of those places to which we have been most attached in previous moments (Knez, 2003). If a person grew up in an environment full of a specific type of vegetation, in a brickhouse, or alongside a stream, and has bonded with it, it is likely that they will feel some type of association whenever they encounter those specific features elsewhere. This encounter can in fact elicit emotions through retrospection and lead to a particularly regardful and charming treatment of such a place.

### 1.3 Sense of Place sustainability feedbacks

Whenever we feel close to a place due to spiritual affiliation or material satisfaction, we tend to look after it to preserve its condition. Broadly speaking, indeed, if we feel personally tied to something or someone, we would hardly be happy if it fell into disrepair, as we could no longer

enjoy its company and benefits. If, for example, one is very affectionate toward a house where they grew up contentedly with their family and friends, it is expected to see some kind of regard toward its maintenance. Likewise, if it is true that we tend to innately develop a connection with natural environments and other organisms (Wilson, 2021; Barbiero and Berto, 2021), it might be true that we are also naturally inclined to preserve them. Which would mean that there is a correlation between people's spontaneous attachment to green spaces, and a general attitude of care toward 'natural' environments, that should thus be shared globally.

However, the current state of the world tells us otherwise. The era of climate change and environmental degradation caused by human actions, also referred to as the Anthropocene (Steffen et. al., 2017), bears witness to this. Even if it is true that some people try to push for a global ecological transition, unfortunately it is not supported by many, and it often gets blocked by large scale political-economic priorities. Only sometimes, under the pressure of an impending disaster or with the threat of crossing an unrecoverable threshold, we show concerns for environmental conservation. An attitudinal change indeed occurs mostly when the difficulties or discomfort caused by the diminishing of nature benefits begin to be too challenging.

The large-scale changes in climate that are occurring however are only a part of the problem. Indeed, there have also been a process of radical modification of the landscapes we inhabit all over the world, which has led to a loss of biodiversity and of the many services provided by its functioning (Chapin et. al. 2000). The general trends of land use for intensive agricultural practices and overbuilding resulted in landscape fragmentation and habitat loss that have profoundly altered the functionality of the ecosystems on which our well-being is dependent.

Among the sources of this problem may be a general biophilic detachment of individuals toward organisms and our natural environments. The economical and industrial trends that led to the alteration of many green environments have acted as a divider of the human-nature connection that had been central of agricultural practices and countryside lifestyle throughout the ages. At one point, instead of the prosperity provided by ecosystems, societies started following economical and industrial profits, which have contributed to the abandonment of practices of coexistence with the agricultural landscapes and green spaces. At the same time, cities attracted more people as they offered more opportunities, a more comfortable life, but that was also way greyer. And so, the long-established bond with our green environments went slowly shattered under the conditions of a different welfare and its compromises. While our former landscapes

became more heavily used, the services that green spaces offers us were slowly replaced, or adapted to new needs, and employed for creating a different type of well-being. Agricultural processes were intensified, land cemented, and the link that used to unite us to our land went oftentimes swept under the rug.

If this were the case, however, one might think that among the solutions for combating environmental degradation there would be the restoration of our forgotten natural connection with verdant landscapes, that would benefit both ecosystems and the population. Is it possible then, that through the implementation of specific green infrastructures in our urban and rural landscapes we could help re-harmonizing individuals' connection and care for the environment?

This answer could be discovered through a careful study of those social dynamics that either drive, or do not, attention toward ecological stewardship. Analysing the stories of those that have decided to invest in the conservation of green spaces, or have taken a different path, may reveal how to plan and manage ways to engage people in combating the challenges of the Anthropocene. The first step then, is to collect the testimonies of those who have not completely forgotten their connection to their long-gone landscapes. I have always been curious to understand what is at the origin of sustainability in people's behaviour. Why, for instance, some people decide to dedicate their life to studying and working for ecological conservation or restoration. Or why, when faced with the choice of a college pathway, some students decide to pursue a career in Environmental Sciences or Environmental Humanities.

The introductory short video created by Ca' Foscari University to promote our master's degree in Environmental Humanities recites an opening that goes "We used to play in the woods." This statement got stuck silent in my head for a long time and went on an unanswered and undercover journey through my thoughts. It is indeed true for most of the Environmental Humanities scholars that we were all playing in the woods at some point, and that playing there got us entangled with the beauty of our different environments, and to the natural world. But how have these personal "woods" really influenced our path? If we would follow the argument sustained so far, it would mean that most of the scholars that take on this field of study, at some point in their life, had meaningful experiences of connection with places that had a good degree of naturalness. It is therefore possible to assume that if one could recreate settings that enable people, and even more so children, to have meaningful bonding experiences to natural environments, it would be possible to engage a portion of the population to take care of environmental issues?

## 1.4 Research gap

The assumption that was just made, seems to make it in simple terms on how to enhance sustainable behaviours. Indeed, if it was to be true, it would imply that a targeted planning approach, aimed at increasing individuals' Sense of Place through the implementation of green infrastructures (Giudice, Novarina, Noghera, 2023), would result in an attitude of ecological interest in individuals. However, if we were to interpret it through the current global trends of increasing urbanized grey areas and degrading landscapes, it would also mean that we are heading towards a feedback mechanism of loss of Sense of Place with consequent less sustainable behaviours. Indeed, recent studies indicate that climate change will negatively impact overall communities' Sense of Place, especially in those ones living in landscapes that have been severely altered (Neumann et al., 2015; Ellis & Albrecht, 2017). Damage to habitat conditions in fact can result in a loss communities' identity and impairment of basic socio-physical conditions (Plieninger et al., 2015b).

Furthermore, in landscape planning projects oftentimes there is a tendency to focus primarily on material benefits and neglect the importance of social factors, that would help assess individuals' perception and opinion on the projects. Thus, missing out on the opportunity to understand what, and how, people value in a landscape. On the other hand, in the research on Sense of Place and pro-environmental behaviours, are prioritized social and cultural components, while considerations on biological background or physical features of the environment are often neglected. This leads to a partial evaluation of the drivers of Sense of Place, which is by nature hardly quantifiable and therefore requires specific integrated assessments.

Overall, there is a lack of communication between various disciplines when it comes to Sense of Place and landscape management. When facing the multiple challenges posed by land degradation the focus is often to find material solutions that can increase ecological functionality and services, while forgetting the importance of grasping the social mechanisms that contribute to such degradation in the first place. Landscapes are indeed social-ecological systems, and as such should be analysed through different points of view that can, if combined, reconstruct the true causal patterns at play.

## 1.5 The Environmental Humanities solution

In this challenge of understanding landscapes socio-ecological dynamics, there is a need to take on an interdisciplinary approach that equip the researchers to investigate the different layers and components in play. The Environmental Humanities provide the right framework to do so, as they combine different branches of knowledge that range from Landscape Ecology to Anthropology and Ecopsychology. The concepts of Sense of Place and pro-environmental behaviour are in fact defined differently across a variety of academic fields. They are both related to social, cultural, and physical factors, and as such need to be approached in a multidirectional way.

For instance, Sense of Place is accounted in this thesis as the synthesis of genetic-biological, socio-cultural factors and of the physical components of the landscape. The goal of understanding what individuals feel most bonded to is combined with examining to which extent natural spaces and elements are part of this connection. To do so it is necessary to combine evaluations of both the landscape ecological functionality and of individuals' perception, to check whether as one changes, the other does too. In this sense, the Environmental Humanities allow for the establishment of a framework that can give historical meaning to cultural perceptual value of individuals and combine it with an in-depth estimation of landscape-scale ecology.

Such a framework may not only be useful for the study conducted here, as it may also be adopted for preliminary appraisal in green infrastructure planning. It may help achieving a more biodiverse landscape while also enhancing ecosystem services that would result in greater aesthetic value and communities' Sense of Place. Evaluating communities' perception and satisfaction of ecosystem services can provide great insights on synergies and trade-offs in action, along with indications of potential correspondence of Sense of Place. Furthermore, connecting theories and tools pertinent to Sense of Place within broader socio-ecological systems studies is expected to improve our understanding as how and why people engage in solving challenges related to the sustainable use of ecosystems (Masterson et al., 2017, 2019).

The landscape scale is the best for displaying these systems because it provides the right scope to grasp both the ecological and human patterns that might create the right conditions for Sense of Place to occur. Indeed, it is expected to find that the Sense of Place is greater if ecosystem services are as well, and thus people should be inclined to maintain those services. And conversely, under the conditions where a landscape is modified and the habitats fragmented

(Fischer and Lindenmayer, 2007), it is plausible that the satisfaction and bonding value given by ecosystem services diminishes.

## 1.6 Research questions

The research was set up by trying to maintain an operational outline that captures multiple aspects pertaining the relationship between places and people. The purpose is to capture the perception and connection of individuals relative to a landscape, to observe what effects and implications this relationship produces. This study aim is therefore to assess to what extent individuals' Sense of Place is generated by environmental factors, and if it is correlated with pro-environmental behaviours.

The research was done at landscape scale, to be able to capture the socio-ecological dynamics that are measured in terms of residents' perceptions of that landscape, and which gives useful information about attitudes, connections, and satisfaction of the territory. To capture these differences, questionnaires were set up to be administered to the residents of two Italian municipalities, which were integrated with information obtained from the mapping of the two municipalities. The landscape was then used as the stage upon which inspecting in parallel individuals' perception of places, and the physical structure of such places.

i) The first objective carried out in the research is that of investigating how Sense of Place is generated in the municipalities' residents, which gives information about what they value the most and the places they feel most bonded to. Once the drivers of their Sense of Place were investigated and evaluated, they were reported on a mapping that enabled to find out and evaluate what was the structure of those places to which people felt more connected to.

ii) Secondly then, it enabled to report if, and what, was a relationship between the selected places and landscape structure, with a focus on the possible link of Sense of Place to green areas and elements. The result of the mapping of Sense of Place supported the integrative analysis of various indicators, such as the degree of landscape heterogeneity, biodiversity indexes and percentage of artificial lands. This allowed to explore whether there is a correlation between individuals' Sense of Place and green landscape features. In this sense, through the examination of Cartigliano and Nove is tested what landscape features are more linked to residents' Sense of Place.

iii) Ultimately, it is investigated if the degree of individuals' Sense of Place can be associated with an increase in their pro-environmental behaviours. Thus, measuring if an increase in one corresponds with an increase in the level of the other, that is by checking if a deeper connection with one's environment is correlated with a greater willingness to support ecological conservation projects.

The pursuit of these research objectives will provide insight into what is most valued by citizens of both communities. It will produce knowledge about whether there are substantive differences in the results of the two pools of respondents. Thanks to a comparison of both findings, it will be possible to explore what is the reason behind any differences, that will be matched with the historical socio-political profile of the two municipalities.

## 1.7 Significance of the study

The research carried out in this thesis tries to determine under which circumstances individuals feel more satisfied and bonded with their environment. This method of study may prove to be very important in determining the motive behind citizens' connection with their municipality, and the repercussions it has in attitude and compliance. This study could be replicated in other similar municipalities as they could benefit from the results as having a socially and politically useful tool that will enable them to plan projects according to citizens' wishes and needs. If, for example, dissatisfaction was to be found for various ecosystem services, it will be possible for policymakers to properly plan a green infrastructure. This may help to increase well-being and connection with the territory and will help to acquire consensus should future projects be made.

Furthermore, the results could indicate whether the respective communities of Cartigliano and Nove feel a lack of well-maintained green areas in their municipality, giving the citizens a possibility to express their dissatisfaction and desire to increase or improve them. This study provides place-based knowledge on residents' level of satisfaction of ecosystem services to see if there a mismatched offer of such services and understand whether there is a shared desire to see them increased. Thus, it can be employed as an aspiration index of residents' willingness and ambition regarding the development of green infrastructures. If, for example, an ecological restoration or conservation project was to be pursued in a landscape by policymakers, it would also provide a foundation of knowledge accounting for the degree of residents' approval and willingness to invest. By knowing the mechanisms underlying residents' Sense of Place, it is

possible to work out how to increase it and consequently enhance satisfaction and pro-environmental attitudes.

Within the academic world this research aims at advancing in the comprehension of Sense of Place and its 'green components'. Based on previous studies it aims at verifying the correlation with pro-environmental behaviours, measured as the general caring attitude of individuals and their willingness to invest in green areas conservation. It will additionally take a step forward in the mapping of Sense of Place and of its link with other ecosystem services. This dissertation is an attempt to make progress within the framework of interdisciplinary approaches carried forward by the Environmental Humanities and Landscape Ecology.

## 1.8 Limitations of the study

The work conducted in this thesis provides interesting knowledge both for further academic investigations and for practical implementation. However, it needs to be stated that this research has some potential limitations, both for the site-specific case study and for its general findings. It has already been stated that Sense of Place is a hardly quantifiable value that can arise from multiple factors. Therefore, the findings of this research are place-specific and do not account for an absolute measure. Furthermore, it is important to note that human-place relationships are already difficult to define and can be misdescribed or misinterpreted in a data collection process achieved through surveys. However, since the surveys were filled out only voluntarily, it is to be expected that those who responded may have an interest bias for the topics covered and for the conservation of their territory.

In assessing resident's Sense of Place, I did not include data collection tools that were able to thoroughly quantify the cultural-political background and dynamics at play, as they are difficult to measure and not directly related to the covered issues. There is thus a flaw in being able to fully account for socio-cultural mechanisms at work. The scope of the research was indeed narrowed down by the unavailability of investigating Sense of Place through a more prolonged timespan. If it had been possible to dispose of citizens' responses dating fifty years back, it would have been meaningful to assess a time-comparison analysis of the results, as it would have provided significant context to explain socio-political factors.

When investigating how landscape structure relates to Sense of Place and understand which environmental feature most influences it, the relation with green areas and elements may be overshadowed by the most significant socially valued urban features, like monuments or

squares. Additionally, individuals' Sense of Place may be connected to distant events or no longer existing landscape features, making the analysis on the correlation with present ones temporally fallacious.

Furthermore, the academic foundations of this study are based on many diverse disciplines such as Eco-psychology, Biology, Landscape Ecology or Human Geography. Many of the studies ranging across these research fields however were hardly integrated between one another, leaving many well-established theories lacking a practical interdisciplinary application.

## 1.9 Roadmap

- In the introductory chapter just discussed I outlined the logical framework in which the research will move. The major concepts and objectives were highlighted, as well as the how and why the result are intended to be achieved. Moreover, to define the aims, I also introduced the limitations of the study, contextualizing them with the present case study.
- In Chapter two the existing literature regarding Sense of Place is reviewed to understand its significance in research and see how it has been conceived so far across multiple disciplines. It then considers how it has been linked to spatially oriented studies and see what the literature says about its correlation with pro-environmental behaviours.
- The third Chapter is focused on the case study of the municipalities of Cartigliano and Nove. It starts by investigating the historical background of the location as a premise to dive deeper into the materials and methods that were used. The process of collecting the data is then displayed to provide context and explain the approach used. Following, there is a section that outlines what data analysis conducted. It lays out the process of extrapolating and processing previously gathered information. The steps involved in the achievement of the desired results are also explained and contextualized.
- After the data analysis, there is a chapter that proceeds in outlining and visualizing the results of the processed data. This will enable to uncover the outcome of the specifics that were investigated, as the investigated questions are thoroughly answered.
- Lastly, there is a chapter dedicated to discussing the found responses and link them to the research objectives. Reflections about why those results were given is thus paired with an attempt to reconstruct a logical pathway that opens conclusive considerations about the research conducted and confronts the findings with the hypothesis on Cartigliano and Nove residents' Sense of Place. This is then followed by the final conclusions of the thesis.

# 2. LITERATURE REVIEW

## 2.1 Sense of Place foundations

The concept of Sense of Place was first brought up by geographers Tuan (1977) and Relph (1976) as a way to represent and describe the subjective nature of human-environmental experiences (Foote and Azaryahu, 2009), thus broadly representing the experiential relationship that people establish with a particular place. One of the main components of Sense of Place is the bond that an individual or a community feels toward such place, which is generated by a multitude of socio-cultural and physical factors. In this thesis I argue that the structure of the landscape, and the supply of ecosystem services in which these relationships occur, is a decisive component of the quality of this connection, and thus of the degree of attachment that an individual feels toward a place. Sense of Place is examined thoroughly in this chapter to better understand what it is, how it is created and what are its implications in landscape management. The goal is to show that a positive relationship with a place can pose the foundations for stimulating collective pro-environmental behaviours and create caring feedbacks for the landscape and its ecosystems.

The concept of Sense of Place is therefore used here to establish a conceptual framework that allows to examine the circumstances and components of how this relationship happens. Specifically, by building this framework it is possible to create a research model that facilitates the investigation of Sense of Place in the study on the municipalities of Cartigliano and Nove. In this thesis the concept of Sense of Place (SoP) will refer to the overall connection between individuals and their environment and will be used as the umbrella term under which expressing the full extent of this bond.

It tries to encompass the emotional, spiritual, and cognitive way in which individuals interpret their landscape (Tuan 1977; Jorgensen and Stedman, 2006). The affinity which is formed with a place is established when individuals experience being in a geographic space and is mediated by a multitude of social, biological, and physical factors (Stedman, 2003), which are thus influence by social relations, cultural ideology, and local ecology (Butz and Eyles, 1997). The concept of Place itself involves already both the physical setting and the human interpretation of a space (Sack, 1980), and describes the dynamic connection between humans and their environment. People develop a Sense of Place by interacting with, perceiving, and living in a location, and are influenced by individual, biological and sociocultural variables (Russel et al., 2013).

To fully interpret what Sense of Place means, however, it is first necessary to define the connotation that is being attributed to the concepts of 'place' and 'landscape'. Tuan in "Space and Place" (1997) defines *place* as the location perceived by human experience. He confronts it to the concept of *space*, which is perceived instead as a mere location that doesn't involve a human relationship with it. Therefore, places consist of spaces that are filled with meanings and objectives by human perception in a particular location. Tuan conceives place as a way of people to give or derive meaning from their environment and thus organize the world around themselves (Cloke, Philo & Sadler, 1991). It therefore encompasses the idea of a space that is filled with people's cultural meanings and relationships and is thus a context of cultural and physical dynamics. Landscapes play a fundamental role in shaping the understanding and connection of individuals and communities to their environment. They are read through the interpretation of natural and cultural elements and imply the experience of living in them (Soini and Aakkula, 2007).

With places and landscapes, we develop a unique relationship as we live in them in an open dynamic of interdependence and influence (Heidegger, 1962, 1971; Manzo, 2003). Here, places and landscapes are considered as a dwelling space, which is not something external to human being and thought, but simultaneously both the object and the subject of the experience (Ingold, 1993, 2000). Through this interpretation, the concepts of 'places' and 'landscapes' cannot be seen as opposite, but rather as indivisible. Karjalainen (1986) indeed, defines every place as part of some landscape, and every landscape as part of some place (Saar & Palang, 2009, Cresswell, 2018). Places and landscapes are therefore related, since both succeed in expressing the idea that there is a relational dynamism between people and their surrounding space and are thereby taken as synonyms in describing the human-environment tie.

Sense of Place, however, is intended differently across several disciplines (Trentelman, 2009). In environmental psychology it is used to describe people's mental attachment and dependance from a specific setting which affects human behaviour (Stedman 2002; Van Riper and Kyle 2014). In human geography it describes how people assign a meaning to a location and what value they give to it and its elements (Tuan, 1990). In health science it is considered as the benefit that people draw form being connected to a natural environment, thus as a biologically based condition that improves mental and physical health (Maller et al., 2006). Sense of Place has widely been studied also in the field of tourism development, as it plays a key role in understanding tourists' satisfaction and wellness while visiting a place (Kil et al., 2012; Kuo et. al., 2013; Cheng et. al., 2015).

However, the most relevant definition for this thesis stems from the study of ecosystem services and landscape management, that defines Sense of Place as the relationship between humans and ecosystems, which is influenced by the perception of quality of an environment and the services it provides (MA, 2005; Milcu et al., 2013). I share the idea that conceives Sense of Place as something shaped by human-dependent socio-cultural conditions, and by the independent physical components of a landscape (Dale, Link and Newman, 2008). In this sense, its main drivers come from, biological condition, historical and cultural processes at multiple collective levels (Twiggeross and Uzzel, 1996), and from the structure of the landscape where is considered.

## 2.2 Sense of Place and landscape structure

Early studies on Sense of Place were focused mostly on individuals' identities and socio-cultural significance of landscapes, neglecting the importance of understanding intrinsic landscape values and elements such as green areas and provision of ecosystem services (Stedman, 2003). Brown (2007, 2015) was among the first ones to highlight the importance of assessing physical features of landscapes in people's Sense of Place, moving on from the idea of evaluating the relationship just based on its meanings and social value. His research started engaging in whether the physical landscape exerts an influence on people's perception, and thus generated connection and attachment. Stedman (2003) affirms that: "physical features do not produce Sense of Place directly, but influence the symbolic meanings of the landscape, which are in turn associated with evaluations such as attachment". The physical space therefore both constrains and directs the possible Senses of Place that can emerge in individuals (Dale et al., 2008).

To investigate the importance of physical features in Sense of Place, researchers started carrying studies that would spatially locate Sense of Place, with the aim of accounting for an alternative method of valuing perception of places and natural environments (Brown et. al., 2015). The creation of a map-based Sense of Place based on individuals' survey responses started being regarded as a great tool for understanding what is mostly valued in a landscape, and for distinguishing which elements most enhance communities' Sense of Place. It enables landscape projects to assess what is more appreciated by residents or visitors, which is a great tool for planning how to improve social and physical ties to a place. Spatially mapped Sense of Place offers a framework for investigating place-related meanings and affections (Stedman, 2016), and contributes to understanding the physical conditions of human-nature relationships (Nelson

et al., 2020). Knaps and colleagues (2022), for instance, came up with a "Meaningful Places model" that builds on this idea and tries to estimate the site-specific meaning of a place to which individuals feel connected.

The premise of these studies is that landscapes are to be intended as socio-ecological systems, where human-nature relationship and values are constantly influencing each other and are affected by social and physical dynamics (Brown et. al., 2015; Masterson et al., 2017). People and landscapes are indeed in a co-evolving relationship where both affect each other. It is therefore evident how territorial development can exert a strong influence on the connection that people have with a place (Tress and Tress, 2001). Natural landscapes and places can affect people's mindset and reinforce behaviours, as they exert a strong effect on individuals, leading sometimes to a more responsible and sustainable attitude, especially when a place is well preserved (Antrop, 2000). Since communities play a huge role in landscape decision-making processes, understanding how people perceive, influence, and are influenced by their surroundings is fundamental (Lee et al., 2007). However, to do so, it is important to first establish a framework for tracking what the main influencing factors are and how they co-create a Sense of Place.

## 2.3 Conceptual Framework

The interpretation of how Sense of Place is constructed has changed over the years due to its ambiguous nature and the general difficulty in accurately quantifying its components and relative value they entail (Jorgensen and Stedman, 2006). In principle however, when considering individuals living in locations such as those in the case study of this thesis, a Sense of Place can be defined as a concept that encompasses the *identities*, *attachments,* and *satisfaction* of being in a place, and can thus be investigated under these premises (Stedman, 2003).

This definition is used in this thesis to establish a conceptual framework upon which to investigate the Sense of Place of Cartigliano and Nove inhabitants. Existing concepts in literature were taken and adapted to this research by creating five macro categories of generative factors of Sense of Place (macro-topics), which are: Place attachment; Place identity; Place satisfaction; Social relationships; Green value.

One of the core constituents of a Sense of Place is indeed 'place attachment', which is sometimes used as its synonym in literature and broadly describes the positive emotional bond

that people have with a place (Hummon 1992; Low and Altman 1992; Moore and Graefe 1994) and can vary based on the depth and length of its experience (Antonsich, 2010). It may arise from the historical or familiar heritage of communities, or from an individual experience in a place, and can be better represented as the roots one has in a place. It can thus comprise the value of the local historical tradition that is felt by the population and the sense of fondness that is felt, for instance, in households with a farming or craftmanship tradition. One of the earliest research schemes on place attachment, devised by Vaske (2003), was based on a two-dimensional model of individuals' functional and emotional attachment to a place, which he quantified in terms of material dependence and personal-cultural identity.

A person's attachment is in fact conceptually related to the meaning or identity that he or she draws from the social heritage of a place (Williams and Stewart, 1998). Greider and Garkovich (1994) affirm that symbolic meanings of settings influence the social context of human interactions and thus individuals' Sense of Place. One tends to construe a meaning from its attachment to a place or a tradition, as it evokes personal thoughts, memories, feelings, and interpretations (Schroeder, 1991). Tuan (1977) and Ryden (1993) assign 'place meaning' as an integral part of Sense of Place, as they say it is the intrinsic and authentic interpretation that is evoked from the contact and involvement with a place. This helps build one's personal identity, which can manifest in different ways: from the choice to continue local family traditions and customs, to even engraving symbolic tattoos of such places on skin.

'Place satisfaction', on the other hand is derived from the material and social possibilities that a place provides and can thus be recognized as a precondition or complementary factor for place attachment (Stedman, 2002). It is the perceived quality of a landscape, which is based on the services and benefits that it can provide for individual wellbeing. It is oftentimes associated with the concept of place dependence which is related to how well a setting can serve peoples' goal achievement compared to other ones (Ujang & Zakariya, 2015). Thus, reflecting the role of a place in providing the required support for one's needs and use (Brown & Raymond, 2007). Place satisfaction, for instance is related to one's perceived contentment of ecosystem services in the location of living, that it is crucial for establishing a strong connection with it.

This three-dimensional conceptual framework can be evaluated through two main drivers of socio-cultural heritage and the physical settings of places and can be used in the research for those factors that generate Sense of Place. Alongside these drivers, however, considerations about the social character of interpersonal relationships that each person forges in his or her

community must be added, which are here referred to under the definition ‘social relationships’. These are related to the above-mentioned factors, as they are determined by several fundamental cultural and political conditions linked to life chances, traditions, or shared identities.

In addition to social and identity dynamics, a major contributing driver is the spontaneous connection that many people feel towards green areas and elements present in their environment, which is defined in this thesis as ‘green value’. Some schools of thought have focused their studies on investigating whether a genuine tendency exists to feel tuned-in with natural beings and environments. The concept of Biophilia: the love of all that lives, theorized by Wilson (1993), is at the origin of this reasoning. His idea was that there is in everyone a natural tendency to associate and bond with living organisms, which is confirmed by the findings in north American studies that a large proportion of the population prefers being in green spaces rather than in artificial ones (Kaplan 2001; Lamb and Purcell, 2001).

Wilson (2002) defines biophilia as an innate impulse to focus strongly on living things and become emotionally affiliated with them. Several studies have even attempted to research and construct parameters to identify the degree of environmental identity of individuals, arguing that to different extents everyone has a natural propensity to forge attachments with living beings, as it is an innate condition of the human existence (Clayton, 2003; Brown and Raymond, 2007). The mental and physical value of this biophilic condition is huge for humans’ life. First, it influences cultural and social values, as it leaves an imprint on our imagination of landscapes and green spaces around us, and frames how we represent them in arts (Barbiero and Berto, 2016). Secondly, it determines the way in which populations relate to and shape the environment around them.

The socio-physical structure of a landscape has a great deal of influence on human perception and condition. Different landscapes can be more biophilic than others as they possess characteristics that promote a stronger connection with the environment. As already mentioned, environments that contain green areas and vegetation are preferred to artificial ones for they provide many great advantages, which on average tend to increase people's satisfaction levels (Kaplan and Kaplan, 1989).

Beyond the material goods that a functioning and biodiverse landscape can offer, numerous psychophysical benefits have been proven to exist, such as stress reduction and higher levels of health on average. Swedish psychologist Roger Ulrich for instance, conducted many studies on the effects of viewing a natural landscape in hospital patients. In addition to requiring less

attention from nurses, patients who enjoyed a view of green areas showed greater contentment, as well as having significantly shorter recovery times and dosages of post-operatory painkillers than those who did not enjoy such view (Ulrich, 1984). Contact with living organisms, indeed, has a strong regenerative power that is capable of overall improving the human life experience of perception and involvement with one's surroundings (Kaplan 2001).

