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LM-1 (Cultural Anthropology and Ethnology)

Final Thesis

The potential of tourism in Sardinia to facilitate environmental education on ecosystem services

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"Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts."

Rachel Carson

Abstract

Sardinia, Italy's second largest island in the Mediterranean Sea, is a land rich in traditions, history, beauty, and pristine nature. It is famous for its sceneries and beaches, and its ecosystems provide a variety of services to humans. Its population of around 1.6 million people increases during the summer months when tourists from all over the world arrive on the island's four shores. Tourism is a major source of income in Sardinia, but when excessive, especially in some locations during the months of July and August, it causes severe harm to the environment, decreasing the quality of services offered by humans and by nature. This thesis will investigate whether tourism in Sardinia can play a role in educating visitors about ecosystem services and climate change by allowing them to experience nature firsthand with the help of locals. It will also explore who the main stakeholders in the industry are and what their role is, together with analyzing land use on the island.

1. Introduction

Sardinia is a renowned holiday destination for its white sandy beaches, its clear waters, and its sunny weather. Tourism represents a crucial revenue stream for the island, and many services are strictly linked to the industry, but it also represents a major source of environmental damage. Sardinia is not only characterized by beautiful beaches, as it is rich in diverse ecosystems that provide essential services that make human life on the island enjoyable. As tourism has a wide reach, it has the potential to rise awareness of such ecosystems and the services they provide, eventually leading visitors to become more conscious of the crucial importance of nature for human life and of their impact on the environment.

1.1 Sardinia

Figure 1: Location of the island of Sardinia in the Mediterranean sea

Sardinia is the second biggest island in the Mediterranean sea, after Sicily. It is located west of the Italian peninsula and south of the French island of Corsica. It is surrounded by the Tyrrhenian Sea on the eastern and southern coast and by the Sea of Sardinia on the west

coast. It is one of the 20 regions of Italy and it is officially named the Autonomous Region of Sardinian (*Regione Autonoma della Sardegna*), to denote the degree of domestic autonomy the island has obtained through a special statute granted by the Italian State. It is divided into four provinces (Sassari, Oristano, Nuoro, Sud Sardegna) and one metropolitan city, which is also the capital and the largest city on the island, Cagliari. Sardinia is officially recognized as a bilingual region, with Italian and Sardinian being the two official languages, although the latter is currently endangered. Other language minorities present on the island are Sassarese, Gallurese, Algherese, and Tabarchino.

In ancient Greece, Sardinia was named *Ichnusa*, from the greek word *ichnos*, "footprint", as the shape of the island reminds of the shape of a human footprint. The current name probably comes from the word *Shardana*, which according to Egyptians, identified the ancient Sardinian people.

The island is characterized by such a variety of ecosystems, from mountains to plains, from rocky shores to sandy beaches, that it has often been referred to as a micro-continent.

1.1.1 History

Sardinia is one of the most geologically ancient areas of Europe (Carmignani et al. 2015) and has gone through different eras of domination. The prehistoric population of the island is assumed to have built one of the dominating features of Sardinia: the nuraghi. A *nuraghe* is a conic structure built out of blocks of basalt with no bonding between the blocks. Most buildings are quite small, but some seem to have been fortresses. The nuraghi are dated between 150 and 400 BCE, therefore being around 3.000 years old (Moravetti et al. 2014). There are a lot of uncertainties when it comes to this population, which left no written record. However, from the archeological evidence, it seems that they were divided into organized tribal states. It seems that the Sherden people either came or settled in Sardinia, giving it its name. The Phenicians played an important role on the island, creating trade settlements from the 9th or 8th century BCE, but were eventually conquered by the Carthaginians, whose domination was followed by that of the Romans (Cattaneo 1996). During that time the island was often used as a place of exile, but there is a lack of precise information about this period. Around 456 CE the Vandals occupied Sardinia, and their rule represented a period of cultural revival. In 711, Arabs started raiding the island, which resulted in Sardinia becoming more organized for defense. After a relatively peaceful period in the 10th century, the island was attacked by the Spanish in 1015 (Encyclopedia Britannica 1998). In the 11th century, the

island was divided into the four giudicati of Cagliari, Arborea, Torres, and Gallura. In 1297 James II of Aragon was made king of Sardinia and Corsica and the Aragones' domination began, unifying Sardinia and centralizing authority, but also putting the island in a state of lethargy. In the 1700s Sardinia became Austrian territory. In 1847 Sardinia renounced its autonomy to become part of the Italian Mainland States (Stati di Terraferma), which had a centralized government in Turin. In 1861 the island became part of the unified Italian State (Cattaneo 1996). Sardinia took part in both the First and Second World Wars. During Fascism, several swamps were reclaimed for agricultural purposes, and many communities such as Mussolinia (now Arborea) were founded for farmers and workers from all over Italy to move into (Tognotti 2009). The city of Carbonia, which became the center of coal mining, was also established in that period. The hardships of the war were worsened by the heavy presence of malaria on the island, which was finally eradicated in 1951 by the Rockefeller Foundation through the use of hash chemical pesticides. The eradication of malaria created the preconditions for tourism to develop in the '60s, leading the island's economy away from coal mining. The '60s were also characterized by strong industrialization efforts, which did not yield the desired results, together with the creation of military bases (Sotgiu 1990). To this day, 60% of all Italian military bases are found in Sardinia.

1.1.2 Geography

The island extends for a total of 24.100 km2, which makes it the third Italian region in size. 68% of the island consists of hills and rocky highlands, 18% of plains, and 14% of mountains. The coasts are 1.897 km long and part of the Sardinian territory extends on minor islands such as Sant'Antioco, San Pietro, and Asinara island (Regione Autonoma della Sardegna 2018). Huge areas of the island are uninhabited, mostly due to a general lack of financial resources, but also due to the difficulties in establishing productive agricultural businesses due to the climate and the thin and infertile soil.

The main road on the island is the SS131, also named E25, the European route, as it virtually connects it to other European countries, from the Netherlands, through Belgium, France, Switzerland, and other areas of Italy. The building of the road was initiated by King Carlo Felice di Savoia in the XIX century and therefore has his name. It connects Cagliari, in the south, to Porto Torres, in the north, and it develops on the western part of the island, while the rest of Sardinia is connected through smaller local roads such as the SS127 connecting Olbia

and Tempio, the SS125 from Cagliari to Olbia, and the SS129 to Alghero. There are a few scenic routes such as the ones in Costa Verde (west coast) and Costa Paradiso (north coast).

The climate is variable but generally Mediterranean, with