## 2.4 Pro-environmental behaviour is enhanced by Sense of Place

Contact with vegetation and friendly animals, both in urbanized and wilderness contexts, exerts a powerful influence on our psychophysical health and perception of the world (Barbiero and Berto, 2016). In unpleasantly hectic settings, like overcrowded urban ones, people's well-being can be put to the test due to increased stress levels and decreasing personal satisfaction (Berto, 2014). In these situations, the presence of green elements, or the possibility to quickly escape in a green space, can be of great help as they can promote people's biophilic attachment and its consequent benefits. Exposure to natural environments can act as a *buffer*, that is as a cushion for the dampening of negative stressors (Faber Taylor, Kuo, Sullivan, 2002).

Given equal socioeconomic opportunities, people tend to seek contact with green environments as much as possible, as they seem to be aware of the stress-relieving effects to its exposure (Korpela et. al., 2002). The regenerative effect of being in contact with living beings is indeed sought through the inclusion of plants and animals in urban settings and symbolized by the choice of many to spend their leisure time in green settings. Being in these contexts, even if briefly, succeeds in producing positive emotions and feelings, which can last for some more time through memories. These reactions are provoked by the characteristics of natural features in an autonomous way and can condition the choice of which places to attend and the behaviour adopted within them (Ulrich et. al., 1991). Individuals indeed, tend to associate with and develop Sense of Place in those places that can offer them positive emotions and mental well-being (Regan and Horn, 2005).

The specific conditions linked to different environments are thus able to influence people's choices about deciding where to spend time and how one behaves in them. Firstly, because thanks to the ability of certain environmental conditions to contribute to personal and collective well-being people are more likely to adopt peaceful and cheerful behaviour in them. Secondly, because those who benefit from these environments are expected to be more willing to contribute to their preservation. This is because the perceived benefits derived from such settings succeed in creating an emotional and functional attachment and, in this sense, prompt

people to adopt a stance inclined toward their preservation in order to enjoy such benefits further in life (Vaske and Kobrin, 2001).

Indeed, among the many benefits that one draws from ecosystems and green environments there is that one of establishing a connection which naturally enhances individuals' care for the environment (Stern and Dietz, 1994). Shultz and Tabanico (2007) for instance, thought that people have implicit self-association with living beings, and this influences their environmental concerns and attitudes. Several research have proven how this self-association can influence individual and social actions for intervening and investing in landscape development projects (Cheng et.al. 2003).

Sense of Place has been specifically found to be a key component in determining specific environmental attitudes and behaviour, making people more willing to get involved in local advocacy efforts and partake in social actions (Kruger and Shannon, 2000). The emotional and physical connection to a place influence how people perceive and act toward it. Thus, if there is a positive connection with environments that include green areas, a more responsible behaviour toward such environment is expected.

Vaske and Kobrin (2001) theorized how a sustainable attitude is instituted when people feel attached to a place. They used a two-dimensional framework to study place attachment/Sense of Place through place dependence and place identity, to demonstrate how satisfaction and dependence to a specific resource or environment can work alongside individuals' meanings and identity leading to a more attentive ecological behaviour. They found a causal link between relational attachment with a place and human attitude, thereby inferring that increasing levels of place dependence and identity also increases individual accountability.

The relationship they found unfortunately has only partially been studied further, as there is an evident difficulty of quantifying and defining the multidimensionality of human-place relationships and pro-environmental attitudes. As stated earlier, Sense of Place is defined by a multitude of socio-cultural and physical factors which creates difficulties in being able to generalize this correlation (Scannell and Gifford, 2010). Even though usually, socially based factors of Sense of Place are stronger than physically based ones the unique qualities and benefits that can be gained from a particular environment have been demonstrated to pose a great deal of influence on environmental attitudes (Hidalgo and Hernandez, 2001; Manzo and Perkins, 2006). Scannell and Gifford (2010), for example, found that direct attachment to

natural environments increases pro-environmental behaviours to a similar degree as attachment to given civilized environmental rules.

Since more than half of the world population now lives in urban contexts, many individuals are deprived of meaningful natural experiences, which overall tend to diminish the relationship with natural elements and discourage an attitude of care for the environment (Soga and Gaston, 2016). Taking these considerations into account is crucial in landscape planning processes, as measures can be taken that succeed both in respecting and fostering attachment to places, and in encouraging respect and involvement in ecological land conservation projects. Affective ties to places can help inspire actions to protect and improve landscapes that are most meaningful to citizens. Consequently, the study of Sense of Place can provide great insight into how residents can be motivated to act collectively to preserve, protect, or improve their community and to participate in local planning processes. Therefore, in developing plans for environmental restoration or maintenance of a landscape, it is of utmost importance to understand what mechanisms of affiliation with a place are involved for the communities that inhabit it.

# 3. METHODOLOGIES AND MATERIALS

This chapter explains the various methodologies that were used to collect the data necessary for the pursuit of the research objectives. It starts by briefly introducing the location investigated in the case study to display its major features and provide context for the research through a narrative of the landscape's socio-environmental history. The last section is dedicated to the description of the data collection process, that is divided in 1) the creation of categorical maps of the two municipalities and 2) the design and delivery of the questionnaire for the groups of residents. Therefore, an attempt is be made to clarify the steps that were taken to integrate these two research tools.

## 3.1 Study area description

To better understand how individuals' Sense of Place is generated, and how it can enhance public actions for environmental conservation, an in-depth comparative analysis was carried out in the neighbouring municipalities of Cartigliano and Nove, in the Italian province of Vicenza (Fig. 3.1). They are located in the Eastern Po Plain at the foot of the Alps and are separated naturally by the Brenta River. In terms of population and extension there are no major differences, with Cartigliano having a population of 3711 inhabitants over a surface of 7,38 km², and Nove counting 4894 inhabitants over 8,15 km² (ISTAT, 2021).

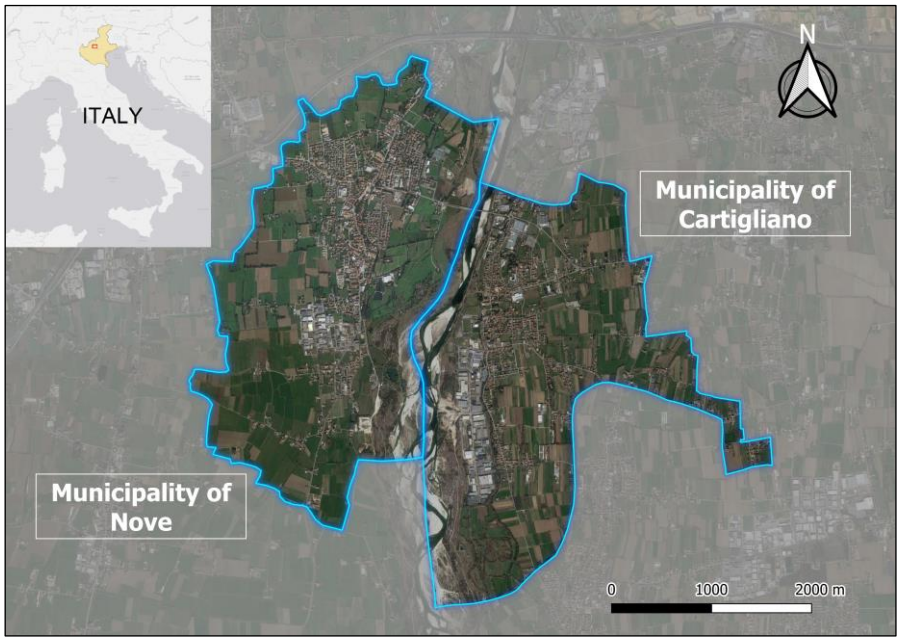


*Figure 3.1: Municipalities of Nove (left) and Cartigliano (right) located in the Veneto Region*

The morphological composition is similar in both municipalities and is characterized by the mutual adjacency to the Brenta River. Such closeness results also in similar land covers and in the sharing of a protected Site of Community Interest (SCI) and Special Protection Area (SPA) "SCI/SPA IT3260018 - Grave e Zone Umide della Brenta" (Fig. 3.2).

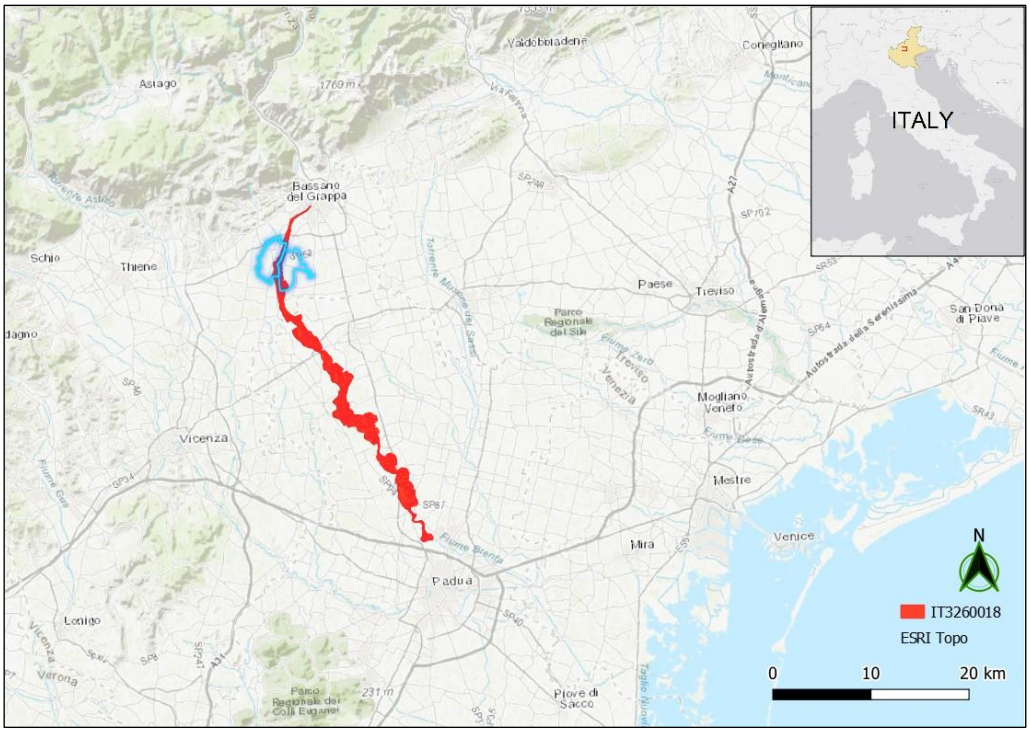


*Figure 3.2: SCI/SPA IT3260018 - Grave e Zone Umide della Brenta and study areas*

## 3.2 History and background of the case study

While the two municipalities are located very close to one another and share many structural features, the respective communities have proved in the last decades a different degree of interest towards the stewardship of their natural environment. This divergence makes it an interesting comparison, and a worthy case study to explore the major socio-historical factors that may have contributed to causing these differences. Through this comparison it was possible to investigate and substantiate Sense of Place and its implications across two different backgrounds.

The physical and cultural division of the two municipalities, that is now attenuated by the bridge that connects them, gives to the two communities of residents a uniqueness of proximity and diversity. Such diversity, however, cannot be grasped by simply looking at the physical features of the landscape, as it lies in the rich history of the places that make it up and in those who were raised acknowledging it. Although the two municipalities are in fact so close to each other, their

history recounts of two different socio-historical paths. The history of the bridge itself, that today allows for a greater physical and social connection between the two realities, represents in its youth a new perspective of closer ties between the two communities. It was indeed built and inaugurated only in the 1960s, putting an end to the natural division that had been crossed until then only through more difficult practices of ferrying boats.

Taking a further step back, however, this natural barrier was not always in place between Cartigliano and Nove. There was once a time when the river had a different location from where it currently flows, as the area had been altered several times by the powerful changes of the river stream. Throughout the centuries the landscape and its inhabitants, have been strongly marked by the impetuous and unpredictable streaming of the Brenta river, which dictated the conditions for the development of the social fabric that are still endure to this day. Rising on a difficult territory, characterized by the impetuous flooding and overflowing of the waters, the first settlements were slow to prosper in the entire contiguous lands; mostly due to the great power generated by the downflow and by the flat morphology of the region. For centuries, large parts of the territories were uncultivated and uninhabited, especially on the west banks of the river course. Some communities nevertheless started learning soon how to take advantage of the river and its natural resources and figured out ways on how to benefit from local availability of raw material.

The origin of Cartigliano can be even traced back to the first Roman settlements on the Veneto plain. Its name encloses a history that is closely linked with the characteristics of the area where it once formed. At the time of the centuriation process of the territories adjacent to the river, at the time called *'medoacus'*, some plots of land were donated to the families of those veterans that were returning from the wars conducted by the Roman empire (Signori, 1998). Like the *'fundus Baxanius'* (today Bassano), the *'fundus Cartilianus'* was established at the time for the *'gens Cartilia'* (a family dedicated to the production of laterite bricks), as it's witnessed in some inscriptions present at museums in Padua and Este. The decision of where to settle was not accidental, but rather determined by the abundance of clay that allowed the occupants to continue the household production of bricks and establish a connection with the territory.

At that time, the watercourse flowed to the right of Cartigliano where now stands the town of Travettore (called after the '*traicium'*: ferrying), dividing it from the neighbouring village of Rosà (Valle, 1983). Reconstructing exactly how the Brenta has changed its course before 1500 is impossible, but there is historical evidence in the "*Historia Longobardorum*" by Paolo

Diacono from the XIII Century that around the end of the XI Century there was an unprecedented flood that led to a major deviation of the waters. As if by fate, this settled precariously into its new riverbed, located between the two municipalities studied here. It brought lots of debris and sediments that made the territories, especially on the side of Nove, particularly treacherous and uncultivable, but rich in clay and other materials which soon began used.

Historical fate soon blessed the new riverbed, making the ford between the two municipalities the scene of the battle that took place in 899 between the Hungarians and the army of King Berengario I (Signori, 1998). The battle gave the place unprecedented historical importance, so much so that the crossing was renamed "*Vadus Ungherorum*", which constituted a recurrence celebrated for many centuries. For a similar amount of time, Nove remained only a fraction of its neighboring town Marostica, as the municipality's original name dates only to this period, when the *terrae novae* (new houses) were edified. These new houses were built on the land that emerged slowly on the gravelly soil left by the continuous adjustment of the river course and were initially confined to being subordinate properties of the close-by Marostica. Some texts even report that the neighbouring ‘marosticensi’ came up with the name Nove due to the nine houses that were initially present on site (Matteazzi, 1983).

Between the 13th and 14th centuries the two municipalities started taking on a more significant and autonomous life and began their own commercial activities. In Nove, the wealth of clay and other materials led to the beginning of a major production of pottery, that has since strongly typified the town’ commercial identity. Cartigliano, under the rule of various families such as ‘Scaligeri’ and ‘Visconti’ began being involved in the major political events of the region and began to be an important centre for agricultural production (Signori, 1998). With the entry of the Venetian Serenissima Republic from 1400 the two centres began to distinguish themselves for their precious productions and artefacts, that were valuable to Venice and Bassano; to whom they were subordinated. During this period Nove started gaining more notability than Cartigliano thanks to the artisanal production of ceramics, that were highly valued and exported in Europe by the Serenissima Republic. Facilitated by the presence of inorganic material useful for the craft of ceramics, Nove attracted more and more interest over the years, and saw an increase in the number of households settling in the area to launch their manufacturing facilities. At the same time, the valuable production of primary resources in Cartigliano attracted prosperous Venetian families, who sought to expand their territorial holdings. The villa of Cartigliano for instance, that is now the headquarters of the local public administration, was

built by the Venetian Morosini family in 1580's. Since the 15th Century this family had already set Cartigliano as the headquarter of their interests investing in cereal and wool production, and soon engaged also in the beautification of their properties.

The phase of growth and local production that took place during these centuries turned out to be decisive in the historical formation of identities of the two municipalities, that has been carried on till our days. The diverging commercial routes of artefacts and agriculture have been a predominant characteristic of the social differences between the two sides and turned out to be a key influence in shaping the landscape and the mindset of its inhabitants.

### 3.3 Historical heritage

The social character of the two communities is also represented in the monuments and landmarks that shape the landscape and its urban component. They carry the symbol of the major figures and cultural traditions of a place and have been shaped by the events that characterize its society, shaping in return the culture of whom lived by their side. Looking at the major streets and squares in Cartigliano and Nove it is possible to find some representative icons that embody what have been the major socio-cultural trends. In Nove, for instance, there are many references to the figures and families that have contributed to the making of the ceramics' heritage, with the main square named after Giuseppe de Fabris; a renowned sculptor who came from a family of ceramists. While on the opposite bank, in Cartigliano, the references take on a more social meaning, like that of the main 'Piazza della Concordia', which tells of the more recent history of the place. It was a speaks of the attempt of the mayor that in 1945 desired to enhance its inhabitant's social cohesion after the atrocities of the second world war.

The reestablishment of the activities after the end of WWII was a decisive moment for the formation of the local social fabric and economic structure. The manufacture of ceramics on the one hand, and agricultural production on the other, fully resumed their course of expansion, supported by the general economic growth of the region. Population growth led to a general urban sprawl, which resulted in a higher edification of lands that were converted to living quarters and commercial activities. In Nove, the production of ceramics had a strong expansion both in the industrial and manufacturer markets and consolidated the boost in production that had been latent for years. Beginning especially in the 1960s and 1970s, the transport infrastructure alongside the use of more efficient production machinery generated great economic prosperity by attracting investment and creating jobs opportunities for the locals. During this time, Cartigliano also began investing in the start-up of more prolific industrial

activities, and the landscape was gradually converted from being agriculturally oriented to being cemented. The establishment of textile production, woodworking and metalworking expanded rapidly driven by the new economic opportunities of automation and trade. Thus, it also paved the way for the opportunity to build up in the tertiary sector and consolidate the local urban identity, while leaving little opportunity for the flourishing of local agricultural activities.

The process of economic and industrial intensification grew strongly on both sides of the Brenta, beginning to threaten the valuable natural areas in the area. The welfare derived from commercial activities soon managed to overpower the benefits given by landscape and its ecosystem services. Especially in Cartigliano, the advance of industrial facilities, which progressed in layers toward the southern part of the town, had started altering profoundly the more agricultural and natural landscape of the municipality.

However, thanks to some institutional figures, and to the support of researchers and citizens, it was possible from the 2000's to actively slow down (and then stop) the ongoing expansion of production facilities towards the " Grave e Zone Umide della Brenta " protected area. Indeed, there would seem to have been a social mechanism of subversion against the denaturalization of the place by some citizens. Their desire to be able to enjoy the green spaces of the municipality's territory remained vivid, with some people managing to oppose the design of a complete conversion to more rich industrial advantages. This opposition was manifested less strongly in Nove, where industrial proliferation had attracted the main attentions of privates and the public administration, leaving the focus on the conservation and protection of natural capital somewhat neglected.

Still, to this day, the roots of connection to the green landscape once flourishing are displayed on both riversides. It is tangible in the desire of some people to preserve the natural capital of their township and witnessed in the official projects designed to refurbish their environment. The expressed, or latent, desire for improvement and preservation of municipal green spaces is, however, present in both communities, deepening the question of why there has been a stronger push in Cartigliano than in Nove. The individuals who stood up mostly for the ecological status over the years, were moved by a deeper connection to their landscape. They might have been motivated by remembering the scenic beauty recounted by their relatives' memories and were concerned about the prosperity of local future generations.

In Cartigliano, thanks to their personal initiatives, the public administration, alongside the residents, took by heart the will to maintain and ameliorate its natural capital. Their sense of

belonging and attachment to the landscape soon mingled with the memory of the agrarian tradition and reawakened the collective bond with the town's green spaces. The historical memory of the place formed the common ground over which raise sensitivity towards ecological conservation. Individuals' place attachment created the key components for enabling pioneering initiatives to recall a social stand of pro-environmental attitude and led to the desire of the public authorities to invest even more into green projects. This positive trend unfortunately did not take place equally in Nove, where the desire of some individuals faded away or remained unexpressed and unheard by the ruling class.

As today, there are many cues that show the subtle differences in the evolution of the ecological attitudes of these two realities. One of the most indicative, is by looking at what has been achieved in terms of pro-environmental actions by the two administrations, and specifically, by observing how very similar environmental conditions turned out into a different outcome. Indeed, if one were to make a comparison between the green areas close to the river of both sides, it would be clearly noticeable that a different approach was adopted in managing these spaces.

### 3.4 Tale of two greens

The LIFE PollinAction project (LIFE19 NAT/IT/000848), in which I got involved for creating the questionnaire that is reported and analysed here, was my line of acquaintance with the two municipalities examined in this thesis. The research project that was being carried out in Cartigliano had been demanded, and co-funded by the local governance with the objective of assessing the ecological status of their territory, for better understanding the offer and demand of ecosystem services at play. At the time when I started collaborating with the team of researchers involved in LIFE PollinAction I knew little about this small town of the Veneto region, but I was already surprised that they had been investing the bettering of their environmental condition. The more we developed the surveys, the more information I got on why they were putting effort into it; but at the same time the more questions arose in my mind.

During this period of traineeship, the idea of a comparison with Nove came up as an interesting way of debating about the possible causes of different political pro-environmental attitudes within such similar places. Meeting with the administration of Cartigliano and some of its citizens, it appeared quite clear how much they were proud of drawing the community attention towards ecological strategies. I was explained that it was part of the local heritage, that was once flourishing of green spaces and agricultural productions. This positive narrative however

changed when asked about Nove and its inhabitants' mindset. Between the two communities there is some antagonism, so it was not surprising that they did not have the kindest words for their neighbours on the opposite side of the river. However, they explained that the line of conduct regarding socio-political priorities in Nove has always been more centred around the production of ceramics, and that it had led over the years to neglecting taking care of the green spaces of the town.

The green areas that are found alongside the riverbanks of the Brenta are quite indicative of the different approaches that were adopted over the years by the two administrations. One of the main ecological achievements of Cartigliano is having a protected green area dedicated to the conservation of biodiversity within the municipal borders. From 2010 thanks to the will of local public figures and citizens this area was preserved from being converted into an industrial zone or an excavation area and has undergone many important interventions of environmental restoration and conservation. It is now considered an island of biodiversity and as the green heart of Cartigliano due to its incredible number of plant species and migratory animal corridors. The intervention of a non-profit association (Amici del Brenta) has been a key component of this environmental success, which remains as today one of the few authentic local examples of what was once the symbolic landscape of enclosed land (Naturally separated fields (MEEUS et al.,1990). The farsighted urbanistic planning philosophy adopted by the leadership and public participants of Cartigliano made it possible for many of its inhabitants to enjoy the beauty of such place and benefit from this ecosystem.

On the other side, in Nove, the green area located at the edge of the riverbed has not been treated with the same regard. The park located there, called 'The Oasis of Nove', does not hold the same ecological standing, as it was designed and thus used as an urban park for leisure activities, with barbecue areas and spaces for events. Over the years a part of it was even employed for the creation of a children 'magical forest' with decorations and a natural playground. Although it was not intended to be a place for biodiversity conservation, it was widely utilized as a space for recreational and cultural activities for families and citizens. However, due to administrative mismanagement and carelessness, the children's space was left without grants nor proper maintenance and it started falling in a state of decay and abandonment around.

The political decisions of cutting fundings for the 'magical forest' and for the operator that had been preserving the area for years created around 2015 – 2016 a spiral of degradation. This only provoked banal complaints against immigrants and vandals by the administration, that made no

real effort in tackling this trend leaving the park-goers in discontent. Starting from 2019 fortunately the new administration started cooperating with some local associations that took care again of the park with sporting activities and some general maintenance. To this day the park is in good conditions and frequented daily by residents and bystanders, with clear evidence of attempts to ameliorate it, that unfortunately don't seem to have been maintained properly.

The public attention has increased in recent years and many citizens have expressed the will to better it even more, to make it more functional and heterogeneous. In Nove, part of the population doesn't share the rhetoric of focusing efforts only of commercial productivity and is pushing for more pro-environmental attitudes. This attitude is expanding with the newly elected administration and is confirmed by the attendance and participation of some residents of Nove in the activities organized by the LIFE PollinAction project.

The story of these diverging green areas can be particularly interesting for the purposes of this thesis as it can provide comparative background contexts to the research objectives. Sense of Place is shaped by socio-cultural conditions that are hardly quantifiable, and as such need to be considered and used as the background upon which carrying the research out. The narrative of the municipalities' history thus does not only help in providing information to understand the research setting, but also seeks to offset the shortcoming ability to thoroughly quantify the social factors at play. The comparative analysis is therefore useful in order to be able to retrace a socio-historical pathway that provides the tools to address the research questions.

## 3.5 Research methodology and design

This last section of the chapter discusses the methodologies and materials used to collect the data required to investigate Sense of Place. It outlines the research design to address the nature of the data collection process, alongside reporting the materials that were employed to do so. It also reports what were the steps taken in order to integrate the two data collection tools, to add depth to the comparative analysis conducted here. The underlying rationale to the data collection is also illustrated to validate the performed research.

The approach used in this thesis attempts to bring together quantitative and qualitative research methods, that were implemented to conduct a comparative analysis between Cartigliano and Nove. On one hand, the objective landscape structure of the two municipalities was studied, while information was also collected about the subjective residents' perception and relationship with the landscape. The goal was to integrate the two tools to obtain useful information for

creating a spatial analysis of Sense of Place. This study fits within the research framework that combines subjective and objective evaluations using map-based questionnaires (Brown and Vivas, 2005).

The residents' relationship with their municipality territory is hardly measurable due to its intangibility. Individuals establish bond with the places around them and value them in different ways. This bond, here referred to as Sense of Place, is created by a variety of factors that even the one experiencing it may not be capable of recognizing and quantifying accurately. Sense of Place is therefore studied here on multiple levels to understand its generative drivers and see what they are related to.

The research on the sources of Sense of Place was structured on two main levels: a) to investigate the cultural and historical factors that have contributed to developing people's place attachment, and b) to spatially evaluate the correlations between Sense of Place and landscape features of the municipalities to see which places or elements people are most connected to, and c) see if differently localized Sense of Place can be associated with pro-environmental behaviour. These components of the study were assessed through two main tools of inquiry. Consisting in the creation of a categorical map to represent the structure and components of each municipality's territory, and the administration of a questionnaire designed to explore people's perception and connection of their territory.

## 3.6 Data collection

The comparative analysis of the two municipalities required to adopt the same methods of inquiry for both study subjects. The first step taken was to produce a mapping that could represent and categorize the major elements of both municipality territories. This was then integrated with a survey that was administered to both towns' residents with the aim of achieving a socio-physical interpretation of the relationship between individuals' Sense of Place and landscape configurations. The research aims were carried out as trying to understand Sense of Place through assessing how people perceive and feel connected to their landscape. Thus, making it possible to identify if, and how, different degrees of connection might have been related to the landscape structure and to its supply of ecosystem services. This background was then used to further investigate if the different degrees of people's Sense of Place towards their local area could be taken as an indicator of pro-environmental awareness and attitude.

To obtain the desired information required for answering the research questions, two data collection tools were set up and coordinated with each other, which are 1) the QGIS software

and 2) Google Form surveys. These tools were integrated for allowing residents to spatially locate their connections with places through the maps when filling the survey. Below is the description of the materials developed and used.

## 3.7 Categorical map

The first step consisted in building a categorical map of the municipalities of Cartigliano and Nove through the QGIS Software, version 3.28.2. with 1 meter resolution. The mapping process was structured by defining and assigning values to all the different patches recognizable in the orthophotos of the municipalities. This classification was assigned by photointerpretation of landscape elements through EUNIS Classification System, level 3$^{rd}$ (EUNIS, 2021), and subsequently validated on-site (ANNEX I, Tab. A8.1).

The categorical maps of the municipalities were created to represent and quantify the structure of the landscape, which allowed to further analyse the composition and configuration of the places where people expressed to feel Sense of Place. The maps thus enabled to investigate the relation between landscape structure and residents' Sense of Place at multiple levels: initially with broad categories (i.e., urban, natural, agricultural) and then with individual landscape elements (e.g., forests, meadows, river).

Two different images representing the municipalities were also created through the QGIS Software to be included in the respective questionnaire. These images were created with the purpose of allowing respondents to pinpoint and report the places that better expressed their Sense of Place. To do so, the images consisted of municipal orthophotos on which were added grids of 300 x 300 meters, to virtually divide the municipal territories into cells (ANNEX I; Figs. A8.1, A8.2). These cells were subsequently numbered to facilitate the recognition and quantification of people's housing or Sense of Place, thus enabling the spatial data collection for the evaluations on landscape structure.

## 3.8 Questionnaire

The following stage involved the design of a questionnaire (in Italian language) to be administered to both towns' inhabitants, that could collect relevant information about their involvement, perception and connection with the landscape and its services. This survey was split in seven major sections, that shared the same goal of gathering insights about resident's linkages to their environment and attitudes toward the stewardship of their local green spaces. This questionnaire was the main tool used to investigate the research questions and was

designed over a two-month period, first-testing it in printed format and then through the Google Form platform.

The questionnaire was delivered through different communication tools that were established thanks to the collaboration of the municipalities' public administration. The survey responses were collected through the Google Form platform and were entirely delivered by voluntary participation of residents. The main channel of distribution went through the official WhatsApp communication newsletter of both towns, but other means such as mailbox leafleting, and media platforms (municipal websites and Facebook) were employed as well to enhance participation. At this stage, posters were also designed to be included in the media page announcements or were printed and hung in the dedicated official spaces (Fig. 3.3). To be sure that there were no falsified answers, the surveys collected through official channels and those that were filled in via public areas posters were separated.


*Figure 3.3: posters created to be distributed among residents via different communication channels*

The surveys were administered, and the responses were collected, over a span of one month for each municipality between June and July 2023 and aimed at giving enough time for collecting data that were as evenly representative as possible. This was primarily attempted by obtaining

responses from every sector of the two municipalities, thus ensuring to collect data across the entire territories.

Every questionnaire remained completely anonymous as no sensible data were gathered. The respondents were told that the survey was part of the research project carried out by LIFE PollinAction, Ca' Foscari University of Venice and the respective municipality, and that it would have required 10 minutes to fill it in. It was titled (in Italian): *"Questionnaire for the conservation and improvement of green spaces in the Municipality of Cartigliano/Nove"* and was sponsored by the public administration as a useful tool of information for the public opinion on local natural capital and conservation projects.

By being able to use public communication channels, it was possible for us to send a message of encouragement for participation. In which it was stated that it could have been a great contribution for our research but also an anonymous tool for being able to express one's opinion on public priorities and ideas on how to manage the municipality. Participants were instructed to help people that were less familiar with technology to enable them to participate and give everyone the opportunity to express their opinion. In addition, appointment slots were established for those who wished to be assisted firsthand with the compilation of the survey.

The questionnaire was created by trying to maintain a vocabulary and terminology that was understandable to everyone, avoiding technical terms and specifying several concepts first. These included specifying what was meant by the term 'green spaces': used in several sections of the questionnaire as a key concept to express all the areas or elements containing vegetation present in the municipalities. In the header of some sections was indeed written (in Italian): *"In the questions of this survey, by 'green spaces' we mean all those elements that contain vegetation within them, therefore both natural areas (e.g., woods, hedges, meadows, etc.) and artificial green areas (e.g., parks, gardens, tree-lined avenues, roadside vegetation, etc.)."*

## 3.9 Questionnaire structure and sections

The questions in the survey were set up as a hybrid of check boxes, multiple choice, open answer (long and short), and linear scale from 1 to 10. The first section (ANNEX I, Figs. A8.3, A8.4, A8.5) was dedicated to gathering general information of the respondents such as age and gender, occupation, type and area (cell of the grid; Figs. A8.1, A8.2) of residence, years of residence and intention to move elsewhere. The second section aimed at assessing the use of municipal green spaces (ANNEX I, Figs. A8.5, A8.6). Thereby understanding which green

spaces were the most frequented by residents, alongside their frequency and the activities mostly carried out there. In the third part (ANNEX I, Figs. A8.6, A8.7), it was assessed the residents' attitudinal profile towards the general value of green spaces, asking questions such as #16: *"From 1 to 10, how much do you care about the conservation of green spaces?"* and other questions about its possible economic, ecological, and human welfare contribution.

The fourth section was specifically dedicated to obtaining information about the perceived offer of Cultural Ecosystem Services (and disservices), that focused on three specific aspects of: Aesthetic beauty, Recreation values, and Sense of Place (ANNEX I, Figs. A8.8, A8.9). To extensively cover the research objectives about human-place relationships, specific questions were designed to discover residents' level of bonding with the local area, localizing their Sense of Place through the numbered map, alongside asking for motivations and for the extent to which the presence of green areas and elements influenced their answers: *"From 1 to 10, how much did the presence of green components influence the choice of the selected location?"*. In addition, to test the correlation between individuals' environmental attitudes and their Sense of Place, a question (#30) was included asking: *"From 1 to 10, how happy would you be if some investments were made for the ecological conservation in your chosen location?"*.

Thereafter, the reason given for choosing the selected cell representative of Sense of Place, were obtained through question #28: *"Briefly explain the reason why you feel connected to the indicated place"*.

Later, the responses were grouped into five distinct macro-topics based on the type of responses given and integrated with the established conceptual framework to be able to classify and statistically analyse the responses given (Tab. 3.1). Based on the conceptual framework and the understanding of previous literature, the below listed five topics were employed.

- The responses were categorized under the macro-topic of 'place attachment' when given a rationale that referred to a strong connection to one's house or to the time spent in a place (e.g., '*Because those are the areas I have spent and lived most of my time'; 'Is where my family lives and I was born and raised'*).
- On the other hand, responses were labelled under 'place identity' when they recalled the social and cultural significance that a place had for the individual or the whole community (e.g., *'The "Villa Morosini Cappello" has always been the symbol of our municipality'; 'The avenue is part of the identity of Nove'*).

- The responses categorized as ‘place satisfaction’ were those that mentioned the well-being drawn from the selected places or described contentment about specific area or element present. For instance, when they could be linked to services and benefits provided by such places. (e.g., *‘The Brenta area relaxes me a lot’; ‘Is a great place to play with children’*).
- In ‘social relationships’ were placed all those motivations related to the possibility of meeting and being together in such places. (e.g., *‘The town centre because it is a meeting place’*; *‘Because it's a great place to bring a friend’; ‘Because it is a place where I can find people to talk to’*).
- Lastly, listed as ‘green value’ were all those responses that referred to the presence of green spaces or elements such as vegetation or parks. (e.g., *‘The ‘oasi di Nove’ is an incredible space’; ‘Because I love the river, its water, the trees, the big green and natural spaces’; ‘It makes me feel in tune with nature’*).

*Table 3.1: macro-topics identified for grouping on reason for selection of representative places for Sense of Place*

| TOPICS | DESCRIPTION |
|---|---|
| **PA** | Place Attachment |
| **PI** | Place Identity |
| **PS** | Place Satisfaction |
| **SR** | Social Relationships |
| **GV** | Green Value |

The following two sections (five and six) assessed the perceived importance and satisfaction of nine distinct ecosystem services including air quality, water availability, heat mitigation, pollination. Etc. (ANNEX I, Figs. A8.9, A8.10, A8.11). These sections were included because this thesis supports the hypothesis that the structure of the landscape, and the supply of ecosystem services in which individuals’ Sense of Place is generated, is a decisive component of the quality of the connection that an individual feels toward such landscape. In this sense, the answers to these questions made it possible to assess whether there was a correlation between the most frequently selected locations for Sense of Place and its level of provision of ecosystem services.

The seventh and last section shifted the focus towards final general considerations as to whether respondents would like to increase, decrease or maintain green areas and elements in their

municipality or private home (ANNEX I, Figs. A8.11, A8.12). They were also asked to indicate their preferred type (*wooded areas, hedges, lawns, flower beds, tree-lined avenues, etc.*) and the location they would have preferred to see it implemented.

The final questions of this section were reserved for comments and suggestions regarding the local administration. Residents were asked to select from a multiple-choice answer three options about their opinion on what should be given priority in the future development plans of their municipality (*agricultural, industrial, tourism, residential, mobility, playgrounds and green areas*). Then they were asked how much they would agree if their municipality invested resources in improving and developing new green spaces, alongside leaving space for open comments about actions the administration could take to improve the state of the municipality and the well-being of its citizens. Some of these final questions, despite not being crucial to the research aims of this thesis, were communicated and found to be a useful tool for increasing awareness of current administrations, while also helping the study to better frame some of the shortcomings expressed by the two communities.

After collecting all the responses, the questionnaires were first converted in Google Sheets and then investigated and discussed in descriptive and statistical terms to obtain information on individuals' profiles, perceptions and connection of the landscape and environmental attitude. Based on the statistical result and on the comparison of the responses from the two municipalities it was possible to deepen the results and discuss the validity of research objectives.

## 3.10 Data analysis

To properly answer the research questions of this study, a study of the data extrapolated from the responses of the questionnaires and map outputs was carried out. Here are outlined the statistical analyses that were done to explore Sense of Place in Cartigliano and Nove, which considered their participants in two separate groups. The purpose of this chapter is to provide a summary that explains the methods used to explore the questionnaire findings.

While some answers from the survey were treated and discussed descriptively, others were processed with statistical analyses to strengthen the enquiry of research objectives. Some selected research questions were indeed evaluated with a statistical procedure that aimed at investigating its truthfulness. To these aims, data were uploaded and analysed in R software (version 4.2.1) which is a software that allows to process the findings from the surveys. In all

statistical analyses, a significance level (α) of 0.05 (Dahiru, 2008) was then considered to test which of our hypothesis was most supported by data.

### 3.10.1 Profile and attitude analysis of participants

After briefly described the study areas considering land cover and land uses (ANNEX I, Tab. A8.2) and the protected area of the SCI/SPA IT3260018, the first analysis conducted focused on inspecting the general resident's information that were gathered in the first and second sections of the questionnaire, namely the personal information and green space frequentation. To describe the profiles of participants of Cartigliano and Nove, we considered age (question #1), gender (question #2), social status (question #3), residence time (question #4), attendance of green spaces (question #11) with relative performed activities (question #13) and perceived importance of green spaces (#17).

To complete the attitudinal profile of the two groups of respondents, were then considered the responses about their perception and evaluation of green spaces. For instance, asking whether increase or not green spaces within the municipal territory (question #41), what green elements they preferred seeing implemented in public spaces (#43) and what was their overall desired political priorities (question #45). Thus, a brief and descriptive comparison of the distribution between the two groups of respondents was made for each attribute to assess and visualize the differences among the two considered samples.

To understand the general environmental stand of the two communities, a statistical analysis was conducted to assess the difference in attitudes between the inhabitants of Cartigliano and Nove. To achieve this goal, the responses obtained from three survey questions about the respondents' attitude towards the conservation of green spaces and attachment to their municipality (#16 – #26 – #46) were selected and analysed. Because the output of the three considered questions were ordinal data, a 'Permutational Multivariate Analysis of Variance' (PERMANOVA; Anderson, 2014) was conducted to compare and highlight differences between the two groups (*adonis2* function of package 'vegan 2.6-4').

Since 'PERMANOVA' did not describe specifically which was the question that mainly contributed on attitudinal differences between the two groups, 'multiple t-tests' were conducted to compare the two groups accounting for the three attitudinal descriptive variables separately (Lakens, 2013). Thus, the 'PERMANOVA' and 't-test' helped checking if the difference

between the two municipalities in terms of residents' attitude was significant or not, and for which attitudinal variable.

### 3.10.2 First objective - Sense of Place and green spaces involvement

The first step for investigating how Sense of Place is generated in the residents of Cartigliano and Nove was that of collecting and comparing all the responses regarding the motivation given by individuals for choosing places representative of their SoP (question #28). The responses were thus categorized under the five macro-topics previously established in the conceptual framework of drivers of Sense of Place.

To further address how Sense of Place is generated, the role of green spaces was first investigated by looking at its influence on Sense of Place. Thus, the 'Cumulative Link Models (CMLs) for Ordinal Regression' (Christensen, 2018) was first used to examine the role of green spaces in this process for the participants of Cartigliano and Nove (*clm* function of package 'ordinal 2022.11-16'). This statistical analysis was used to define whether the relationships between the dependent variable 'Sense of Place' (quantified through question #26) and the independent variable 'Green spaces influence' (quantified through question #29), both based on Likert-scale ordinal data, was significant.

Thereafter, a 't-test' was conducted to determine whether the two municipalities significantly differed for the influence of green spaces in the determination of most representative place for Sense of Place (Lakens, 2013). To fully comprehend the role of green spaces in generating Sense of Place, a "Kruskal-Wallys test" was then carried out to determine whether there were significant differences in the influence of green spaces with respect to the five macro-topic classes regarding the motivations given for choosing representative places for Sense of Place within the two groups (McKight and Najab, 2010).

Since the 'Kruskal-Wallys test' did not describe specifically which was the paired groups that determine the significant differences among macro-topic classes, a 'Dunn's test' was conducted (*dunnTest* function of package 'FSA 0.9.5') and made it possible to represent and visualize such differences to understand the importance of the presence of green spaces for each class (Dinno, 2015). Additionally, this analysis demonstrated which topics were highly and lowly influenced by municipal green spaces.

### 3.10.3 Sense of Place and Ecosystem Services

To complete the understanding about how Sense of Place is generated, the degree of satisfaction of ecosystem services among both municipalities' residents and its influence on general Sense of Place was explored. Similar to previously performed investigations on green spaces, a 'Cumulative Link Models (CMLs) for Ordinal Regression' (Christensen, 2018) was first used to examine the role of ecosystem service satisfaction on Sense of Place generation for both groups. This statistical analysis was then used to define whether the relationships between the dependent variable 'Sense of Place' (quantified through question #26) and the independent variable 'ESs satisfaction' (quantified by averaging questions #32 - #40) was significant. To this aim, nine ecosystem services were considered, namely: "air quality", "noise calm", "water availability", "flood prevention", "summer temperature (mitigation)", "scenic beauty", "recreational spaces", "biodiversity", and "pollinators service".

Because the output describing the satisfaction for the ecosystem services supply were defined through ordinal data, a 'Permutational Multivariate Analysis of Variance' (PERMANOVA; Anderson, 2014) was conducted to compare and highlight differences between the two municipalities (*adonis2* function of package 'vegan 2.6-4'). Then, 'multiple t-tests' were conducted to compare the two groups by coupling each ecosystem service separately (Lakens, 2013).

To highlight possible differences among residents on the reason for selection of representative place for Sense of Place, a 't-test' was first conducted using the averaging of all the questions from #32 to #40, to define whether the two municipalities significantly differed for perceived satisfaction of ecosystem services (Lakens, 2013). Then, considering the same grouping on macro-topics (Tab. 3.1), a 'Kruskal-Wallys test' (McKight and Najab, 2010) followed by a 'Dunn's test' (Dinno, 2015) were computed to determine whether there were significant differences in the influence of ESs satisfaction accounting for the motivations behind localized SoP, and define which macro-topic class significantly differed from the others within the two groups. Moreover, this analysis also determined which topics showed the highest degree of satisfaction for ecosystem services.

### 3.10.4 Second objective - Landscape composition and configuration role

In order to investigate the relationship between Sense of Place and landscape attributes, 300x300 m cells were used as statistical units to be considered for this investigation. Particularly, after converting EUNIS classes in Corine Land Cover classification system to

easily compute rasterization of vectorial maps and landscape attributes (ANNEX I, Tab. A8.3), each cell was uploaded in Fragstats 4.2 to compute the following attributes according to McGarigal (2015; ANNEX I, Tab. A8.4):

- percentage of artificial areas ($AREA_{ART}$)

the percentage of the CLC class '1.' cover within each cell;

- number of patches (NP)

the number of patches within each cell;

- patch richness (PR)

the number of CLC classes within each cell;

- Shannon Diversity Index (SHDI)

land cover and land use diversity in each cell;

- Shannon Evenness Index (SHEI)

evenness of land cover and land use relative abundance in each cell;

- Aggregation Index (AI)

aggregation of patches of land cover and land use in each cell;

Concomitantly, frequencies of selection were retrieved for each cell of the two municipalities by looking at responses to the question #27. Then, landscape attributes and selection frequencies were associated with each other for each cell of Cartigliano and Nove.

To test how residents' Sense of Place was related to landscape attributes and explore the relationship between cell selection frequency and related landscape attributes, several 'Cumulative Link Models for Ordinal Regression' were employed separately for each attribute (Christensen, 2018). The analyses thus considered the number of times in which the cells were selected as representative of Sense of Place (dependent variable) and related it to the landscape attributes (independent variables) to identify which ones were significantly involved in SoP and in which way. Thus, when first order regressions were not significant, a second order regression was performed to find more complex relationship.

### 3.10.5 Third objective - Sense of Place and pro-environmental behaviour

To understand if there was a relationship between residents' Sense of Place and their degree of pro-environmental Behaviour, a 'Cumulative Link Model for Ordinal Regression' was used for both municipalities participants (Christensen, 2018). Particularly, the regression was computed by relating Sense of Place (dependent variable quantified through question #26) with Degree

of pro-environmental Behaviour (independent variable quantified through question #46). This model allowed to define whether the coefficient was statistically different from zero and thus if there was a significant relationship between the independent variable and the dependent variable.

# 4. RESULTS

## 4.1 Mapping Outputs

The mapping process conducted in GIS environment has led to the production of categorical maps both for Cartigliano and Nove (Fig. 4.1). Particularly, for Cartigliano a total of 8237 patches grouped in 52 EUNIS classes (III level) were found, while for Nove the number of patches amounted at 5002 among the 46 identified EUNIS classes (ANNEX II, Tab. A9.1).

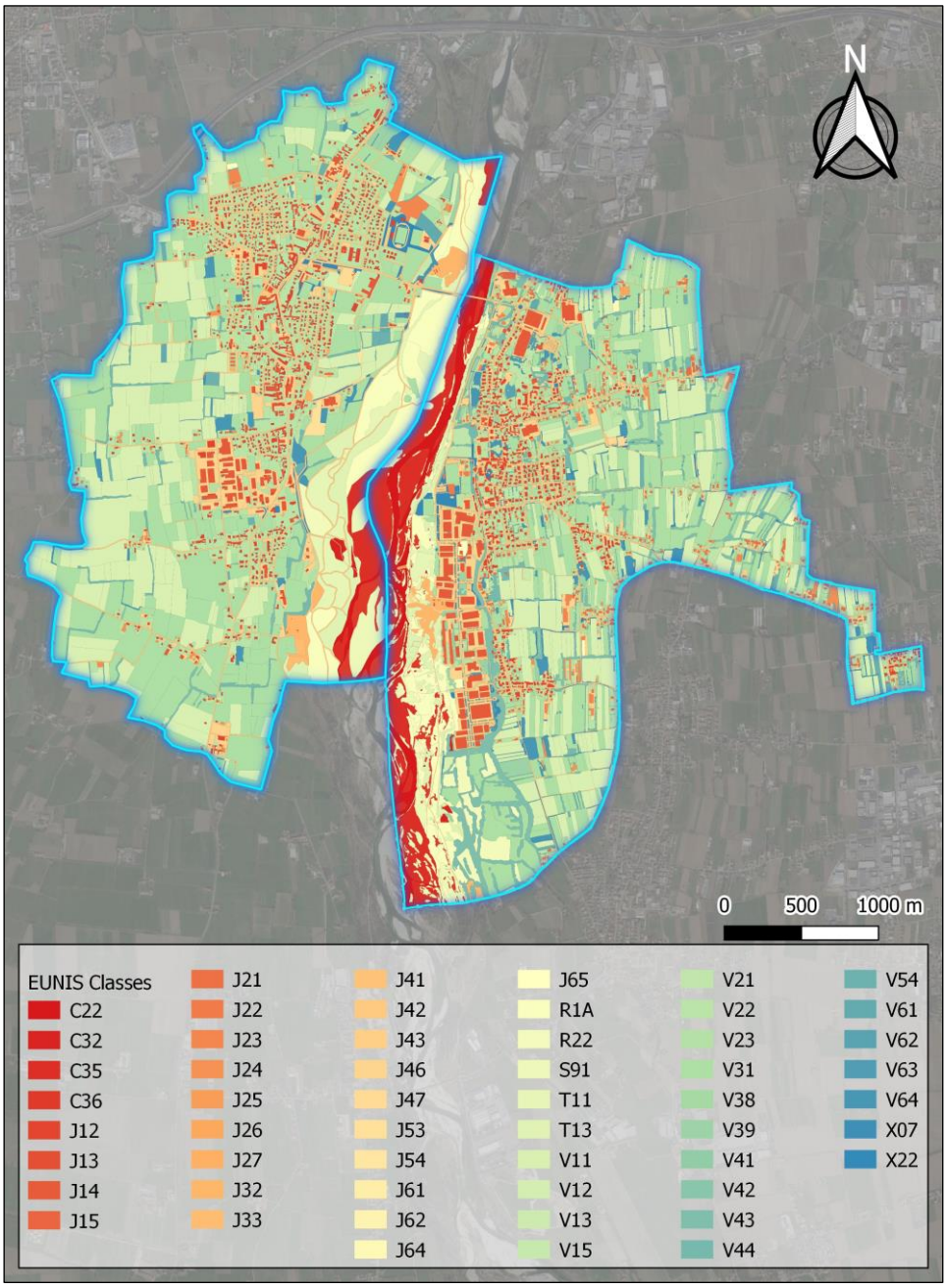


*Figure 4.1: EUNIS III level categorical maps of Nove (left) and Cartigliano (right)*

Looking at the SCI and SPA IT3260018 “Grave e zone umide della Brenta” (Fig. 4.2), this study revealed that although the two territories look quite similar at first sight, there are relevant differences in the number of Natura2000 habitats (Habitat Directive 92/43) and land cover percentages for the two municipalities (Tab. 4.1). The protected natural area covers 1,77 km² in Cartigliano (24,0% of the entire municipal territory) with overall 8 Natura2000 identified habitats. Conversely, in Nove it covers up 1,35 km² (16,6% of the entire municipal territory) with 6 Natura2000 habitats. Thus, within the municipal territory of Cartigliano the habitat 3260 (‘Water courses of plain to montane levels with the Ranunculion fluitantis and *Callitricho-Batrachion* vegetation’) and 6430 ('Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels’) contribute to a higher richness and heterogeneity of the protected natural areas.

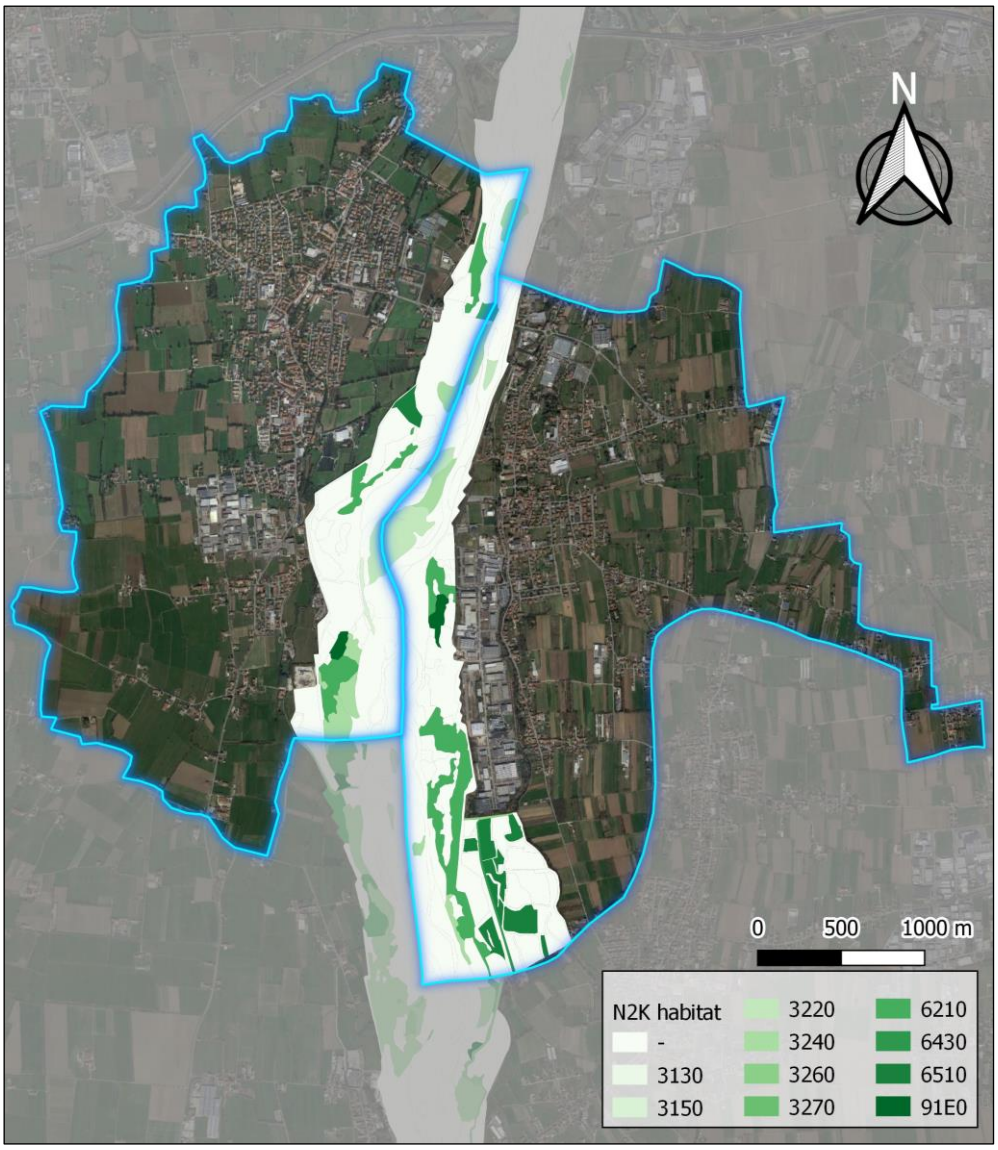


*Figure 4.2: SCI/SPA IT3260018 represented with habitats of the Natura2000 network*

*Table 4.1: list of habitats located within the two municipalities (X defines the presence within Cartigliano or Nove)*

| N2K HABITAT | DESCRIPTION | CARTIGLIANO | NOVE |
|---|---|---|---|
| **3150** | Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation | X | X |
| **3220** | Alpine rivers and the herbaceous vegetation along their banks | X | X |
| **3240** | Alpine rivers and their ligneous vegetation with Salix eleagnos | X | X |
| **3260** | Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation | X | |
| **6210** | Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (*important orchid sites) | X | X |
| **6430** | Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels | X | |
| **6510** | Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis) | X | X |
| **91E0** | Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) | X | X |

Grouping the 52 III level EUNIS classes in 12 macro-category of land use and land cover (ANNEX I, Tab. A8.2) allowed to further understand differences between the municipalities investigated in the study (Fig. 4.3). The predominant land use was that of cultivated fields in both municipalities, with the "Arable Crops" category accounting most of the area in both territories (Tab. 4.2). Both municipalities resulted having a relevant presence of grasslands and meadows ("Grasslands"), with Nove having a slightly larger area than Cartigliano despite the lower percentage exhibited. Moreover, Nove had a higher percentage of "Forests" than Cartigliano, which, however, has a greater presence of "Hedgerows", "Surface Water "and "Public Gardens" than Nove, but less "Private Gardens". In Cartigliano there is also a greater percentage of "Industrial Buildings" and "Road Networks and Parkings".

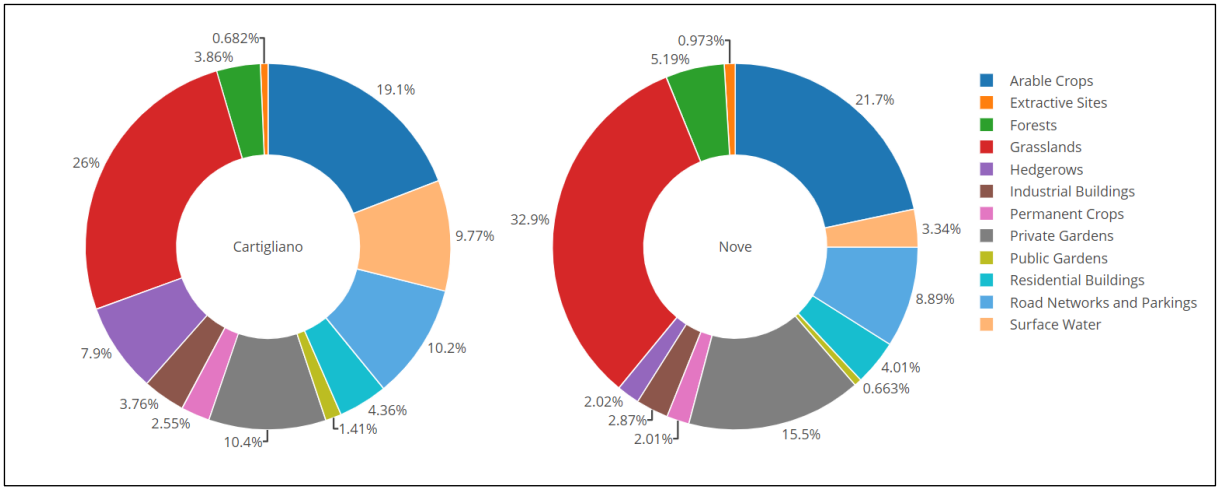


*Figure 4.3: relative cover of the 12 defined macro-category of land use/land cover among the two municipalities*

*Table 4.2: specifications of absolute and relative cover of the 12 defined macro-category of land use/land cover among the two municipalities*

| **LANDSCAPE MACRO-CATEGORY** | **CARTIGLIANO** | | **NOVE** | |
|---|---|---|---|---|
| | Area (*ha*) | Percentage (%) | Area (*ha*) | Percentage (%) |
| **Arable Crops** | 144,20 | 19,1 | 176,99 | 21,7 |
| **Extractive Sites** | 5,14 | 0,7 | 7,93 | 1,0 |
| **Forests** | 29,11 | 3,9 | 42,31 | 5,2 |
| **Grasslands** | 195,98 | 26,0 | 267,71 | 32,9 |
| **Hedgerows** | 59,53 | 7,9 | 16,44 | 2,0 |
| **Industrial Buildings** | 28,37 | 3,8 | 23,38 | 2,9 |
| **Permanent Crops** | 19,19 | 2,5 | 16,36 | 2,0 |
| **Private Gardens** | 78,16 | 10,4 | 126,02 | 15,5 |
| **Public Gardens** | 10,66 | 1,4 | 5,40 | 0,7 |
| **Residential Buildings** | 32,84 | 4,4 | 32,64 | 4,0 |
| **Road Networks and Parkings** | 76,87 | 10,2 | 72,42 | 8,9 |
| **Surface Water** | 73,60 | 9,8 | 27,19 | 3,3 |
| ***TOTAL*** | 753,63 | | 814,80 | |

## 4.2 Questionnaires outputs

Globally, a total of 237 questionnaires were collected over a period of one month for each municipality, specifically 124 in Cartigliano and 113 in Nove. In Cartigliano, reaching the desired participants quota required several reminders through different communication channels. While in Nove there were numerous responses in less time, but also less attention to meeting deadlines from the municipality.

Considering the ‘Age’, ‘Gender’, ‘Occupation’, and the spatial distribution of respondents (ANNEX II, Figs. A9.1, A9.2), the two samples of participants proved to be heterogeneous and representative of the two populations. Since the survey was filled out voluntarily, it is expected that the samples taken may have been prompted by interest in the topic, creating thus a bias with reality. However, it is hoped to have offset this bias by clarifying that the questionnaires would have been collected completely anonymously, permitting only those who wanted to fill it up. Furthermore, it is assumed that across all questionnaires collected there was a similar interest of the topic across both groups. This might have driven a similar pool of respondents with similar attitude to participate in both Cartigliano and Nove, allowing to retrieve reliable evaluations and comparisons due to the similarity of the sampled participants.

## 4.3 Questionnaire descriptive results

Regarding the demographic distribution of the two communities retrieved through question #1, there were no major differences in the age of participants among the municipalities (Fig. 4.4). Moreover, through the present findings it is possible to assume that the distribution of the sample of individuals analysed reflects the true age composition of the two considered population, particularly for adults.

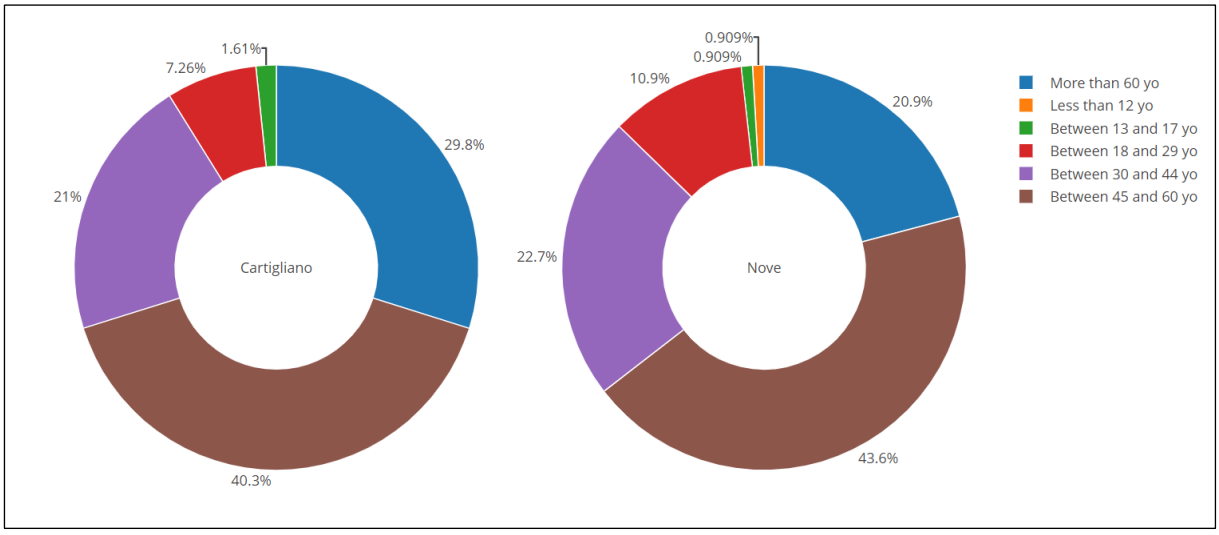


*Figure 4.4: age distribution of the participants of Cartigliano and Nove*

As for the distribution of gender revealed by question #2, in both cases women participated to a larger extent than men while few people preferred not to answer this question (Fig. 4.5). In Nove, for instance, the percentage of women's responses reached nearly 70%.

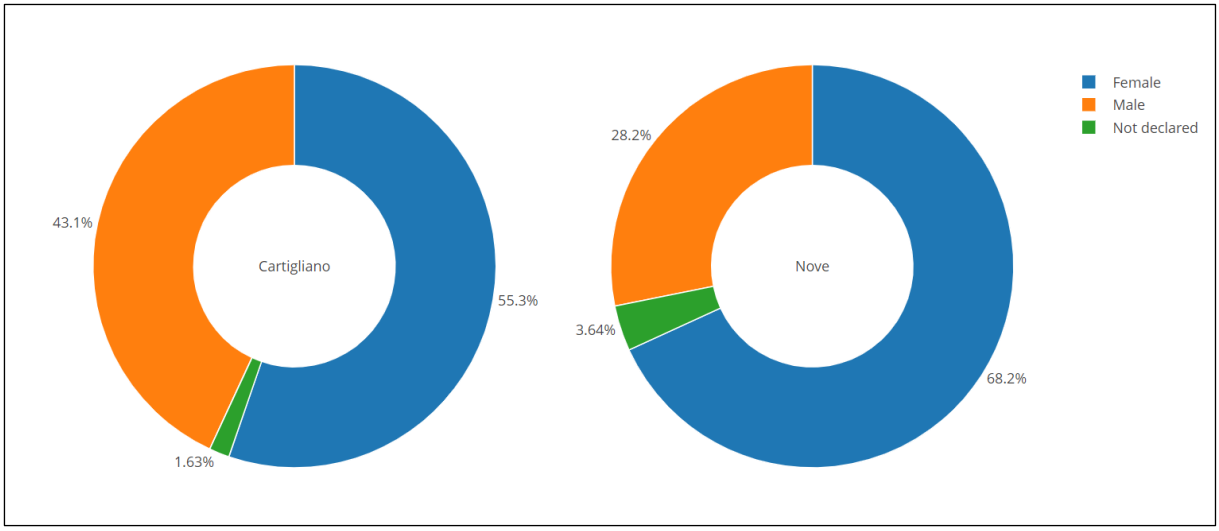


*Figure 4.5: gender distribution of the participants of Cartigliano and Nove*

The survey question #3 about social status reached a total of 11 different types of status in the responses due to the possibility of freely writing "other" options beyond the preset answers (Fig. 4.6). In both municipalities "Employee" and "Retiree" were found to be by far the most common ones, but other occupations are represented in a good number as well.

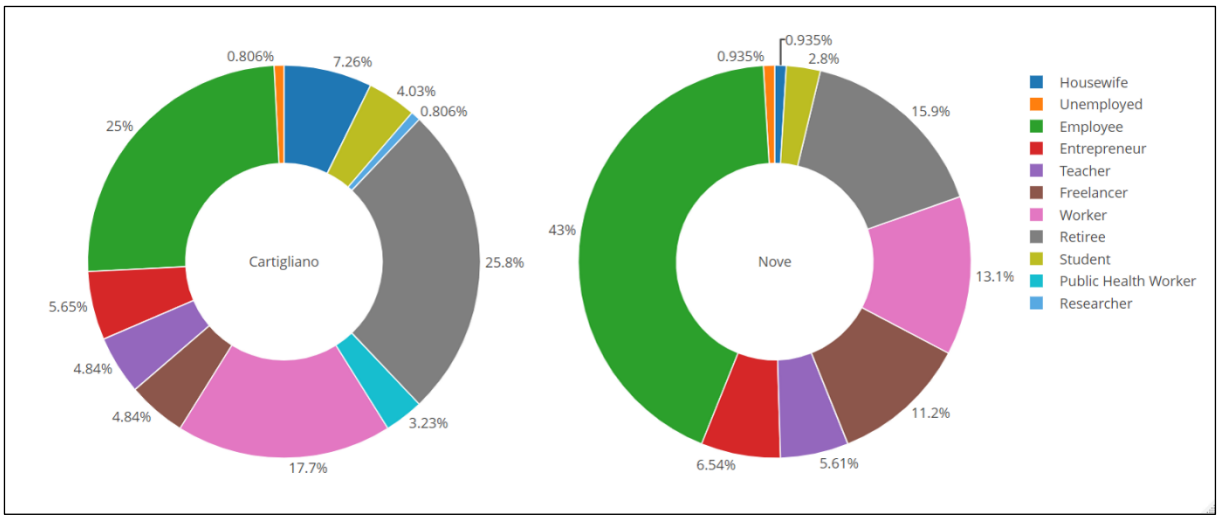


*Figure 4.6: social status distribution of the participants of Cartigliano and Nove*

The results regarding the question #4 revealed that in both cases prevails the proportion of participants who have always resided in their municipality (Fig. 4.7). Other classes of replies about residence time are meaningfully present as well. However, the number of respondents stating that they had lived there for less than a year was the only one below 1% in both municipalities. The finding that most respondents have resided for a long time substantiates the

validity of the responses obtained as they know the entire municipalities and places and can provide useful information for the aims of this study.

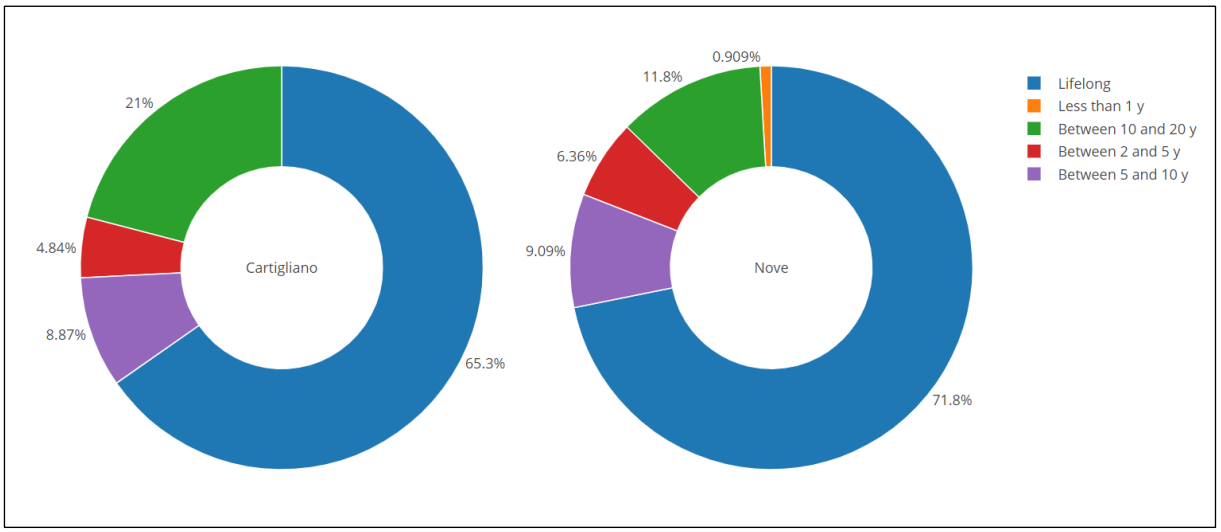


*Figure 4.7: residence time distribution of the participants of Cartigliano and Nove*

As to the question #11 on the attendance of green spaces, the participants were found to be equally distributed among classes, except for the group of individuals who do not frequent green spaces at all in their municipality (12,6% in Nove vs 5,65% in Cartigliano; Fig. 4.8). Also, this finding confirms that participants know the entire municipalities ensuring valuable insights for this study.

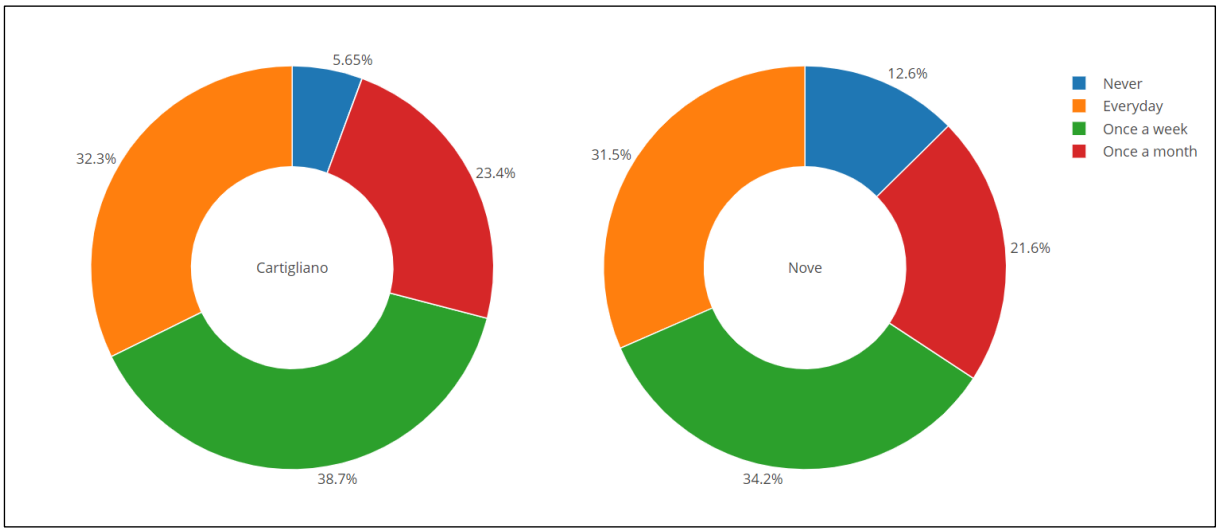


*Figure 4.8: participants frequentation of the municipal green spaces respectively of Cartigliano and Nove*

As for the question about the reason why people attend the green spaces of their municipal territory (#13), the results highlighted up to 8 different performed activities. The possibility of independently writing "other" activities beyond the preset answer left room for several suggestions here as well. Out of all the activities chosen in the responses, “Physical activity” (such as running, yoga and walking) was found to be the prevailing in both municipalities, followed next by “Walking the pet”, “Child supervision” and “Socialize” activities (Fig. 4.9).

In Cartigliano there were many “other” responses written voluntarily that were related to the maintenance of public and private green spaces, which are here referred to as “Green care” and accounted for 4.2% of all activities (e.g., *“I do some maintenance at the park”*). In Nove, routine activities like: “Walking the pet” and “Child supervision” were found to be more prevalent, with the latter activity accounting for twice the percentage as in Cartigliano. However, Cartigliano resulted having slightly larger percentages of those activities that were more closely related to a spiritual and material immersion in the municipalities green spaces (“Contemplating nature”, “Relax”, “Wild harvesting”).

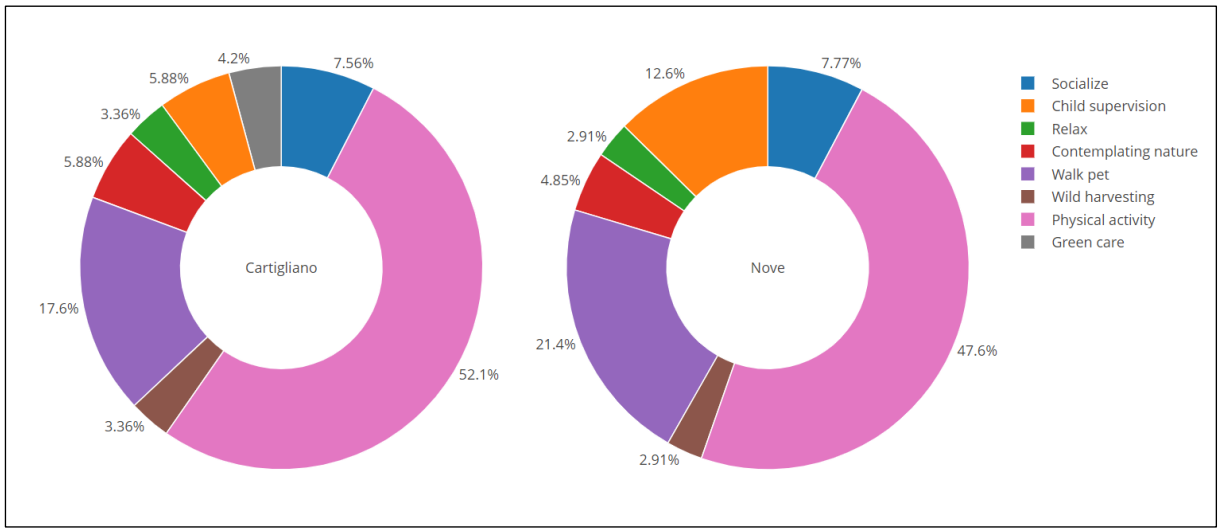


*Figure 4.9: activities usually performed by participants during the frequentation of the municipal green spaces*

Through the results obtained from the comparison of the two groups answers to question #17 (*“In your opinion, what is the most important role of green spaces?”*), it was revealed that some of the choices were selected with relevant different frequencies (Fig. 4.10). First above all, the selection of "Biodiversity conservation" resulted being noticeably higher in the respondents of Cartigliano, as well as that for “Scenic beauty enhancement” and “Local traditions

preservation". While on the other side, the selection of "Recreational activities" and "Meeting point" was found to be more frequent for those of Nove.

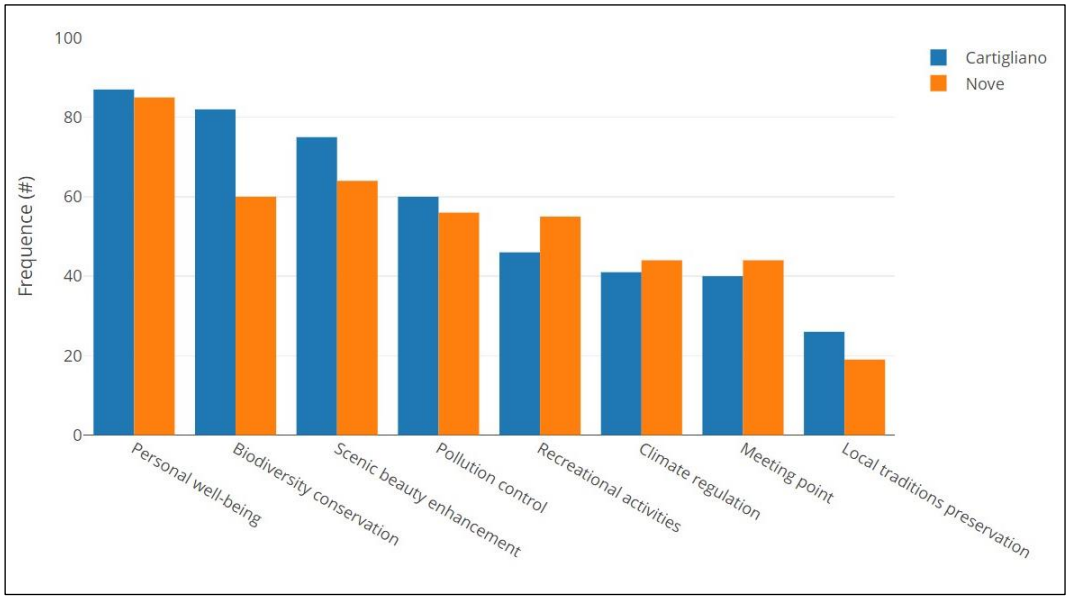


*Figure 4.10: comparison of the selection frequency for the deemed roles of green spaces*

Considering the question #41 (*"I would prefer that my municipality green spaces will be..."*), differences emerged between the two municipalities (Fig. 4.11). Specifically, participants of Cartigliano showed to be inclined more in maintaining the current green spaces than in increasing them, while the opposite emerged through participants of Nove. Moreover, none of the participants of both municipalities selected the option "Diminished".

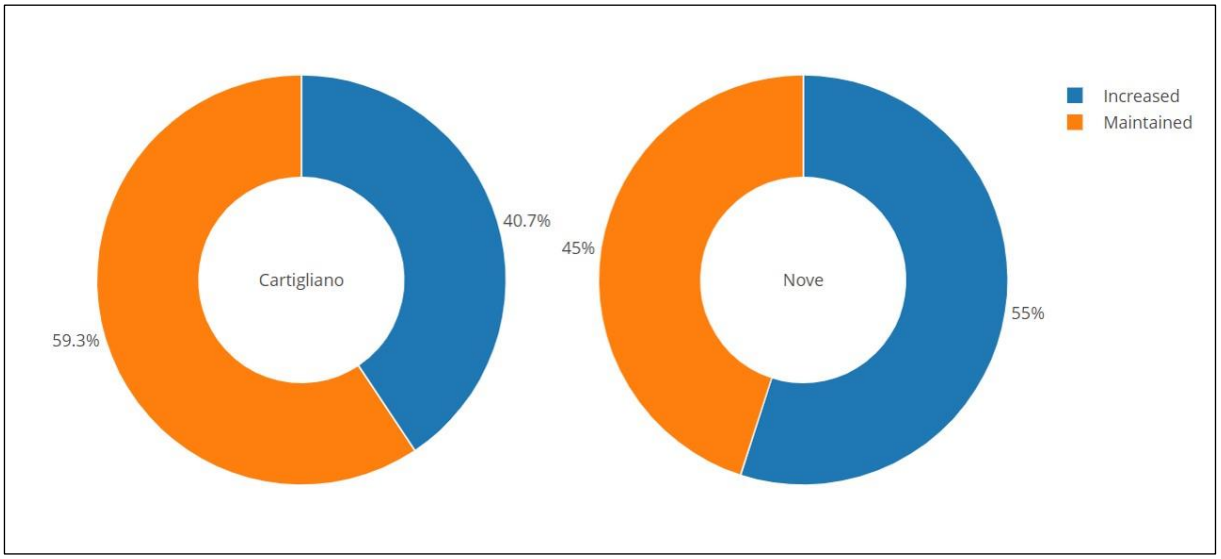


*Figure 4.11: participants consideration and wishes on municipal green spaces global management*

The comparison of the answers between the two municipalities to question #43 (*"I would prefer that my municipality green spaces had more..."*), turned out to be dissimilar between the two groups for some meaningful classes (Fig. 4.12). The findings unveiled that those choices like "Wooded areas" and "Hedgerows", which indicate a more natural and biodiverse option, were selected considerably more in Cartigliano. Whereas, in Nove the preference veered more towards those classes that represent open recreational spaces such as "Sport green areas" and "Grasslands".

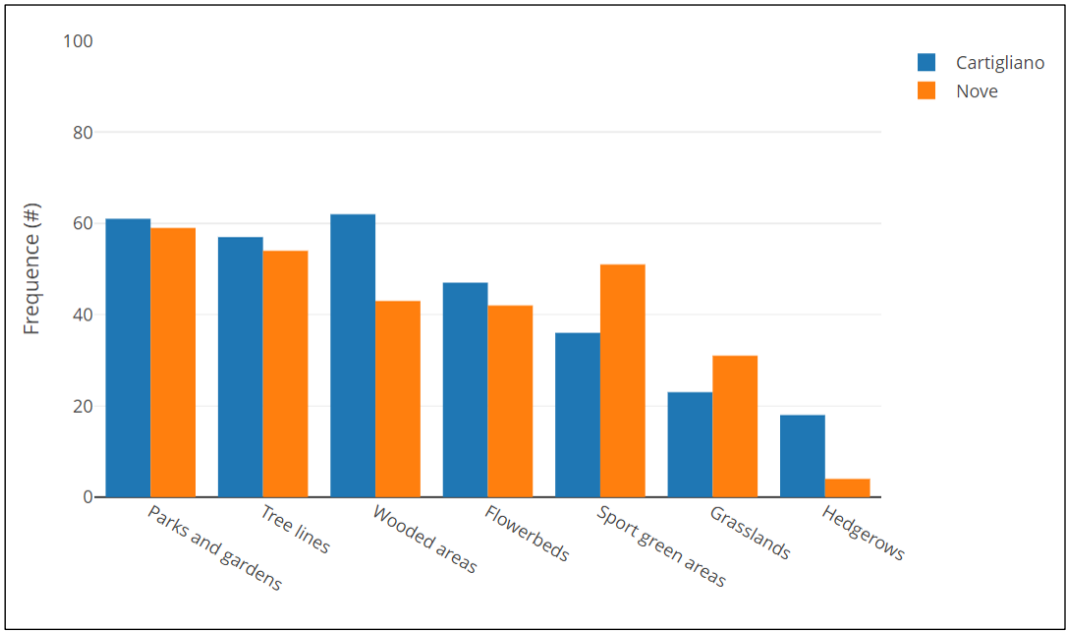


*Figure 4.12: participants preferences on green elements to be placed within the municipality*

Regarding what participants wished for the political priorities of their municipality administration (question #45), the two groups were found to be quite similar for almost all classes except for "Agriculture", which was selected considerably more times in Cartigliano than in Nove (Fig. 4.13). "Mobility" and "Nature" resulted being the most selected ones in both municipalities, while "Industry" the least selected one, and even less in Cartigliano than Nove.

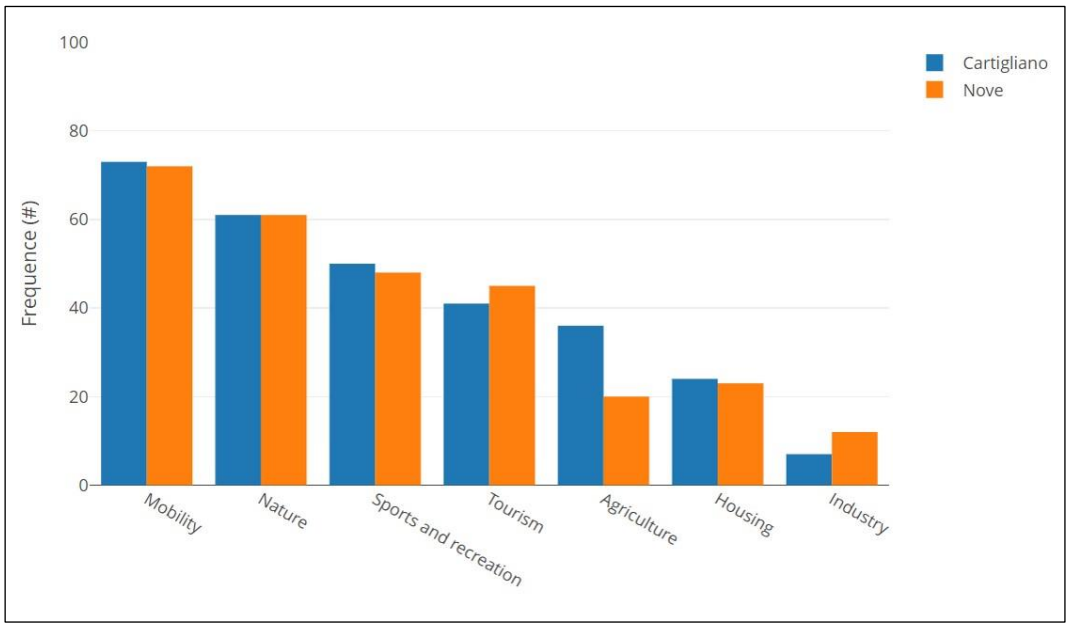


*Figure 4.13: comparison of partcipants priorities for the local development of Cartigliano and Nove respectively*

## 4.4 Environmental attitude analysis results

Considering the questions #16 *("From 1 to 10, how much do you care about the conservation of green spaces?"*), #26 (*"From 1 to 10, how connected do you feel to Cartigliano?"*) and #46 (*"From 1 to 10, how much would you approve if the municipality where you live invested resources in improving and building new green spaces?"*) as descriptive of people's environmental attitude, the analysis allowed to verify if there were enough evidence to verify the differences between the two groups. Particularly, the 'PERMANOVA' test showed a significant difference between the residents of Cartigliano and Nove as the p-value was found to be below the established significance level (i.e., <0.05; Tab. 4.3).

*Table 4.3: PERMANOVA test outputs for the environmental attitude comparison between the two municipalities*

| | DF | $R^2$ | F | p-value |
|---|---|---|---|---|
| **GROUPS** | 1 | 0.014 | 3.250 | **0.032** * |

*: p-value < 0.05

The results obtained from multiple 't-test', where each of the three variables were compared between the two municipalities, demonstrated that the responses to question #46 were the only ones to differ significantly, with a p-value <0.05 (Tab. 4.4). These tests highlighted that in Nove the group of respondents were more supportive of the idea that their municipality would invest resources in improving and building new green spaces (Fig. 4.14).

*Table 4.4: t-test outputs on comparison between Cartigliano and Nove for question #46 means*

| | DF | t | p-value |
|---|---|---|---|
| **Question #46** | 206.03 | 3.250 | **0.020** * |

*: p-value < 0.05

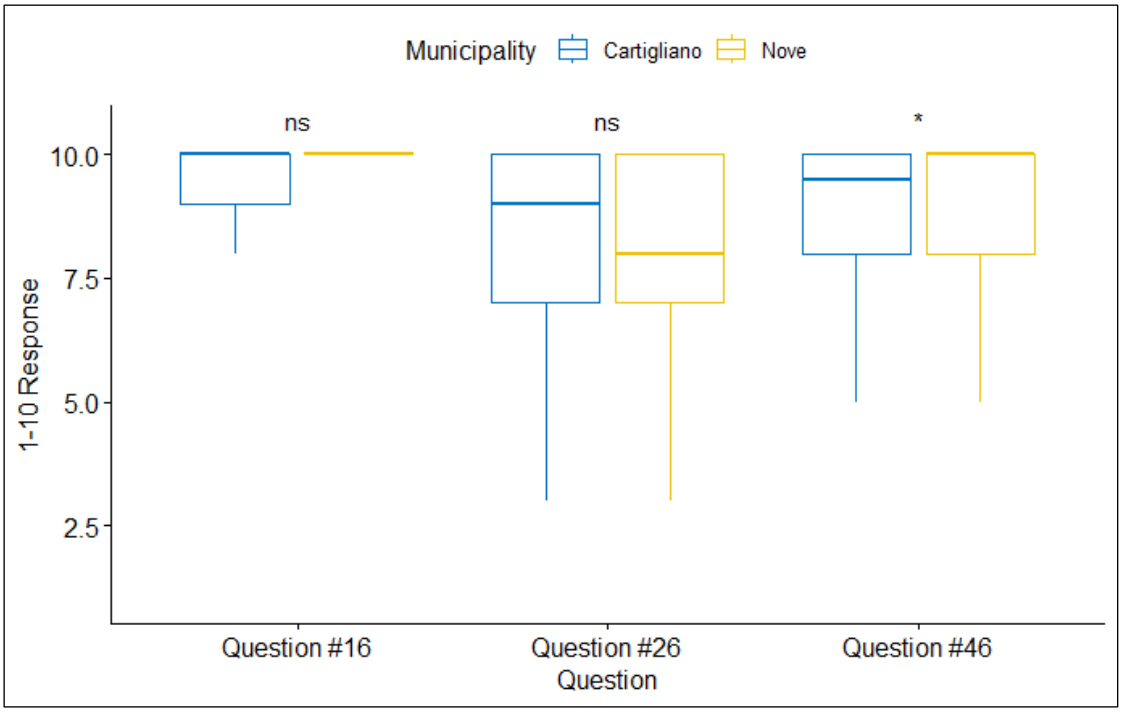


*Figure 4.14: boxplots comparison of questions describing environmental attitudes for each municipality*

## 4.5 First objective – Sense of Place and green spaces involvement

The classification and comparison of the motivation given by respondents for choosing the places representative of their SoP (question #28), revealed that the components 'Place Attachment' (PA) was predominant and in similar percentage for both municipalities (Fig. 4.15), followed by the also similarly distributed 'Place Identity' (PI). However, there were more relevant differences for the other components, with respondents from Cartigliano giving higher percentage motivations related to 'Social Relationships' (SR) and 'Place Satisfaction' (PS) than those from Nove, who instead selected reasons associated to 'Green Value' (GV) more often. Particularly, the maps of frequency selection (ANNEX II, Figs. A9.3 and A9.4) showed how frequencies of selection and topic components were spatially distributed across the municipal territory for each municipality.

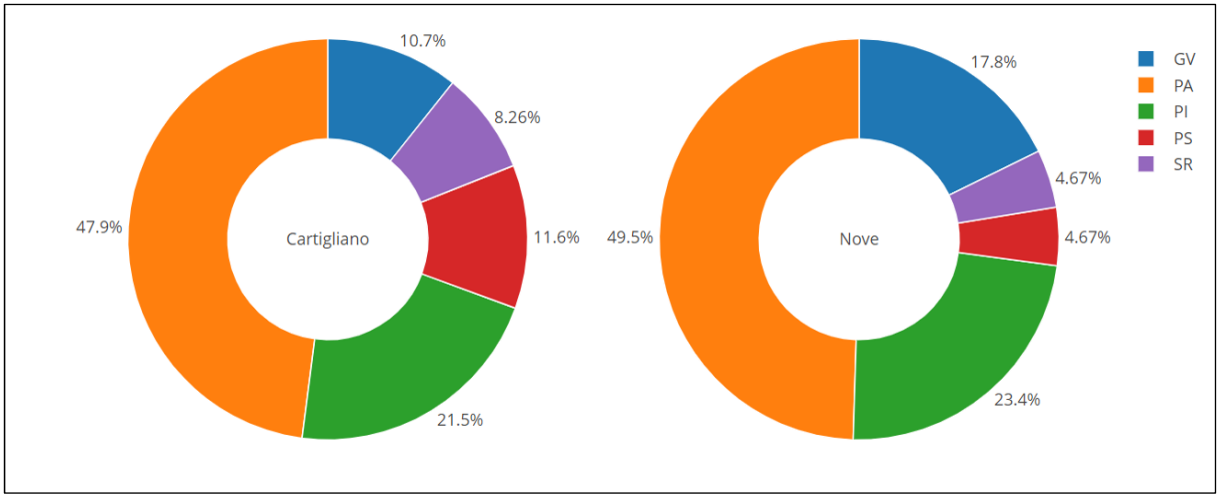


*Figure 4.15: selection topic frequencies for the participants of the municipalities of Cartigliano and Nove (GV – green value, PA – place attachment, PI – place identity, PS – place satisfaction, SR – social relationship)*

Concerning then the influence of green spaces on Sense of Place generation, the 'Cumulative Link Model for Ordinal Regression' revealed a significant relation between Sense of Place and the role of green spaces in the selection of places most representative for SoP (p-value <0.05; Tab. 4.5). More specifically, the positive coefficient found (*cfr.* 'Estimate' in Tab. 4.5) indicates that greater Sense of Place was related to a higher influence of green spaces during the selection process of the most representative places for Sense of Place (Fig. 4.16).

*Table 4.5: cumulative link model outputs for green spaces influence on Sense of Place*

| | **Estimate** | **Std. Error** | **z-value** | **p-value** |
|---|---|---|---|---|
| **Question #29** | 0.113 | 0.041 | 2.75 | **0.006** ** |

*: p-value < 0.05

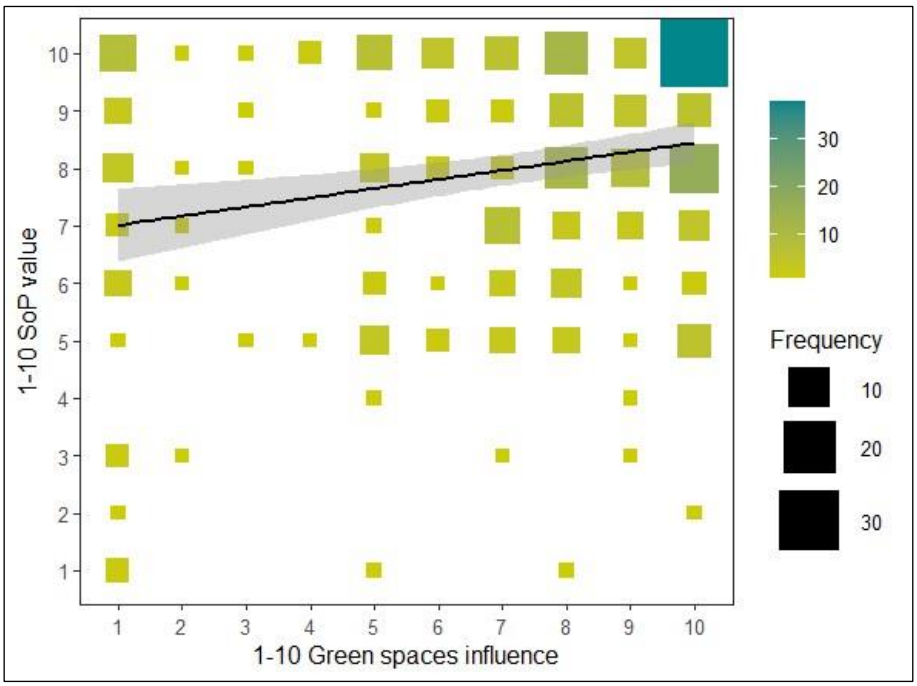


*Figure 4.16: plot of the relationship between green spaces influence and Sense of Place*

The 't-test' compared the influence of green spaces on the selection for most representative places for SoP and showed a significant difference between residents of the two municipalities (p-value <0.05; Tab. 4.6). Particularly, participants of Nove demonstrated a higher influence (i.e., 7.70/10; Fig. 4.17) with respect to ones of Cartigliano (i.e., 6.93/10).

*Table 4.6: t-test outputs for green spaces influence mean comparison between the two municipalities*

| | **DF** | **t** | **p-value** |
|---|---|---|---|
| **Question #29** | 232.62 | -2.0395 | **0.042** * |

*: p-value < 0.05

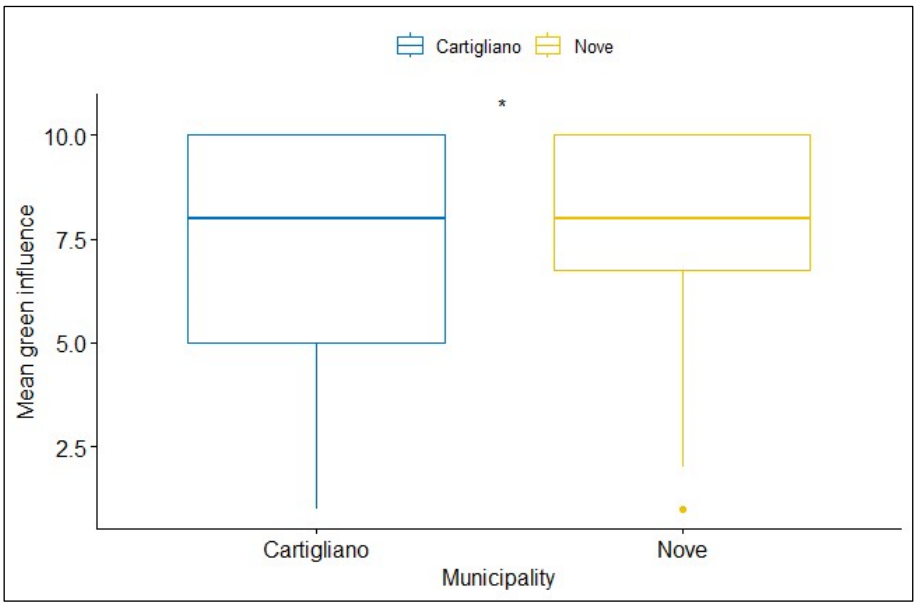


*Figure 4.17: boxplots comparison for green spaces influence between the two municipalities*

Furthermore, the 'Kruskal-Wallys' test found that in Cartigliano the influence of green spaces was substantially diverging across the five different macro-topics (i.e., the reason for the selection for most representative place for SoP; Tab. 4.7), while this was not detected in Nove.

*Table 4.7: Kruskal-Wallys test output for the comparison of green influence between topics in Cartigliano*

| | DF | chi-squared | p-value |
|---|---|---|---|
| **GROUPS** | 4 | 17.126 | **0.002**** |

*: p-value < 0.05

Since in Nove no substantial difference was detected among the influence of green spaces for the five different macro-topics, only for the residents of Cartigliano, a 'Dunn's test' was then conducted (Fig. 4.18). This enabled to highlight that for the topics of Green Value (GV) and Place Satisfaction (PS) there was a greater influence of green spaces in the choice of location, which was found to be significantly different from the Social Relationship (SR) topic, where green spaces had the least influence on the choice.

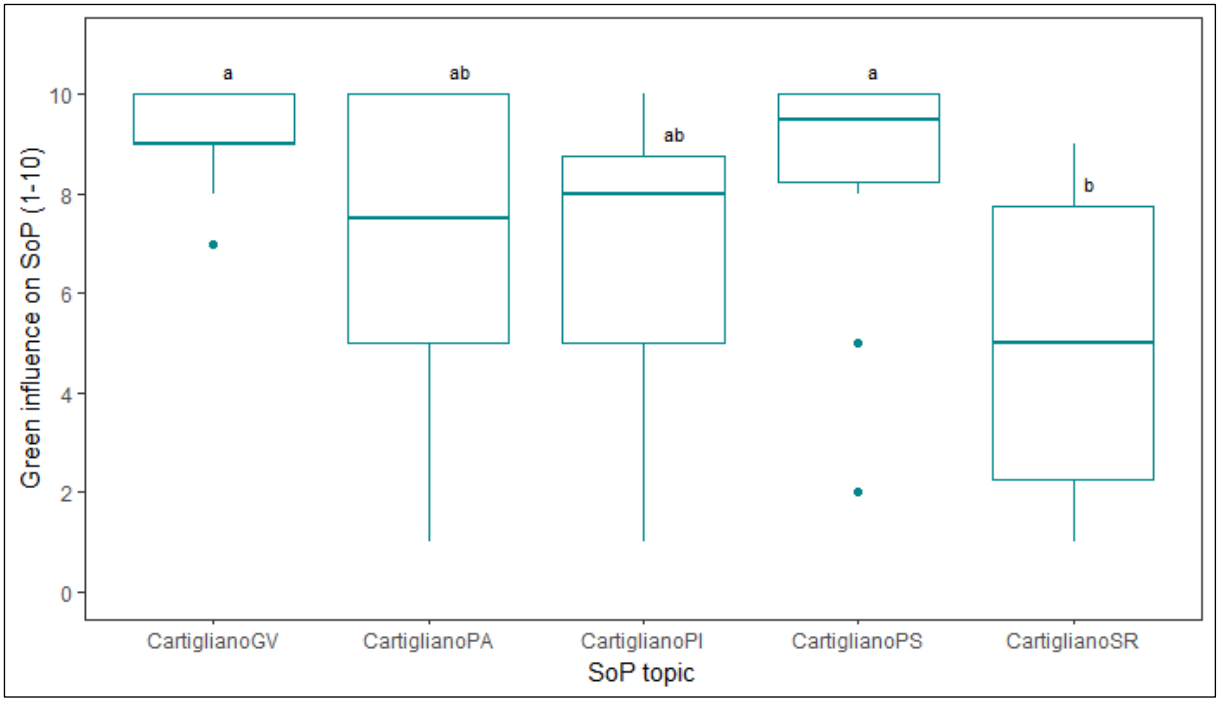


*Figure 4.18: comparison for green influence on (Sense of Place) place selection among topics for participants of Cartigliano*

## 4.6 Sense of Place and Ecosystem Services

Moving on to investigating the degree of influence of ecosystem services in the formation of Sense of Place, a significant relationship was revealed between Sense of Place and satisfaction for the offer of Ecosystem Services in both municipalities' respondents (Tab. 4.8). Particularly, estimate value showed a positive relationship between the two variables, that means citizens' Sense of Place was found to be greater at higher levels of ESs satisfaction (Fig. 4.19).

*Table 4.8: cumulative link model outputs for mean ecosystem services satisfaction influence on Sense of Place*

| | Estimate | Std. Error | z-value | p-value |
|---|---|---|---|---|
| **Mean #32-#40** | 0.348 | 0.082 | 4.22 | **2.43e-05** *** |

*: p-value < 0.05

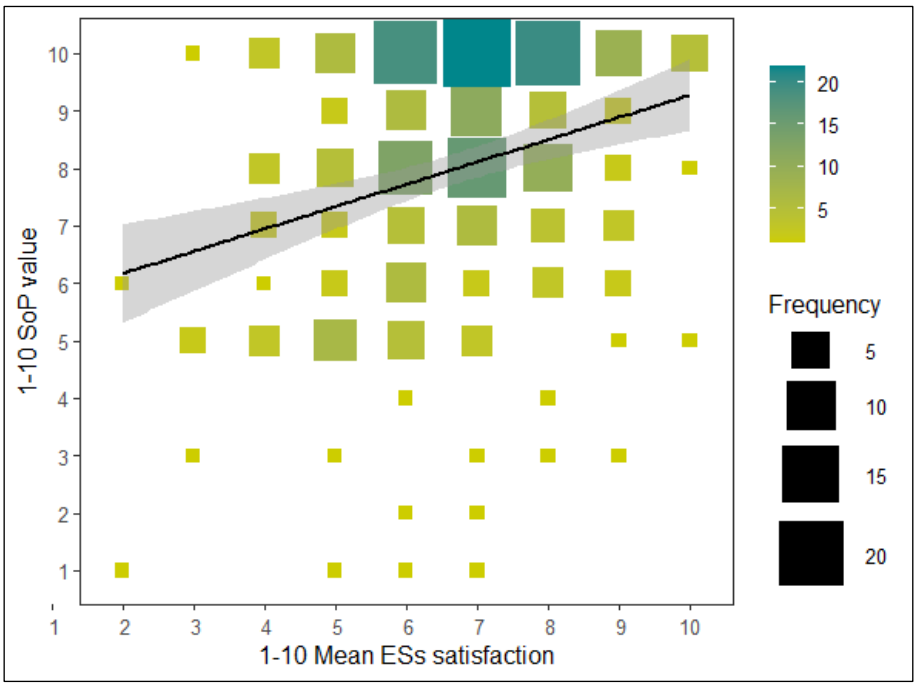


*Figure 4.19: plot of the relationship between mean ES satisfaction influence and Sense of Place*

By comparing the satisfaction for each ecosystem services between the two municipalities, the 'PERMANOVA' test showed a significant difference as the p-value was found to be below the established significance level (i.e., <0.05; Tab. 4.9).

*Table 4.9: PERMANOVA test outputs for ecosystem service satisfaction level comparison between the two municipalities*

| | DF | $R^2$ | F | p-value |
|---|---|---|---|---|
| **GROUPS** | 1 | 0.014 | 3.448 | **0.020** * |

*: p-value < 0.05

By then analysing and comparing in detail the satisfaction of each ecosystem service through multiple 't-test' for the two groups of respondents, significant differences emerged for four of these services (Fig. 4.20). Specifically, the satisfaction of "Flood prevention", "Summer temperatures (mitigation)", "Pollinators presence" and lastly "Biodiversity" was found to be significantly higher among the inhabitants of Cartigliano.

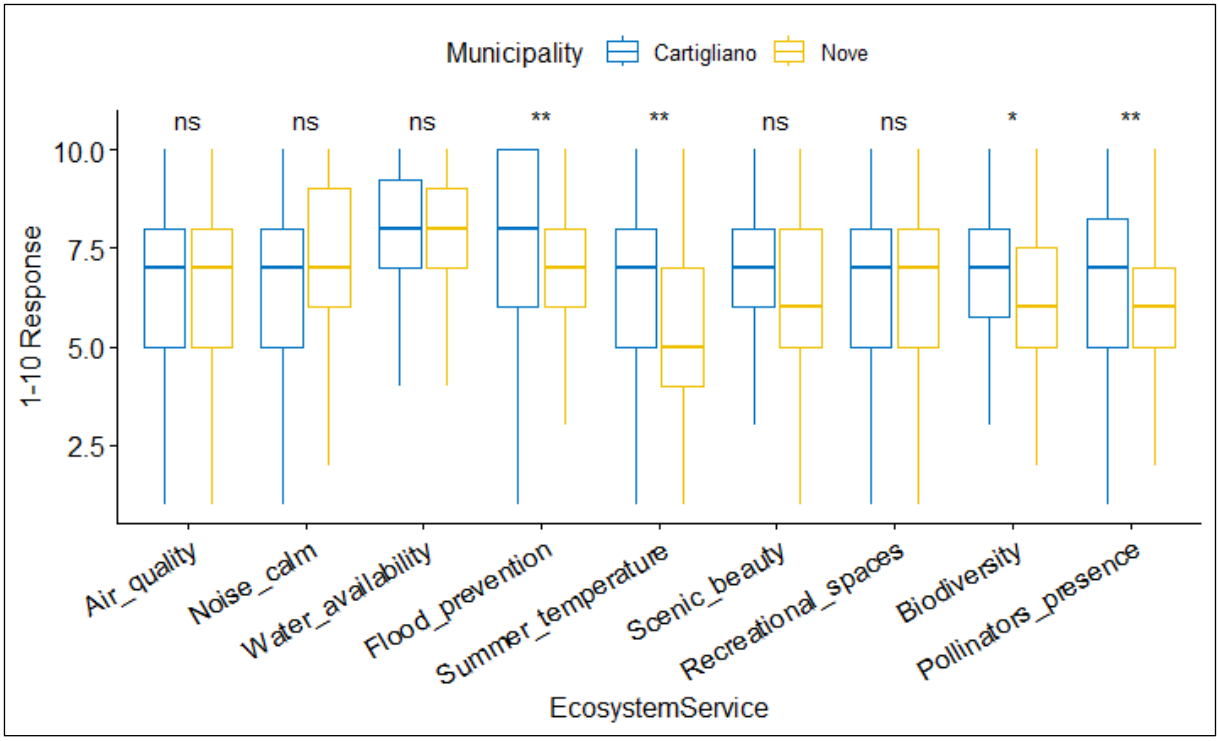


*Figure 4.20: boxplots comparison of satisfaction for each ecosystem service for the participants of Cartigliano and Nove*

On the generation of Sense of Place, the comparative test showed a significant difference in the mean satisfaction of ecosystem services among the inhabitants of the two municipalities (p-value <0.05; Tab. 4.10), with Cartigliano being found to have significantly higher satisfaction level (i.e., 6.90/10) than Nove (6.49/10; Fig. 4.21).

*Table 4.10: t-test outputs for mean ES satisfaction influence comparison between the two municipalities*

| | DF | t | p-value |
|---|---|---|---|
| **Mean #32-#40** | 232.93 | 2.099 | **0.03691** * |

*: p-value < 0.05

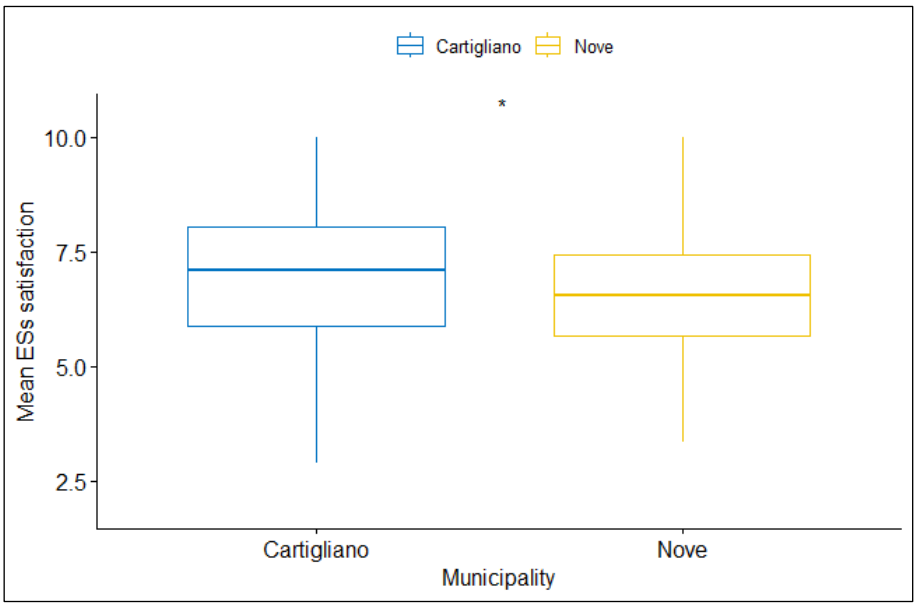


*Figure 4.21: boxplots comparison for mean ES satisfaction between the two municipalities*

After combining the above-mentioned results with those concerning the macro-topics for the individual Sense of Place, the 'Kruskal Wallys' test showed that in Cartigliano there was no difference in the level of satisfaction of the ESs across the five different macro-topics. Conversely, a significant difference was verified for the participants of Nove (Tab. 4.11).

*Table 4.11: Kruskal-Wallys test output for the comparison of mean ES satisfaction between topics in Nove*

| | DF | chi-squared | p-value |
|---|---|---|---|
| **GROUPS** | 4 | 10.404 | **0.034*** |

*: p-value < 0.05

When analysing this difference in more detail, the 'Dunn's-test' highlighted that the people guided by Place Satisfaction (PS) during the cell selection process were the most satisfied about the provision of Ecosystem Services. This was particularly evident when the macro-topic of PS was compared to the macro-topic of Place Identity (PI), which exhibited to be the least satisfied (Fig. 4.22).

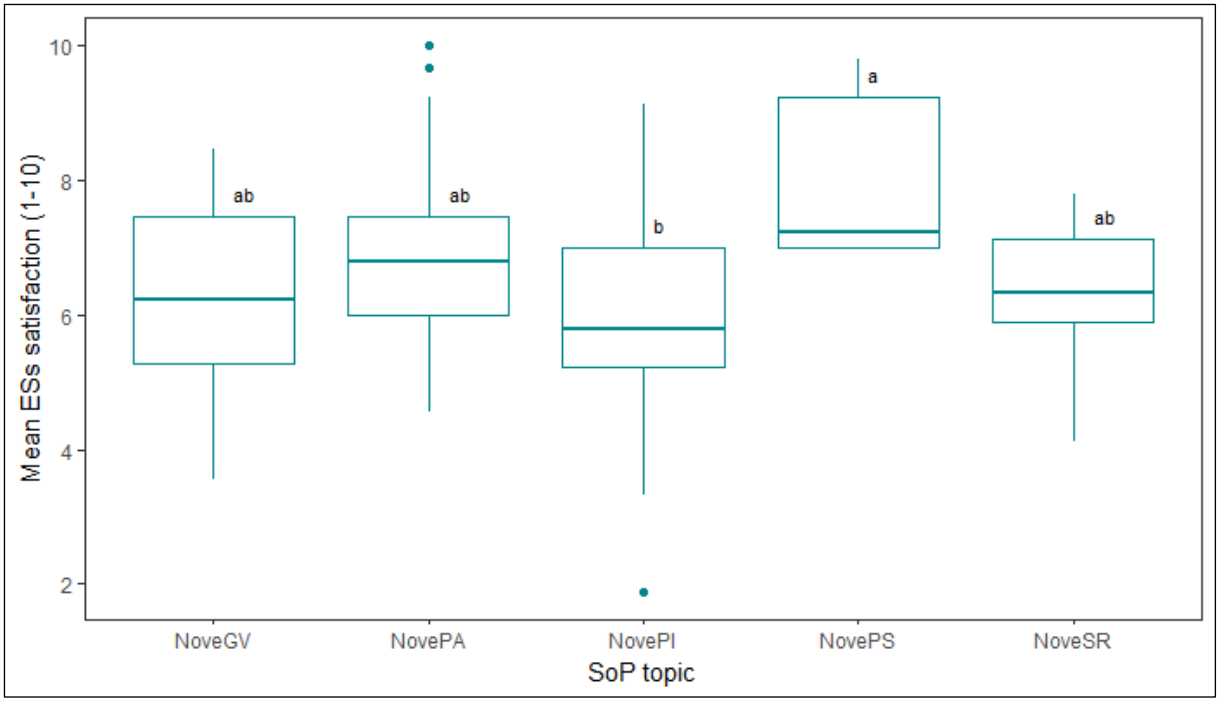


*Figure 4.22: comparison for ES satisfaction influence on (Sense of Place) place selection among topics for Nove's participants*

## 4.7 Second objective – Landscape composition and configuration role

To assess the relationship between Sense of Place and landscape attributes, maps of selection frequencies were considered (ANNEX II, Figs. A9.3, A9.4). Both in Cartigliano and Nove, most frequently selected places were those related to the city centres (respectively 40 and 28 times). However, rest participants selected cells outside the city centres, revealing a high variability in the selection of representative places for Sense of Place as quite evenly distributed across the municipal territories.

After conducting the 'Ordinal Regression model', the results concerning the relation between the frequency selection of the most representative cells for Sense of Place and landscape attributes showed:

- a significant relationship between selection frequency and artificial areas ($AREA_{ART}$; Tab. 4.12). Particularly, the positive estimate proved that cells with more man-made elements were selected in higher amount (Fig. 4.23.A);
- a significant positive relationship between selection frequency and number of patches (NP; Tab. 4.12), which means that cells with the higher number of patches were selected to a greater extent as representative for SoP (Fig. 4.23.B);
- a significant relationship between selection frequency and patch richness (PR; Tab. 4.12). The positive estimate calculated by the regression model revealed a positive

relationship between the selected variables. This means that cells with larger variety of landscape classes were selected in higher amount as representative for Sense of Place (Fig. 4.23.C);

- a significant negative relationship between selection frequency and Aggregation Index (AI; Tab. 4.12). Particularly, the regression model highlighted that cell with lower aggregation where more selected for SoP representation (Fig. 4.23.D).

Conversely, the 'Cumulative Link Model for Ordinal Regression' did not show significant relationship between the frequency selection for SoP and the indexes SHDI and SHEI (p-value >0.05).

*Table 4.12: cumulative link model outputs for landscape attributes influence on (Sense of Place) place selection*

| ATTRIBUTE | Estimate | Std. Error | z-value | p-value |
|---|---|---|---|---|
| **$AREA_{ART}$** | 0.029 | 0.009 | 3.28 | **0.001** ** |
| **NP** | 0.012 | 0.002 | 5.11 | **3.19e-07** *** |
| **PR** | 0.287 | 0.056 | 5.12 | **3.05e-07** *** |
| **AI** | -0.165 | 0.073 | -2.26 | **0.0238** * |

*: p-value < 0.05; **: p-value < 0.01; ***: p-value < 0.001

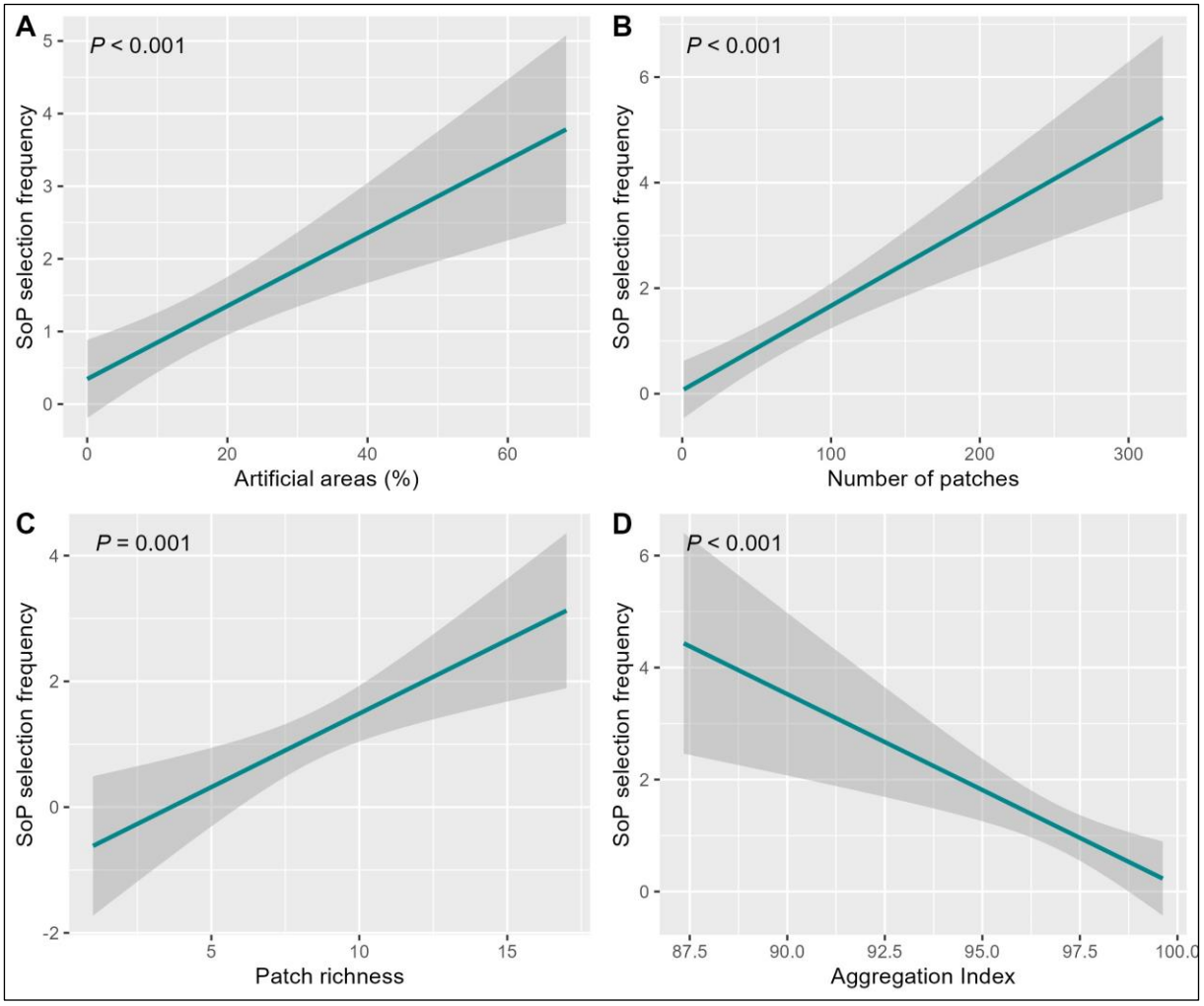


*Figure 4.23: plots of the relationship between landscape attributes and (Sense of Place) place selection frequency. A) artificial areas - AREA$_{ART}$, B) number of patches - NP, C) patch richness - PR, D) aggregation index - AI*

For the two indexes that did not show a significant relationship with the selection frequency for SoP, further analysis was conducted to detect more complex relationships. Particularly, the inclusion of quadratic terms of these indexes has led the regression model to reveal a significant influence for SHDI (Tab. 4.13). Specifically, the positive estimate demonstrated that the selection of places became increasingly higher at higher values of Shannon Diversity Index (Fig. 4.24).

*Table 4.13: cumulative link model outputs for landscape attributes quadratic influence on (Sense of Place) place selection*

| ATTRIBUTE | Estimate | Std. Error | z-value | p-value |
|---|---|---|---|---|
| **SHDI** | -3.187 | 2.062 | -1.55 | 0.1221 |
| **SHDI$^2$** | 1.534 | 0.777 | 1.98 | **0.0482** * |

*: p-value < 0.05

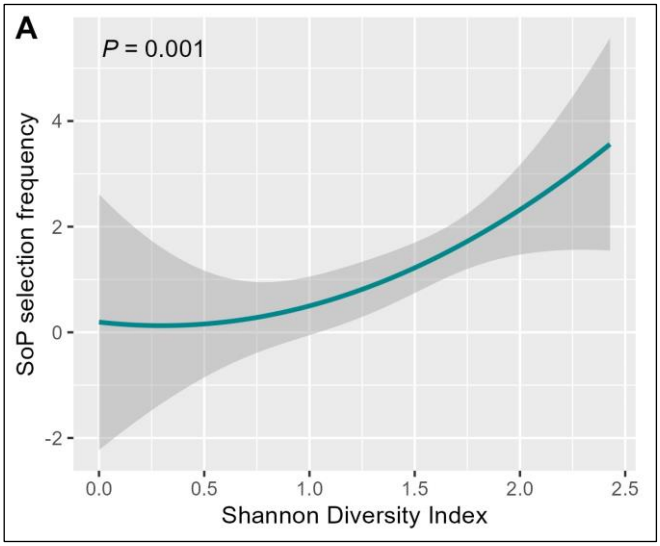


*Figure 4.24: plot of the Shannon Diversity Index - SHDI - and (Sense of Place) place selection frequency relationship*

## 4.8 Third objective – Sense of Place and pro-environmental behaviour

The 'Cumulative Link Models for Ordinal Regression' showed that there was a significant positive relationship between Sense of Place and pro-environmental behaviour (Tab. 4.14). In particular, the positive coefficient revealed that greater levels of Sense of Place were associated to higher willingness and desire to contribute and favour plans for the ecological conservation and improvement of their municipality's green spaces (Fig. 4.25).

*Table 4.14: cumulative link model outputs for Sense of Place influence on pro-environmental behaviour*

| | Estimate | Std. Error | z-value | p-value |
|---|---|---|---|---|
| **Question #26** | 0.134 | 0.063 | 2.13 | **0.033** * |

*: p-value < 0.05

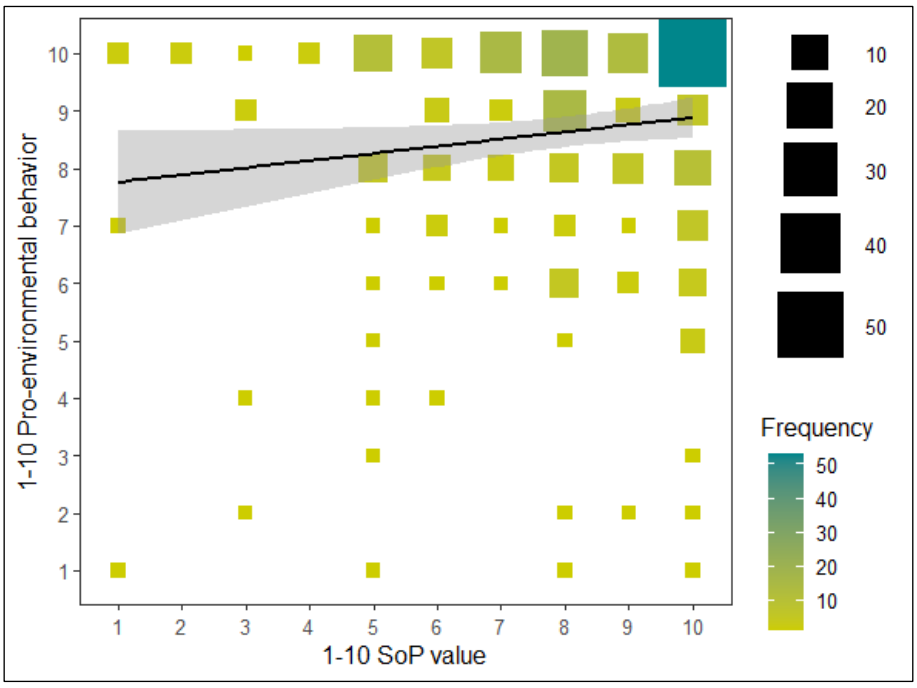


*Figure 4.25: plot of the relationship between Sense of Place and pro-environmental behaviour*

# 5. DISCUSSION

The outcomes of this research have provided insights regarding how Sense of Place is generated in the residents of Cartigliano and Nove and have evidenced significant relationships between SoP and landscape structure, and between SoP and pro-environmental behaviour. In this chapter are thus highlighted comparative insights on how the inhabitants of Cartigliano and Nove perceive and feel connected to their landscape based on the statistical tests previously outlined. The purpose of this chapter is thus to report and interpret the main results concerning Sense of Place, presenting how they justify the research objectives through an examination of the descriptive and statistical findings.

The sample proved to be representative for the demographic categories of age distribution, gender, social status, and time of residence. Since the pool of respondents consisted mainly of people over 45, with social status of ‘employee' or 'retiree', unfortunately no significant comparisons between different ages could be made. These comparisons could have indeed revealed qualitative aspects of the perception of green spaces across generations. In both municipalities the prevalent time of residency was ‘lifelong’, which validates the reliability of the collected answers and consolidates the credibility that the results may represent at best the two communities.

It is noteworthy to say that the total amount of questionnaires collected was 237, but the number could have been increased by ten more samples in Nove, adding up to 123 (247 total). However, due to a delay in the notification of encouragement from the official administration channels to fill in the surveys, some responses arrived several days after the beginning of the data analysis process, thus making it impossible to include such responses in the findings of this research. Nevertheless, the number of responses collected allowed significant statistical analysis for both municipalities, but the administration's inattention in Nove for meeting deadlines was already representative of their degree of attention towards the topics being addressed.

## 5.1 Ecological comparison of descriptive results

Interesting details about the quality and structure of the landscapes surfaced from the study of the categorical mapping of the two municipalities. In Cartigliano the presence of two more Natura 2000 identified habitat (3260 and 6430) in the “Grave e zone umide della Brenta” protected area indicates an overall higher richness and heterogeneity of the natural landscape. Indeed, despite having more forests and grasslands in Nove, Cartigliano features a higher

percentage of public gardens and hedgerows, a landscape element which also contributes to the upholding of the traditional ‘campi chiusi’ structure in the “Basse del Brenta” area.

The preserved natural value of such area is attributable to the municipal policies and the ecological conservation activities that were carried on by associations and individuals such as ‘Amici del Brenta Cartigliano’ or ‘LIFE PollinAction’. Partnering up with public administration, they engaged in many activities to restore and maintain the local green spaces. The occurrence and importance of these activities is testified by the results that show how in Cartigliano 4.2% of the pool of respondents engages spontaneously in practices of maintenance and care of the green spaces (Fig.4.9). Nove’s qualitative conditions of its green spaces on the other hand may have been severely affected by the administrations negligence, that has not really put effort and resources in making its green spaces viable and enjoyable. This can be seen in Fig. 4.8, as in Nove despite having more grasslands and forests people that ‘never’ attend green spaces are more than double that those in Cartigliano.

Moreover, by examining the activities that people conduct in the green spaces of the two municipalities (Fig. 4.9), it is possible to notice that in Nove and Cartigliano there is a different kind of involvement. As much as physical activities are the most practiced in both groups, in Nove there is a vast proportion of people that do domestic routine activities that imply interactive responsibilities, like supervising children or walking domestic animals. On the other hand, in Cartigliano more people conduct individual leisure activities that involve a deeper connection with the natural environment like contemplating and relaxing in the green spaces, practicing wild harvesting, as well as the above-mentioned caretaking.

It is not easy to understand the differences about the mindset of the two groups. However, some of the results from the questionnaires prove how there are subtle distinctions in their political priorities and relationships with green spaces. Indeed, by putting together some of the responses regarding the general attitudes it gets evident how the two communities acknowledge the importance of green spaces differently from one another. As much as both recognize the contribution that green spaces bring to personal well-being, in Cartigliano biodiversity and landscape heterogeneity are more valued, while in Nove great importance is placed on the opportunity they provide for recreational activities and socializing (Fig. 4.10).

These trends are additionally confirmed by the great amount of people from Nove that expressed a desire to increase sports areas and open grasslands, whereas in Cartigliano people indicated wanting to have more hedgerows and practicable wooded areas (Fig. 4.12). In any

case, on both sides among the highest political priorities was indicated the implementation of more green spaces, and in Cartigliano that was complemented by a group of people that suggested to invest more political efforts in agricultural development.

Interestingly, however, when asked how much they would have approved if the public administration invested resources to improve and build new green spaces, the respondents of Nove were found to be significantly more favourable than those of Cartigliano (Fig. 4.14). Such finding is difficult to explain by looking at what have been said so far, especially because Nove has a greater extent of "greenery" than Cartigliano. However, by taking into consideration the historical background of the events that took place in the "Oasis of Nove" and the administration's inattentions, it is arguable that there may be a general discontent among the inhabitants. This could have in first place contributed to enhancing a bias in the responses of the residents of Nove, who, hoping to be heard by the public administration, highlighted their desire to increase efforts for the bettering of local green space. Moreover, it can be argued that the general desire to increase the green spaces within the municipality of Nove (Fig. 4.11) may be due to a lack of accessibility and proper maintenance of the actual ones. To this extent, the preference of wanting to implement new accessible open spaces like grasslands or physical activities areas would justify it.

## 5.2 First objective – Sense of Place generation, green spaces involvement and ecosystem services

The findings obtained regarding the first research question of understanding how Sense of Place is generated in the municipality's residents of Cartigliano and Nove proved to be in line with previous academic research on Sense of Place. For instance, with the work of many researchers (e.g., Stedman 2003, 2016; Manzo and Perkins, 2006; Brown et. al., 2015; Masterson et. al., 2017) who argued that SoP is related among many factors to the qualitative physical structure of the landscape. As pointed out in the first chapters, in their studies is supported the idea of a positive relation between people's environmental connection and the presence of specific features like green spaces and elements within them.

By including question #28 in the survey, it was possible to leave room for respondents to autonomously describe their Sense of Place without interfering in the choice. The results gathered with this method led to the conclusion that this thesis conceptual framework was accurate in foreseeing and broadly defining the main drivers of SoP. It is thus feasible to affirm that Sense of Place is generated among the inhabitants of Cartigliano and Nove through a

mixture of socio-cultural dynamics and physical qualities of the landscape (other than biological inclinations). Furthermore, these drivers can be distinguished into five main macro-topics of: 'place attachment', 'place identity', place satisfaction', 'green value' and 'social relationships'.

Although as Fig. 4.15 shows, drivers that encompass socio-cultural meanings like 'place attachment' and 'place identity' were largely responsible for Sense of Place generation in both municipalities (around 70% combined overall), other factors linked to landscape structure proved to be relevant too. Indeed, in both groups the combination of 'place satisfaction' and 'green value' accounted for more than 22% overall. This result indicates that personal experiences and social identities, established through common historical meanings, familiarity with places, and alignment with local tradition, were the main drivers of SoP in the two groups. However, it also means that the quality of the landscapes, mostly measured on the featuring of green spaces and vegetation, influenced the emotional and material bond that people have with places. These achievements therefore were able to bring forward previous research suggestions like that of Stedman (2003) and Brown (2007, 2015), which stressed the importance of further investigating the role of landscape physical qualities in SoP generation.

Furthermore, these findings are supported by the positive influence found of green elements on individuals' Sense of Place, which highlights that at higher levels of SoP people are more influenced by their natural surroundings (Fig. 4.16). This result may be a step forward in confirming practical application of biophilic theories shared by many scholars (Barbiero and Berto, 2016; Wilson, 2021). Their studies supported the hypothesis of a natural individuals tendency to associate and bond with other living beings (animals and vegetation). They also believed that connection to other beings produced greater personal satisfaction and well-being (Kaplan and Kaplan, 1989; Clayton, 2003; Brown and Raymond, 2007). The results from this thesis reinforce such interpretation by demonstrating that at greater extents of green spaces and elements in a landscape, people are more likely to feel a connection with it. In support of these theories are also the results which demonstrated a positive relationship between Sense of Place and mean satisfaction of ecosystem services in both municipalities. Proving that landscape structure and characteristics can impact SoP generation to higher degrees.

Besides the physical dimensions of SoP, a very significant driver found in Cartigliano, reaching up to 8.26%, was 'social relationships', which only reached 4,67% in Nove (Fig. 4.15). This outcome consolidates the leading role of socio-cultural conditions in SoP generation and

confirms previous studies that focused on the importance of interpersonal dimensions of Sense of Place (Relph, 2008). Indeed, from the gathered answers it was clear how 'social relationships' played a huge role in defining some people's Sense of Place, especially if carried out in a pleasant environment. In this regard, as mentioned by Berto et. al., (2008), natural environments seemed to offer the best conditions for interpersonal interactions to occur in a pleasant way, especially in Nove.

## 5.3 Role of green spaces and ecosystems services in Sense of Place generation in Cartigliano and Nove

Interestingly, comparing the results of generative drivers of Sense of Place in Cartigliano and Nove, green spaces were found to have influenced differently the choices of representative places for the SoP. Among the inhabitants of Nove it was indeed found that green spaces had influenced more the choice, meaning that on average such spaces can be considered more responsible for generating their Sense of Place.

From further tests then, which separated each macro-topic of SoP to study and compare individually the influence of green spaces, it turned out that in Nove there was no significant difference across these macro-topics, while there was in Cartigliano. Here, the ones found being higher were the macro-topics of 'green value' and 'place satisfaction', which were significantly differing from the 'social relationships' one, being the lowest overall. This result indicates that in Nove green spaces have a more consistent and evenly distributed influence across various aspects of Sense of Place. Thus, that those who gave motivations related to their own sphere of attachment or personal identity were equally influenced than those who gave motivations of place satisfaction, green value, or social relationships. Which is not the case in Cartigliano.

The greater influence of green spaces on Sense of Place in Nove could be attributed to several factors. Firstly, it is possible that the physical landscape of Nove, with its higher percentage of forests, grasslands, and private gardens might have inherently led individuals to place a stronger emphasis on it. As so, they have probably experienced a greater degree of personal interaction with green spaces due also to the types of routinary activities conducted in these areas, such as supervising children or walking domestic animals.

Moreover, as evidenced by Fig. A9.3, the spatial distribution of Sense of Place in Nove is uniform in both the more natural and urban areas of the municipality. Which suggests that those who locate their Sense of Place in different contexts (city centre or parks) experience the same

influence of green elements for all macro-topics. Thus, meaning that throughout the group of respondents there is a shared view about the importance and role of green spaces, intended strongly for recreational activities or as a meeting place.

Such hypothesis would clarify why, in Nove despite having more green spaces, there is overall less satisfaction of ecosystem services and a greater desire for increasing such spaces (Fig. 4.11). In that sense, the biggest shortcoming in Nove could be the accessibility and maintenance of such spaces, or the lack of activities that succeed in involving and raising awareness among citizens for their ecological planning. Due to historical events and administrative policies, the degree of sensitivity and perception of the ecological value of green spaces might have developed in a more utilitarian way. The residents of Cartigliano, conversely, seem to place a higher value on biodiversity and landscape heterogeneity (Fig. 4.10), which may lead them to perceive green spaces as more valuable for personal well-being and the ecological value of the territory. Additionally, the great satisfaction of ecosystem services and the proper attention to such spaces may be leading to a relatively lower demand for additional green spaces (Fig. 4.11).

Interestingly, however, among some different macro-topics related to motivation of SoP for Cartigliano's residents, the impact of green spaces turned out to be significantly different. Namely, that of ‘social relationships’ was not as pronounced as it was for ‘green value’ (GV) and ‘place satisfaction’ (PS) (Fig. 4.18). There may be multiple reasons for such difference, first being interpreting it by looking at the results presented above on the ecological mindset in Cartigliano. It could indeed be that individuals motivated by GV and PS were significantly affected by the presence of green spaces and elements, as they represent the qualitative focus of their Sense of Place. Or it might simply be that ‘social relationships’ happen in places lacking a good enough number of green features. However, it is also likely that there is a good proportion of people that is so satisfied with the overall quantity and quality of municipal green spaces and related ecosystem services, that causes to overlook their importance over time.

This last hypothesis, however, would imply that satisfaction of ecosystem services and ecological conservation activities may influence Sense of Place in two opposing ways. On the one hand by increasing bonds with green spaces for those who care about ecological stewardship, and on the other by downplaying its perceived importance for those who base their connection with the territory on other motivations. Such results, if found to be true, would suggest that involved actors should stress the importance of involving people in conservation projects and spread awareness regarding local biodiversity to create positive feedback

mechanisms. Prime example of this feedback is the strong awareness and importance given to pollination ecosystem services in Cartigliano, which are undoubtedly the result of the public outreach activities carried out by LIFE PollinAction project.

Moreover, it is feasible that the low influence of green spaces on 'social relationship' in Cartigliano could be attributed to the different character of the two municipalities' green spaces. The 'Oasi of Nove', for instance is conceived as a meeting place and recreational space, with numerous benches, tables, BBQ facilities and sports equipment, while 'Le Basse del Brenta' in Cartigliano are more of a green habitat for biodiversity.

By then looking more in depth at the findings concerning satisfaction of ecosystem services, were found significant differences for four different services between the two residents groups, which were all greater in Cartigliano (Fig. 4.20). Further testing also showed that this satisfaction was here evenly distributed across all macro-topics, meaning that satisfaction of such services is similar across all respondents. Meaning that on average those who feel connected to the landscape because of 'social relationships', 'place identity', or 'place satisfaction' were differently influenced by green spaces, but equally satisfied with the supply of ecosystem services.

This same even distribution was not found in Nove, where conversely the macro-topics of 'place satisfaction' and 'place identity' significantly differed for the mean satisfaction of ecosystem services, with 'place identity' being the lowest overall. Revealing that those who feel a Sense of Place linked to local or personal identities are significantly less happy with ecosystem services. This could be produced by a lack of adequate supply of services in specific places representative of Sense of Place or be indicative of a deep-rooted neglect of such benefits in the common identity.

These findings underscore the complexity of understanding the drivers of Sense of Place and its relationships with green spaces or ecosystem services. It illustrates how these factors can have a great influence on residents' perception and connection with their territory. It suggests that strategies for further enhancing Sense of Place should be tailored to the specific needs and social background of each community. Moreover, it indicates that if social strategies or green infrastructure were to be implemented, they could create feedback mechanisms for increased satisfaction and bonding to the landscape, as well as enhancing attention to local ecological stewardship.

## 5.4 Second objective – Landscape composition and configuration role

So far it has been explained how the physical structure of the landscape with which individuals feel a connection can influence Sense of Place. For instance, the featuring of green spaces and landmarks can enhance the bond that communities establish with their territory as a component of different SoP drivers. These features assume different values depending on each individual and is thus hard to precisely quantify the overall impact they assume on a community. Nevertheless, using categorical maps, it was possible to determine which physical components of the landscapes most represented the two communities' SoP, thus investigating SoP-landscape structure relationship.

Through the findings obtained via the study of spatially mapped Sense of Place it was possible to highlight this relationship, which proved to be a great tool to investigate place-related communities meanings and connections (Stedman, 2016). As suggested by Brown (2007, 2015) and Nelson et. al. (2020) mapping Sense of Place allows to integrate an alternative method of understanding what people value and feel connected to in urban and natural environments, thus assisting also in exploring human-nature bonding drivers. This spatial assessment of SoP was implemented in an innovative way in this study through the design of mapping partitioned into numbered cells, which enabled to collect data on where people localize their SoP and study the landscape structure within those cells (Fig. A8.1 and A8.2).

The results showed how in both municipalities the most frequently selected places were those related to the city centres and big green spaces (“Oasi di Nove” and “Basse del Brenta”), although responses were also recorded in cells scattered in many other locations (Fig. A9.3 and A9.4). There indeed a high variability in the selection of representative places for Sense of Place which were quite evenly distributed across both municipal territories. The only areas that remained particularly uncovered were those of agricultural fields, especially in Nove where the urban sprawl is more clustered.

Although many respondents selected places featuring green spaces, the results proved that there is a significant relationship between the selection frequency of the cells and artificial areas (Fig. 4.23). Specifically, at greater amounts of artificial elements there was a higher selection frequency, thus indicating that the urban component of the municipalities accounts more for individuals’ connections to the municipality than the green one. Nonetheless, it is hard to measure the value of green spaces on spatially located Sense of Place in an urban context like that of Cartigliano and Nove. Firstly, because as mentioned above the social-cultural dimension

accounted for the larger part of SoP, and secondly because the urban-artificial component of many cells, even if featuring green elements, is still physically more extended.

However, when looking at the overall selection frequency relationship and landscape structure, it gets evident how the general preference is for those places that have both artificial and natural component in them. The most selected cells that represent individuals' SoP were indeed found to have positive relationship between selection frequency and number of patches, patch richness and Shannon Diversity Index. Suggesting that, across all the people of the two municipalities, places were preferred if found to be heterogeneous and rich of different patches. To this effect it would mean that even if it is true that man-made elements are positively related to SoP, people generally feel more connected to those locations that feature many and diverse components, including green ones. Moreover, such preference is confirmed by the negative significant relationship that was found between selection frequency and Aggregation Index, which suggests that places with less clustering between their different components are preferred. Hence, it confirms that people's general attitude to bond with places tends to happen toward those ones that feature heterogeneously distributed green spaces and elements (Kaplan and Kaplan, 1989, Kaplan, S., 1995; Kaplan R., 2001; Knez, 2003, Barbiero and Berto, 2016).

Given these discoveries, it could be anticipated that a greater number of individuals would have choose cells with abundant green spaces. However, considering the desire to improve and increase the number of such spaces in the two municipalities, it means that residents would be happy to see investment be made in the urban areas even with small green elements. Therefore, it would overall facilitate the approval of green infrastructure projects in urban settings, as they would satisfy their desire to increase greenery in urban areas and prove to be more effective in enhancing communities' SoP and its multiple drivers.

Indeed, the result indicating that in Cartigliano and Nove individuals feel a greater Sense of Place in heterogeneous locations that feature green elements may not only consolidate the relationship between SoP and natural environments but may also enhance pro-environmental behaviours at multiple levels. Indicating thus that if green infrastructure were correctly designed, it would raise contentment and connectedness with the municipality, as well as creating behaviours of sustainability that produce care of both urban and rural-natural settings. To further maximize these achievements, however, it would be useful to conduct further studies about the best applicable green infrastructure in the considered municipalities.

## 5.5 Third objective – Sense of Place and pro-environmental behaviour

This assumption is reinforced by the findings that proved how there was a significant positive relationship between Sense of Place and pro-environmental behaviour in the respondents of Cartigliano and Nove (Fig. 4.25). Specifically meaning that at greater levels of connection to the landscape (SoP), is related a higher degree of care for such landscape and its green spaces. Thus, confirming previous suggestions on the relationship between connections to places and environmental concerns and attitudes (Vaske and Kobrin, 2001; Shultz and Tabanico, 2007; Scannell and Gifford, 2010) which means that people are more inclined to favour or take actions for ecological conservation (Kruger and Shannon, 2000).

Once again therefore, the planning of green infrastructures could help creating social sustainability feedback mechanisms which would increase personal well-being, satisfaction, and approval of ecological conservation strategies. This could be particularly relevant in those communities like Nove where the community manifests a great willing to increase and maintain green spaces, as if it is coupled with ecological awareness practices, it would prove to be beneficial on numerous levels.

# 6. CONCLUSION

This thesis began with the purpose of investigating Sense of Place in the municipalities of Cartigliano and Nove. Through a multidisciplinary study of their landscape and inhabitants, relevant results were obtained about the drivers generating individuals' Sense of Place and the positive effects it brings toward environmental conservation. Therefore, this chapter sets out the main conclusions that can be drawn from this research, to consider its future applications in academia and policy making.

Sense of Place proved to be a hardly quantifiable indicator of individuals' emotional and material connection to the territory. As such a specific case study was required using surveys that could collect information on how people perceive and care about their surroundings. As observed from previous studies, SoP is confirmed to be determined by socio-cultural factors and by the structure of the landscape. A positive relationship was thus revealed between the presence of green spaces and people's connection to the municipality, as well as finding that such connection increases the likelihood of pro-environmental attitudes of maintenance and care of those spaces.

Based on these findings, the benefits of maintaining or implementing green spaces and other significant features in landscape planning can be confirmed. Indeed, it was found that in Cartigliano and Nove, the SoP increases with a greater extent of green spaces, and with a higher supply of ecosystem services. However, as much as SoP is considered in some academic fields an ecosystem service, in this study it was found to be more of a derivate related to other ecosystem services and only partially originated by ecosystems. Indeed, in Cartigliano and Nove, socio-cultural and personal dynamics turned out to be the main constituent of the Sense of Place of many individuals.

The absence of adequate tools for quantifying present and past political dynamics, has hindered a thorough examination of other possible factors influencing individuals' Sense of Place. This has thus prevented the research to include further considerations regarding attitudinal political perspectives when comparing the two municipalities respondents. In any case, this research made it evident how the study of Sense of Place can be a useful political and social tool for improving communities' satisfaction and connectedness to the territory. For this goal, the application of green infrastructures aimed at increasing ecosystem services and people's well-being may be the right tool.

Should a public administration decide to design one, or further academic research on these issues be pursued, this thesis would provide a good starting point for understanding what methods to use and how to do it. However, I would suggest that due to the unicity of Sense of Place in every person, the tools used need to be adjusted based on the location and population intended to study. Furthermore, the integration of qualitative investigations by taking a representative sample of people with different social status, gender, age, and residence time could either contribute to or partially replace the type of study conducted here.

It would have indeed been interesting to include in the research individuals from other nationalities and cultural backgrounds who are residing in the places studied. In this way it would have been possible to assess the perception and connection with the territory of people who have different socio-cultural values and may not be influenced by the same SoP drivers. In academia, the possibility of extending the obtained results over a longer time span would also allow to see how perception and connection of communities changes before and after a green infrastructure is made. As such, it would enable a deeper study on Sense of Place drivers and on its relationship with landscape structure and pro-environmental behaviour.

To achieve substantial results, it the future, it will be necessary to expand the research on which elements and design of a possible green infrastructure municipalities residents would prefer to see being implemented. This thesis findings, however, highlight the importance of focusing first on raising awareness and including communities in conservation projects like LIFE PollinAction, as it could help acknowledging the importance of ecosystem services beyond the aesthetic and recreational value of green spaces. To achieve the goal of creating real positive sustainability feedbacks, it is essential to find a meeting point between the public wishes of functional beautiful green spaces and the need to increase all-round ecosystem services. Understanding the perception, value and connection assigned to natural spaces must be nurtured through involvement and information, as this is the only way to restore the habitat of the human-nature relationship.

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# 8. ANNEX I

*Table A8.1: III level EUNIS classes listed within the study area during patch classification*

| EUNIS | DESCRIPTION |
|---|---|
| **C22** | Permanent non-tidal, fast, turbulent watercourses |
| **C32** | Water-fringing reedbeds and tall helophytes other than canes |
| **C35** | Periodically inundated shores with pioneer and ephemeral vegetation |
| **C36** | Unvegetated or sparsely vegetated shores with soft or mobile sediments |
| **J12** | Residential buildings of villages and urban peripheries |
| **J13** | Urban and suburban public buildings |
| **J14** | Urban and suburban industrial and commercial sites still in active use |
| **J15** | Disused constructions of cities, towns and villages |
| **J21** | Scattered residential buildings |
| **J22** | Rural public buildings |
| **J23** | Rural industrial and commercial sites still in active use |
| **J24** | Agricultural constructions |
| **J25** | Constructed boundaries |
| **J26** | Disused rural constructions |
| **J27** | Rural construction and demolition sites |
| **J32** | Active opencast mineral extraction sites, including quarries |
| **J33** | Recently abandoned above-ground spaces of extractive industrial sites |
| **J41** | Disused road, rail and other constructed hard-surfaced areas |
| **J42** | Road networks |
| **J46** | Pavements and recreation areas |
| **J47** | Constructed parts of cemeteries |
| **J53** | Highly artificial non-saline standing waters |
| **J54** | Highly artificial non-saline running waters |
| **J61** | Waste resulting from building construction or demolition |
| **J62** | Household waste and landfill sites |
| **J64** | Agricultural and horticultural waste |
| **J65** | Industrial waste |
| **R1A** | Semi-dry perennial calcareous grassland (meadow steppe) |
| **R22** | Low and medium altitude hay meadow |
| **S91** | Temperate riparian scrub |
| **T11** | Temperate Salix and Populus riparian forest |
| **T13** | Temperate hardwood riparian forest |
| **V11** | Intensive unmixed crops |
| **V12** | Mixed crops of market gardens and horticulture |
| **V13** | Arable land with unmixed crops grown by low-intensity agricultural methods |
| **V15** | Bare tilled, fallow or recently abandoned arable land |
| **V21** | Large-scale ornamental garden areas |
| **V22** | Small-scale ornamental and domestic garden areas |
| **V23** | Recently abandoned garden areas |
| **V31** | Agriculturally-improved, re-seeded and heavily fertilised grassland, including sports fields and grass lawns |

| | |
|---|---|
| **V39** | Dry perennial anthropogenic herbaceous vegetation |
| **V41** | Hedgerows of non-native species |
| **V42** | Highly managed hedgerows of native species |
| **V43** | Species-rich hedgerows of native species |
| **V44** | Species-poor hedgerows of native species |
| **V54** | Vineyards |
| **V61** | Broadleaved fruit and nut tree orchards |
| **V62** | Evergreen orchards and groves |
| **V63** | Lines of planted trees |
| **V64** | Small deciduous broadleaved planted other wooded land |
| **X07** | Intensively-farmed crops interspersed with strips of natural and/or semi-natural vegetation |
| **X22** | Small city centre non-domestic gardens |

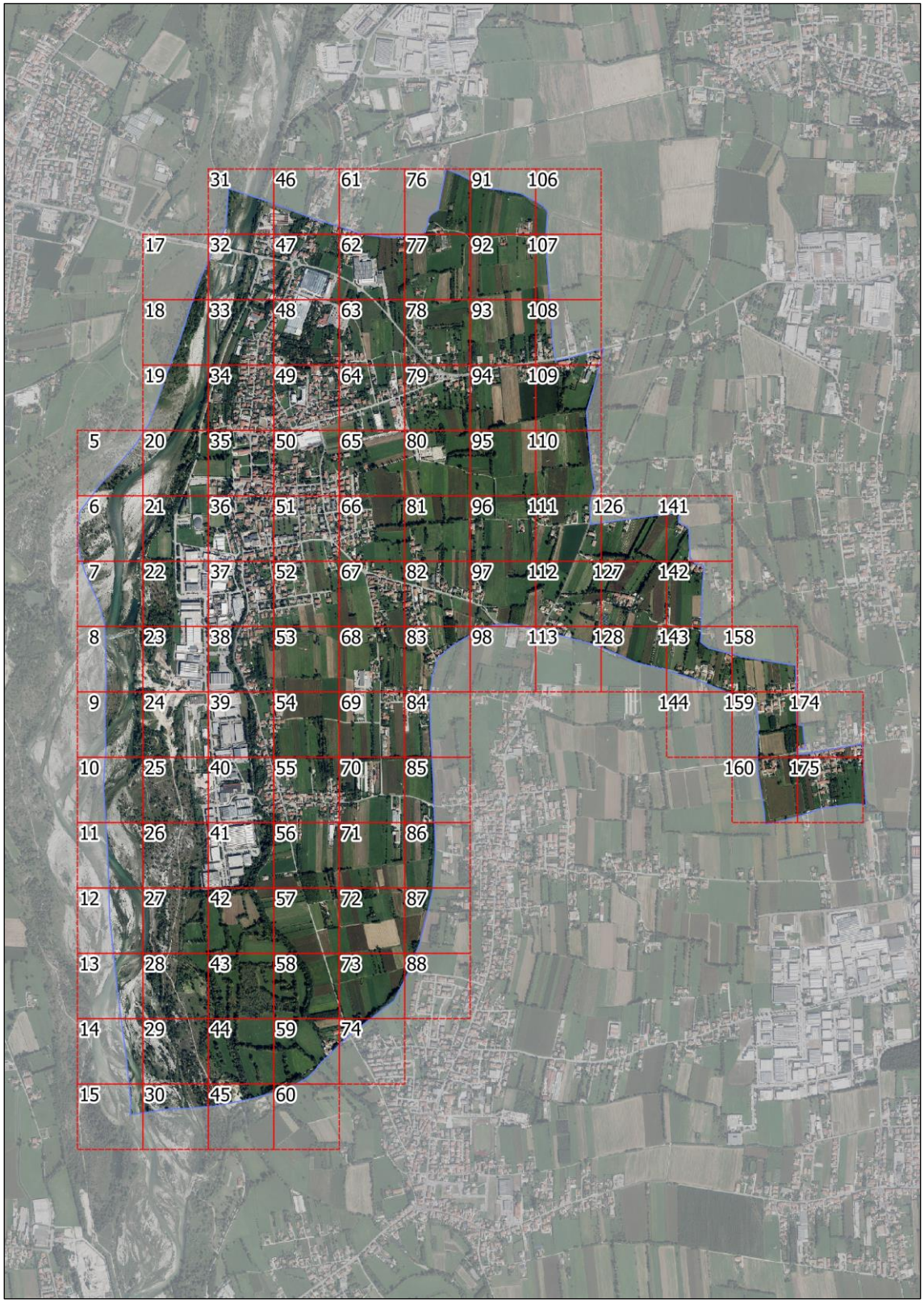



*Figure A8.1: map of Cartigliano with numbered cells attached to the questionnaire*

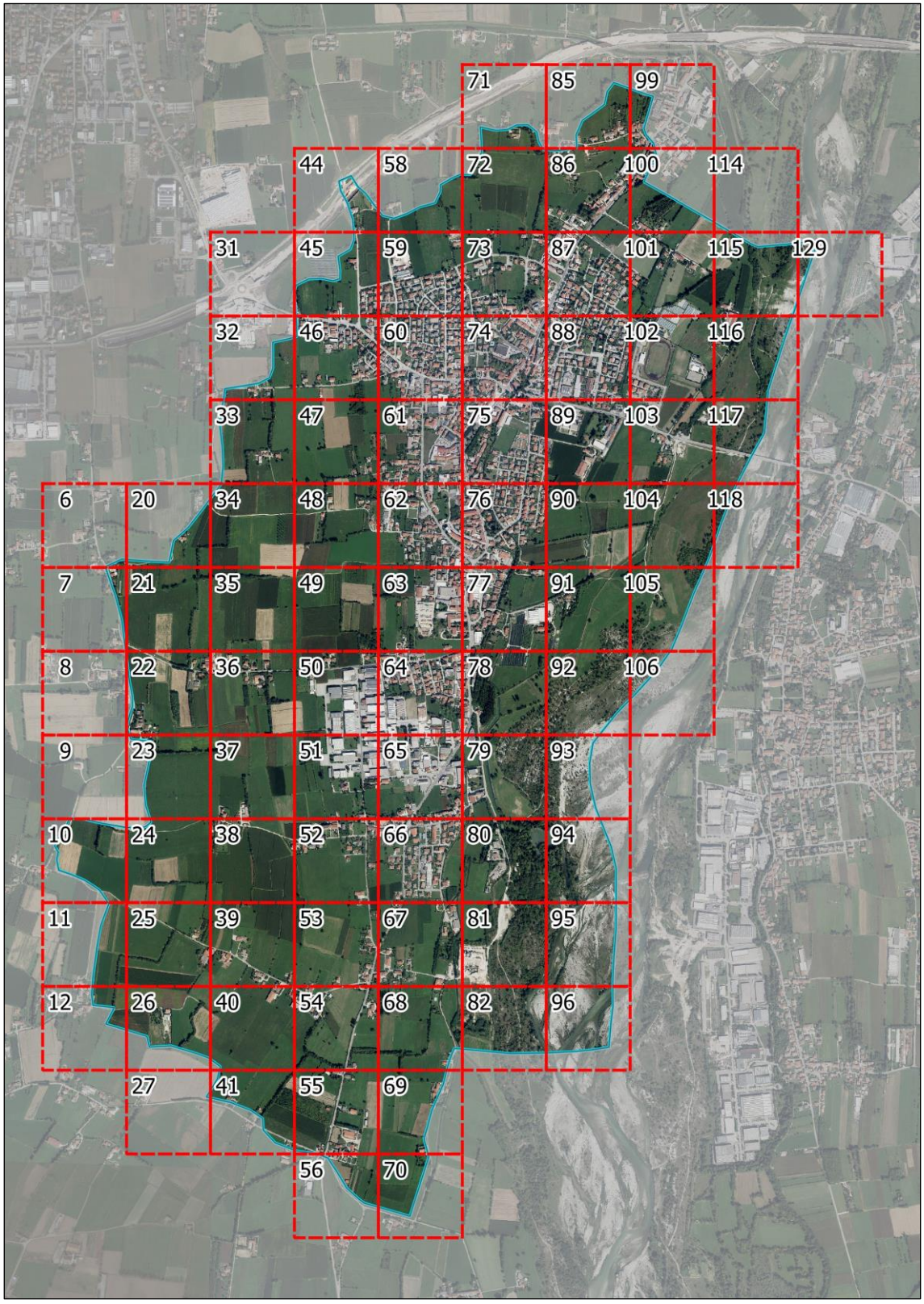



*Figure A8.2: map of Nove with numbered cells attached to the questionnaire*

# Questionario per la conservazione ed il miglioramento degli spazi verdi del tuo Comune

* Indica una domanda obbligatoria

## Sezione 1

1. **Indica la fascia di età a cui appartieni**

Contrassegna solo un ovale.

- o Meno di 12 anni
- o Tra 13 e 17 anni
- o Tra 18 e 29 anni
- o Tra 30 e 44 anni
- o Tra 45 e 60 anni
- o 60 anni o più

2. Indica il sesso di appartenenza

Contrassegna solo un ovale.

- o M
- o F
- o Preferisco non rispondere

3. Qual è il tuo attuale impiego?

Contrassegna solo un ovale.

- o Studente
- o Operaio
- o Impiegato
- o Libero professionista
- o Imprenditore
- o Pensionato
- o Altro:

1

*Figure A8.3: first page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

4. Da quanto vivi a Cartigliano?

Contrassegna solo un ovale.

- ○ Meno di 1 anno
- ○ Tra 2 e 5 anni
- ○ Tra 5 e 10 anni
- ○ Tra 10 e 20 anni
- ○ Da sempre

5. Hai in programma di trasferirti altrove in futuro?

Contrassegna solo un ovale.

- ○ Sì
- ○ No

6. Se Sì, per quale motivo?

Seleziona tutte le voci applicabili.

- ○ Lavoro
- ○ Studio
- ○ Contesto ambientale
- ○ Contesto sociale
- ○ Questioni familiari
- ○ Altro:

7. In quale zona di Cartigliano vivi? *

(riporta il quadrante corrispondente della **MAPPA** riportata qui sotto)

___

8. In che tipo di abitazione vivi?

Contrassegna solo un ovale.

- ○ Casa indipendente
- ○ Appartamento

9. Possiedi un giardino?

Contrassegna solo un ovale.

- ○ Sì
- ○ No



*Figure A8.4: second page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

10. Se Sì, di che giardino si tratta?

Contrassegna solo un ovale.

- ○ Privato
- ○ Condiviso

## Sezione 2

Nelle domande del presente questionario, per "**spazi verdi**" intendiamo l'insieme di tutti gli elementi che contengono della vegetazione al loro interno, quindi sia aree naturali (es. boschi, siepi, prati...) che aree verdi artificiali (es. parchi, giardini, viali alberati, verde lungo le strade...)

11. Quanto frequenti gli spazi verdi di Cartigliano?

Contrassegna solo un ovale.

- ○ Mai
- ○ Tutti i giorni
- ○ Una volta a settimana
- ○ Una volta al mese

12. In quale spazio verde di Cartigliano ti rechi di solito?

(riporta il quadrante della *MAPPA precedente o la località in cui è contenuto)

___

13. Quale attività svolgi maggiormente nello spazio verde indicato?

Contrassegna solo un ovale.

- ○ Svolgo attività fisica (corsa, yoga, passeggio...)
- ○ Porto a passeggio il mio animale domestico
- ○ Mi incontro con altre persone per stare insieme
- ○ Mi siedo/sdraio e mi rilasso
- ○ Osservo/fotografo il paesaggio, le piante e gli animali presenti
- ○ Raccolgo piante e/o altri prodotti offerti dalla natura
- ○ Altro:



*Figure A8.5: third page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

14. Quanto tempo impieghi per raggiungere lo spazio verde indicato partendo da casa tua?

Contrassegna solo un ovale.

- ○ Meno di 10 minuti
- ○ Tra 10 e 30 minuti
- ○ Più di 30 minuti

15. Come raggiungi solitamente lo spazio verde indicato?

Contrassegna solo un ovale.

- ○ A piedi
- ○ In bicicletta In auto
- ○ Altro:

## Sezione 3

16. Da 1 a 10, quanto hai a cuore la conservazione degli spazi verdi? *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| □ 1 | □ 2 | □ 3 | □ 4 | □ 5 | □ 6 | □ 7 | □ 8 | □ 9 | □ 10 |

17. Secondo te, qual è il ruolo più importante degli spazi verdi? (è possibile selezionare più opzioni)

Seleziona tutte le voci applicabili.

- ○ Aumentano la bellezza paesaggistica
- ○ Contribuiscono al benessere personale
- ○ Sono un piacevole luogo d'incontro tra persone
- ○ Rappresentano e tramandano la tradizione locale
- ○ Sono un'area di gioco e attività fisica
- ○ Preservano la flora e la fauna locale
- ○ Sono strumento di lotta ai cambiamenti climatici
- ○ Contrastano l'inquinamento
- ○ Altro:



*Figure A8.6: fourth page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

18. Quali tra i seguenti beni raccogli abitualmente (o hai raccolto) negli spazi verdi presenti all'interno del territorio comunale? (è possibile selezionare anche più di una opzione)

Seleziona tutte le voci applicabili.

- Piante per l'utilizzo in cucina
- Piante officinali
- Piante e fiori ornamentali
- Funghi
- Legna da ardere
- Frutti
- Vado a pesca
- Vado a caccia
- Altro:

19. Da 1 a 10, quanto ritieni che l'inserimento o il miglioramento di spazi verdi possa contribuire a migliorare la qualità della vita?

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

20. Da 1 a 10, quanto ritieni che l'inserimento o il miglioramento di spazi verdi possa contribuire a migliorare il valore economico del territorio? (ad esempio, il valore degli immobili, il flusso turistico...)

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

21. Da 1 a 10, quanto ritieni che l'inserimento o il miglioramento di spazi verdi possa contribuire a ridurre gli impatti provocati da attività umane? (ad esempio, smog, rumori...)

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

5

*Figure A8.7: fifth page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

Sezione 4

22. Qual è il punto di Cartigliano che ritieni essere esteticamente più bello? *

(riporta il numero del quadrante corrispondente della MAPPA precedente)

___

23. E quale quello esteticamente più brutto? *

(riporta il numero del quadrante corrispondente della MAPPA precedente)

___

24. Qual è il punto di Cartigliano che ritieni essere migliore per fare attività sportiva o rilassarti? *

(riporta il numero del quadrante corrispondente della MAPPA precedente)

___

25. E quale quello peggiore per fare attività sportiva o rilassarti? *

(riporta il numero del quadrante corrispondente della MAPPA precedente)

___

26. Da 1 a 10, quanto ti senti legato/a a Cartigliano? *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

27. Qual è il punto di Cartigliano che rappresenta meglio il tuo senso di appartenenza al territorio, ovvero il punto di Cartigliano a cui ti senti più legato/a? *

(riporta il numero del quadrante corrispondente della MAPPA precedente)

___

28. Spiega brevemente il motivo per cui ti senti legato/a al luogo indicato. *

_____

6

*Figure A8.8: sixth page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

29. Da 1 a 10, quanto ha influito la presenza di elementi verdi nella scelta del luogo selezionato? *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

30. Da 1 a 10, quanto saresti contento/a se si investisse nella conservazione del verde nel luogo da te scelto? *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

## Sezione 5

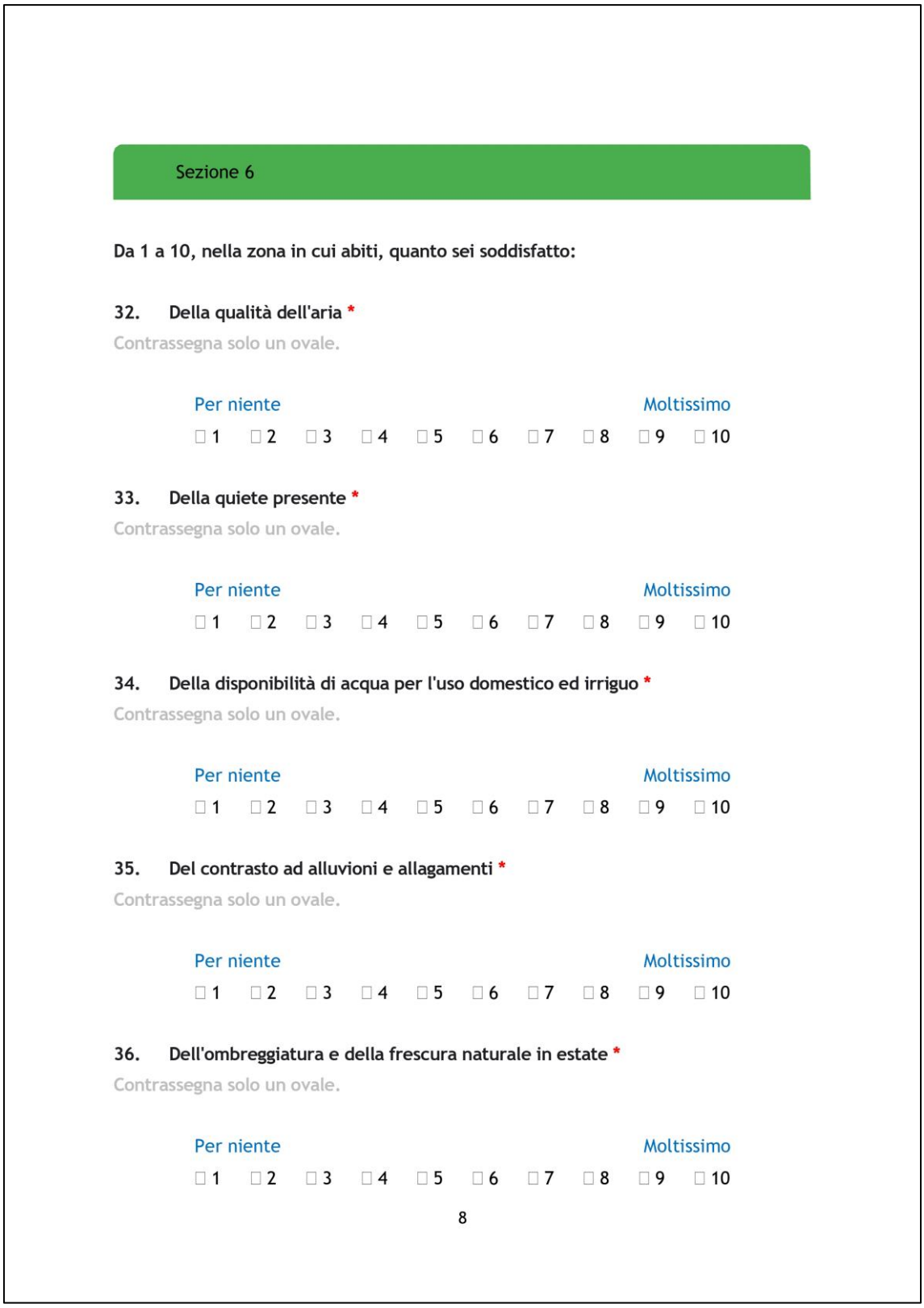
31. Seleziona, tra i seguenti elementi, quelli che ritieni essere più importanti nella tua vita quotidiana. (è possibile selezionare anche più di una opzione)

Seleziona tutte le voci applicabili.

- ○ Avere una buona qualità dell'aria
- ○ Vivere in un luogo privo di rumori
- ○ Disporre di acqua per uso domestico e irriguo
- ○ Tenere sotto controllo le alluvioni ed evitare gli allagamenti
- ○ Attenuare il caldo eccessivo d'estate
- ○ Vivere in un luogo esteticamente bello
- ○ Avere spazi verdi dove poter fare attività fisica o rilassarsi
- ○ Vivere in un luogo ricco di piante e animali
- ○ Sostenere la presenza di insetti impollinatori (es. api, farfalle...)



*Figure A8.9: seventh page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*



Sezione 6

Da 1 a 10, nella zona in cui abiti, quanto sei soddisfatto:

32. Della qualità dell'aria *

Contrassegna solo un ovale.

Per niente Moltissimo

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

33. Della quiete presente *

Contrassegna solo un ovale.

Per niente Moltissimo

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

34. Della disponibilità di acqua per l'uso domestico ed irriguo *

Contrassegna solo un ovale.

Per niente Moltissimo

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

35. Del contrasto ad alluvioni e allagamenti *

Contrassegna solo un ovale.

Per niente Moltissimo

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

36. Dell'ombreggiatura e della frescura naturale in estate *

Contrassegna solo un ovale.

Per niente Moltissimo

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

8

*Figure A8.10: eighth page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

37. Della bellezza estetica del paesaggio *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

38. Della presenza di spazi verdi per attività fisica *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

39. Della diversità di piante e animali presenti *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

40. Della presenza di insetti impollinatori (es. api, farfalle...) *

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 | ☐ 7 | ☐ 8 | ☐ 9 | ☐ 10 |

## Sezione 7

41. Vorrei che la quantità di spazi verdi nel territorio di Cartigliano venisse...

Contrassegna solo un ovale.

- ○ Aumentata
- ○ Diminuita
- ○ Mantenuta



*Figure A8.11: ninth page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

42. Se Aumentata o Diminuita, dove?

(riporta il quadrante corrispondente della MAPPA riportata di seguito o il nome della località)

___

_____

43. Preferirei che negli spazi verdi di Cartigliano ci fossero più... (è possibile selezionare anche più di una opzione)

Seleziona tutte le voci applicabili.

- o Aree boscate
- o Siepi
- o Prati
- o Parchi e giardini
- o Aiuole fiorite
- o Viali alberati
- o Spazi verdi per attività fisica
- o Altro:

44. Cosa inseriresti nella zona in cui è sita la tua abitazione? (è possibile selezionare anche più di una opzione)

Seleziona tutte le voci applicabili.

- o Aree boscate
- o Siepi
- o Prati
- o Parchi e giardini
- o Aiuole fiorite
- o Viali alberati
- o Spazi verdi per attività fisica
- o Altro:

10

*Figure A8.12: tenth page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

45. Secondo te, quali dovrebbero essere le priorità di Cartigliano? (seleziona al massimo 3 OPZIONI)

Seleziona tutte le voci applicabili.

- o Lo sviluppo agricolo
- o Lo sviluppo industriale
- o Lo sviluppo turistico
- o Lo sviluppo urbano/residenziale
- o Le infrastrutture per la mobilità (strade, piste ciclabili, trasporto pubblico)
- o Le aree attrezzate per attività sportive e ricreative
- o Le zone verdi

46. Da 1 a 10, quanto saresti d'accordo se il Comune in cui vivi investisse risorse nel miglioramento e nella costruzione di nuovi spazi verdi?

Contrassegna solo un ovale.

| Per niente | | | | | | | | | Moltissimo |
|---|---|---|---|---|---|---|---|---|---|
| □ 1 | □ 2 | □ 3 | □ 4 | □ 5 | □ 6 | □ 7 | □ 8 | □ 9 | □ 10 |

47. Secondo te, cosa può fare l'amministrazione pubblica del Comune in cui vivi per migliorare lo stato del Comune e il benessere dei suoi cittadini? (riportare un breve commento/consiglio)

_____

_____

_____





*Figure A8.13: eleventh page of the submitted questionnaire in both Cartigliano and Nove (in Italian)*

*Table A8.2: conversion for macro-category grouping*

| LANDSCAPE MACRO-CATEGORY | EUNIS |
|---|---|
| **ARABLE CROPS** | V11 |
| | V12 |
| | V13 |
| | V15 |
| **EXTRACTIVE SITES** | J32 |
| | J33 |
| **FORESTS** | S91 |
| | T11 |
| | T13 |
| **GRASSLANDS** | R1A |
| | R22 |
| | V31 |
| | V39 |
| **HEDGEROWS** | V41 |
| | V42 |
| | V43 |
| | V44 |
| **INDUSTRIAL BUILDINGS** | J14 |
| | J23 |
| | J24 |
| | J25 |
| | J61 |
| | J62 |
| | J64 |
| | J65 |
| **PERMANENT CROPS** | V54 |
| | V61 |
| | V62 |
| | V63 |
| | V64 |
| **PRIVATE GARDENS** | V21 |
| | V22 |
| | V23 |
| **PUBLIC GARDENS** | X07 |
| | X22 |
| **RESIDENTIAL BUILDINGS** | J12 |
| | J13 |
| | J15 |
| | J21 |
| | J22 |
| | J26 |
| | J27 |
| | J41 |
| **ROAD NETWORKS AND PARKINGS** | J42 |
| | J46 |
| | J47 |
| **SURFACE WATER** | C22 |
| | C32 |
| | C35 |
| | C36 |
| | J53 |
| | J54 |

*Table A8.3: EUNIS to CLC conversion table for landscape metric computation*

| CLC CLASS | DESCRIPTION | EUNIS CLASS |
|---|---|---|
| **111** | Continuous urban fabric | J13<br>J15<br>J46 |
| **112** | Discontinuous urban fabric | J12<br>J21<br>J22<br>J47 |
| **121** | Industrial or commercial units | J14<br>J23<br>J26 |
| **122** | Road and rail networks and associated land | J41<br>J42 |
| **131** | Mineral extraction sites | J32<br>J33 |
| **132** | Dump sites | J61<br>J62<br>J64<br>J65 |
| **133** | Construction sites | J27 |
| **141** | Green urban areas | X22 |
| **211** | Non-irrigated arable land | J24<br>J25<br>V11<br>V12<br>V15 |
| **221** | Vineyards | V54 |
| **222** | Fruit trees and berry plantations | V61 |
| **223** | Olive groves | V62 |
| **231** | Pastures | R22<br>V31<br>V41<br>V42<br>V43<br>V44 |
| **242** | Complex cultivation patterns | V21<br>V22<br>V23<br>X07 |
| **243** | Land principally occupied by agriculture, with significant areas of natural vegetation | V13 |
| **311** | Broad-leaved forest | T11<br>T13 |
| **321** | Natural grassland | R1A<br>V39 |
| **322** | Moors and heathland | S91 |

| | | |
|---|---|---|
| **324** | Transitional woodland/shrub | V63<br>V64 |
| **331** | Beaches, dunes, sands | C36 |
| **411** | Inland marshes | C32<br>C35 |
| **511** | Water courses | C22<br>J54 |
| **512** | Water bodies | J53 |

*Table A8.4: formulas adopted by Fragstats 4.2 for the computation of selected landscape attributes*

| ATTRIBUTE FORMULA | ATTRIBUTE FACTORS |
|---|---|
| $$PLAND = P_i = \frac{\sum_{j=1}^{n} a_{ij}}{A}(100)$$ | Pi = proportion of the landscape occupied by patch type (class) i.<br>aij = area ($m^2$) of patch ij.<br>A = total landscape area ($m^2$). |
| $$NP = N$$ | N = total number of patches in the landscape. |
| $$PR = m$$ | m = number of patch types (classes) present in the landscape, excluding the landscape border if present. |
| $$SHDI = -\sum_{i=1}^{m} (P_i * \ln P_i)$$ | Pi = proportion of the landscape occupied by patch type (class) i. |
| $$SHEI = \frac{-\sum_{i=1}^{m} (P_i * \ln P_i)}{\ln m}$$ | Pi = proportion of the landscape occupied by patch type (class) i.<br>m = number of patch types (classes) present in the landscape, excluding the landscape border if present. |
| $$AI = \left[\sum_{i=1}^{m} \left(\frac{g_{ii}}{\max \rightarrow g_{ii}}\right) P_i\right](100)$$ | gii = number of like adjacencies (joins) between pixels of patch type (class) i based on the *single-count* method.<br>max-gii = maximum number of like adjacencies (joins) between pixels of patch type (class) i (see below) based on the *single-count* method.<br>Pi = proportion of landscape comprised of patch type (class) i. |

# 9. ANNEX II

*Table A9.1: III level EUNIS classes found for Cartigliano and Nove and respective number of patches, total and mean patch area*

| EUNIS III LEVEL CLASS | CARTIGLIANO | | | NOVE | | |
|---|---|---|---|---|---|---|
| | *Number of Patches* | *Total Area (ha)* | *Mean Area (ha)* | *Number of Patches* | *Total Area (ha)* | *Mean Area (ha)* |
| **C22** | 6 | 23,56 | 3,93 | 3 | 4,6 | 1,5 |
| **C32** | 5 | 0,57 | 0,11 | 4 | 1,4 | 0,3 |
| **C35** | 112 | 44,15 | 0,39 | 6 | 11,3 | 1,9 |
| **C36** | 57 | 4,36 | 0,08 | 6 | 5,6 | 0,9 |
| **J12** | 803 | 18,48 | 0,02 | 2521 | 30,6 | 0,0 |
| **J13** | 15 | 0,92 | 0,06 | 25 | 0,7 | 0,0 |
| **J14** | 130 | 19,38 | 0,15 | 296 | 13,9 | 0,0 |
| **J15** | 17 | 1,83 | 0,11 | *NA* | *NA* | *NA* |
| **J21** | 492 | 10,63 | 0,02 | 18 | 0,6 | 0,0 |
| **J22** | 9 | 0,52 | 0,06 | 1 | 0,0 | 0,0 |
| **J23** | 54 | 2,79 | 0,05 | 5 | 2,7 | 0,5 |
| **J24** | 142 | 3,75 | 0,03 | 831 | 6,4 | 0,0 |
| **J25** | 150 | 0,71 | 0,00 | 2 | 0,1 | 0,1 |
| **J26** | 10 | 0,41 | 0,04 | 7 | 0,0 | 0,0 |
| **J27** | 3 | 0,05 | 0,02 | 12 | 0,7 | 0,1 |
| **J32** | 4 | 4,39 | 1,10 | 3 | 6,6 | 2,2 |
| **J33** | 6 | 0,74 | 0,12 | 2 | 1,3 | 0,7 |
| **J41** | 1 | 0,01 | 0,01 | *NA* | *NA* | *NA* |
| **J42** | 138 | 29,26 | 0,21 | 51 | 44,4 | 0,9 |
| **J46** | 1536 | 46,93 | 0,03 | 229 | 27,0 | 0,1 |
| **J47** | 12 | 0,68 | 0,06 | 1 | 1,0 | 1,0 |
| **J53** | 23 | 0,09 | 0,00 | 1 | 1,7 | 1,7 |
| **J54** | 32 | 0,86 | 0,03 | 18 | 2,7 | 0,2 |
| **J61** | 8 | 0,12 | 0,02 | *NA* | *NA* | *NA* |
| **J62** | 11 | 0,28 | 0,03 | *NA* | *NA* | *NA* |
| **J64** | 5 | 0,33 | 0,07 | *NA* | *NA* | *NA* |
| **J65** | 6 | 1,02 | 0,17 | 1 | 0,2 | 0,2 |
| **R1A** | 112 | 33,97 | 0,30 | 16 | 45,3 | 2,8 |
| **R22** | 13 | 10,20 | 0,78 | 1 | 2,8 | 2,8 |
| **S91** | 119 | 13,57 | 0,11 | 2 | 9,2 | 4,6 |
| **T11** | 8 | 2,52 | 0,32 | 16 | 20,0 | 1,3 |
| **T13** | 65 | 13,03 | 0,20 | 4 | 13,1 | 3,3 |
| **V11** | 236 | 128,91 | 0,55 | 158 | 164,4 | 1,0 |
| **V12** | 71 | 6,08 | 0,09 | 8 | 0,8 | 0,1 |
| **V13** | 5 | 0,60 | 0,12 | 27 | 3,6 | 0,1 |
| **V15** | 18 | 8,61 | 0,48 | 17 | 8,3 | 0,5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **V21** | 9 | 10,07 | 1,12 | *NA* | *NA* | *NA* |
| **V22** | 1946 | 65,36 | 0,03 | 318 | 123,4 | 0,4 |
| **V23** | 21 | 2,73 | 0,13 | 12 | 2,6 | 0,2 |
| **V31** | 295 | 140,06 | 0,47 | 190 | 214,9 | 1,1 |
| **V39** | 87 | 11,75 | 0,14 | 4 | 4,7 | 1,2 |
| **V41** | 353 | 3,28 | 0,01 | 3 | 0,1 | 0,0 |
| **V42** | 8 | 0,08 | 0,01 | 3 | 0,3 | 0,1 |
| **V43** | 133 | 42,17 | 0,32 | 6 | 2,3 | 0,4 |
| **V44** | 217 | 14,01 | 0,06 | 67 | 13,7 | 0,2 |
| **V54** | 33 | 3,48 | 0,11 | 17 | 3,7 | 0,2 |
| **V61** | 4 | 0,45 | 0,11 | 7 | 2,7 | 0,4 |
| **V62** | 3 | 0,56 | 0,19 | *NA* | *NA* | *NA* |
| **V63** | 238 | 4,52 | 0,02 | 13 | 0,6 | 0,0 |
| **V64** | 51 | 10,18 | 0,20 | 24 | 9,4 | 0,4 |
| **X07** | 161 | 5,71 | 0,04 | 12 | 0,9 | 0,1 |
| **X22** | 244 | 4,95 | 0,02 | 34 | 4,5 | 0,1 |
| **TOTAL** | **8237** | **753,63** | | **5002** | **814,8** | |

*NA: missing classes

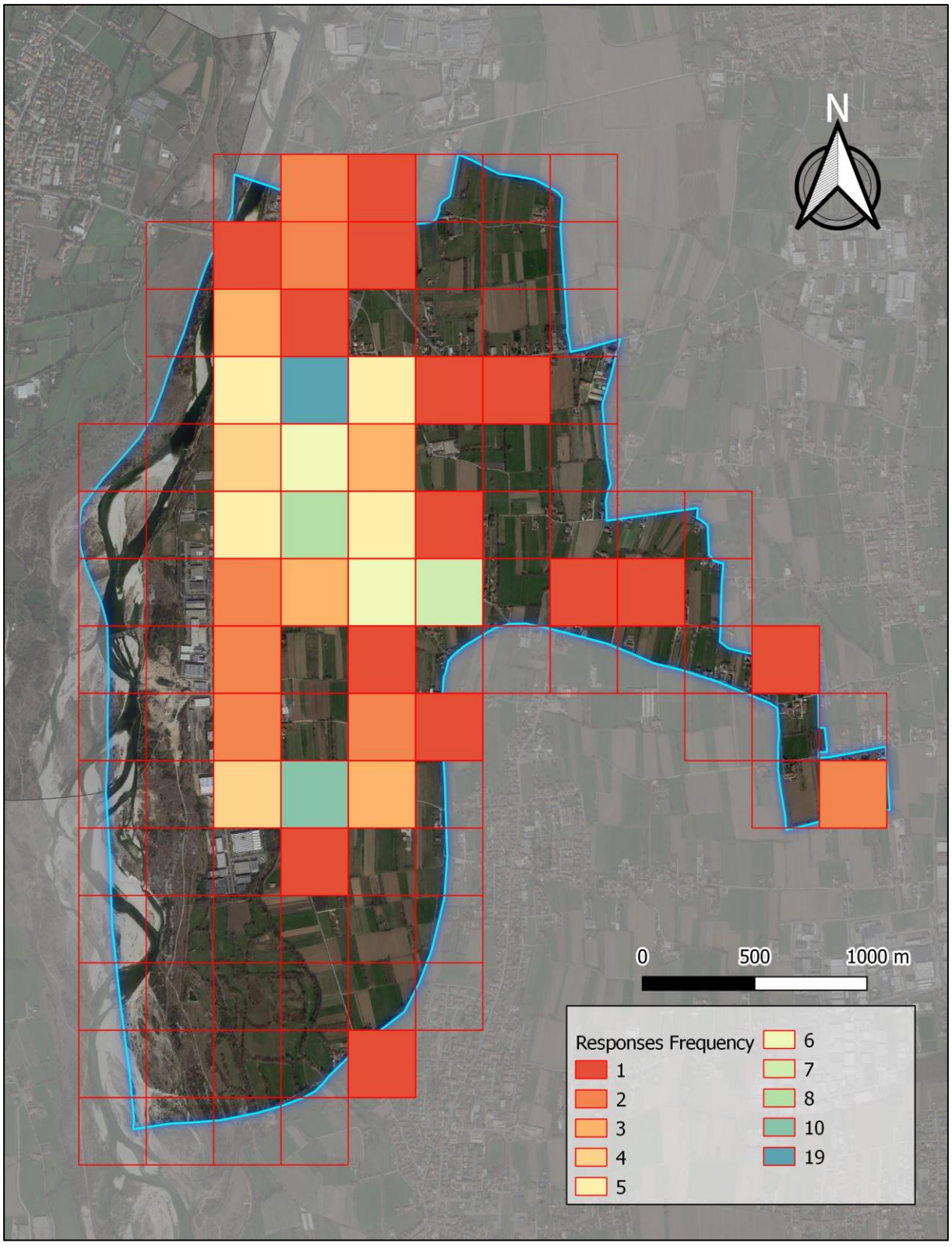



*Figure A9.1: frequency of responses across the Municipality of Cartigliano*

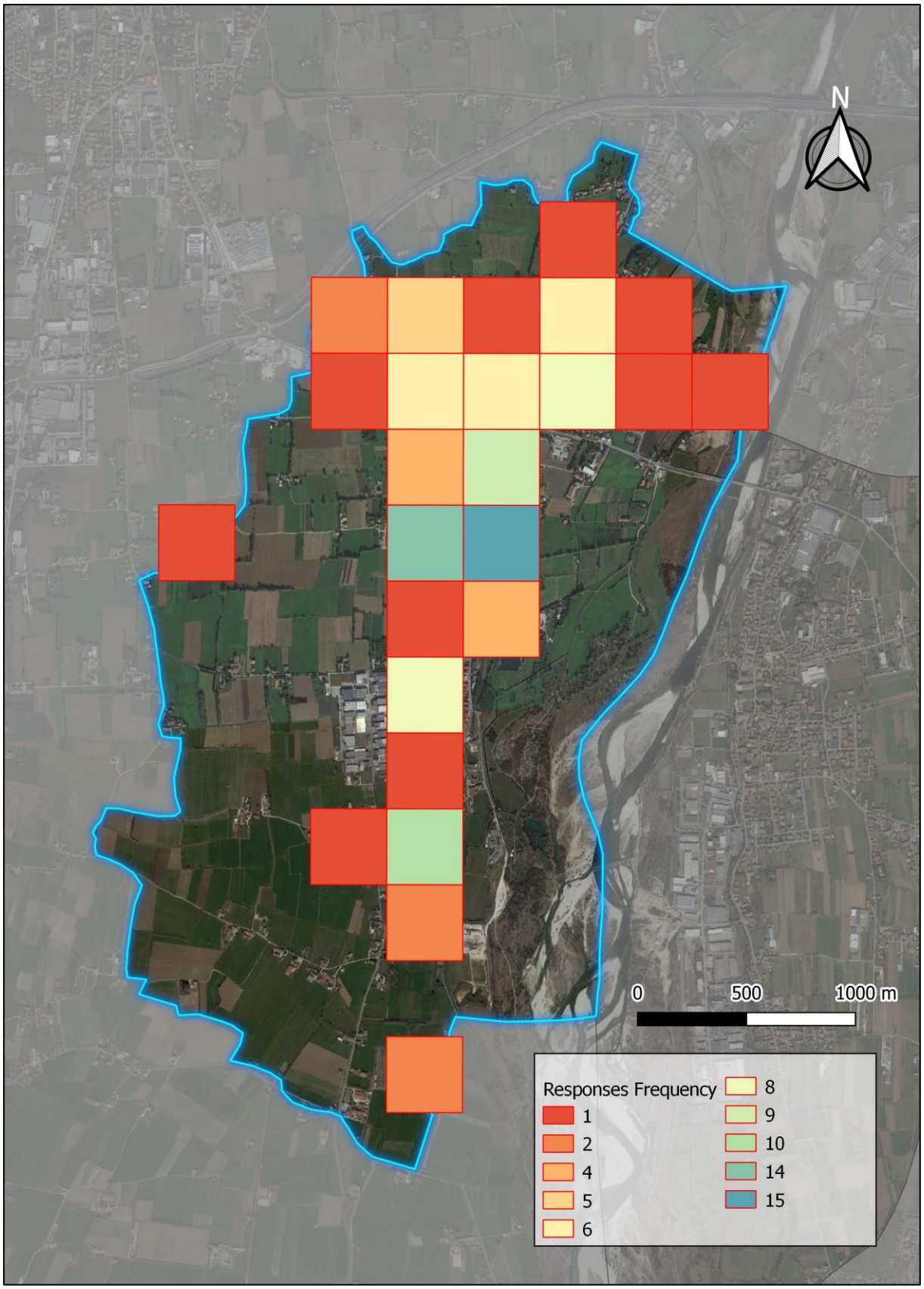



*Figure A9.2: frequency of responses across the Municipality of Nove*

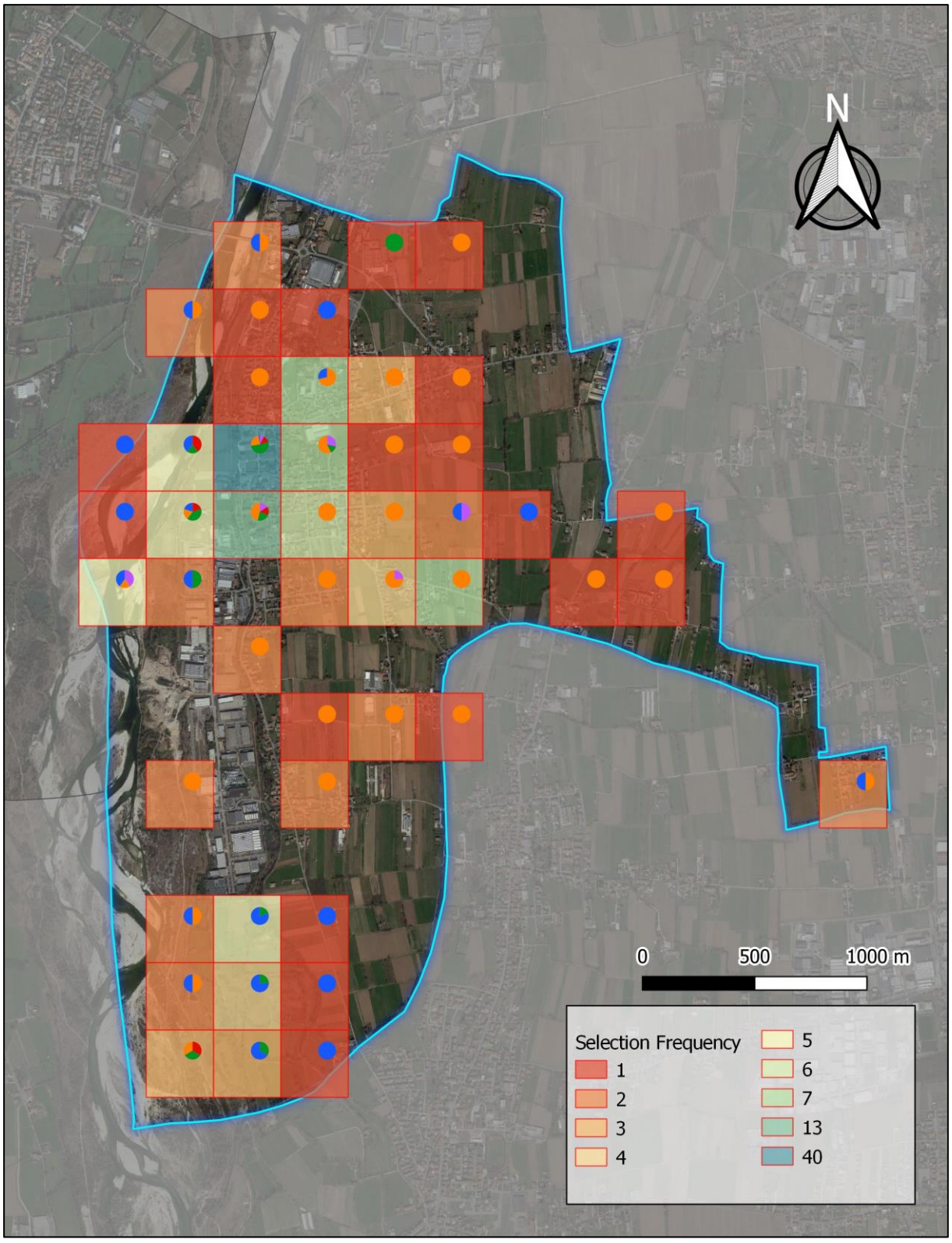



*Figure A9.3: frequency of selection for representative places for Sense of Place within Cartigliano and topic frequency within each cell ( GV, PA, PI, PS, SR)*

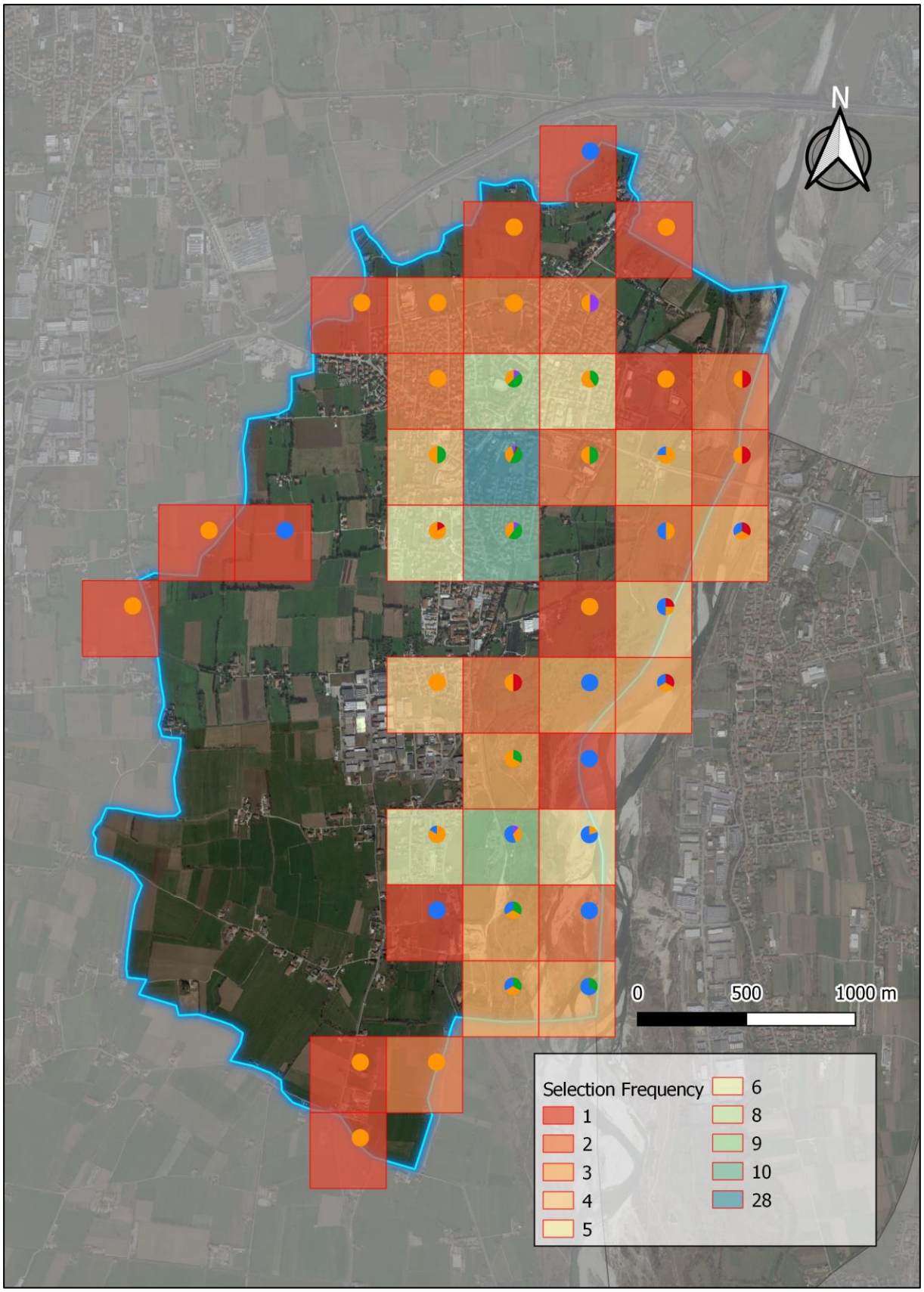



*Figure A9.4: frequency of selection for representative places for Sense of Place within Nove and topic frequency within each cell ( GV, PA, PI, PS, SR)*

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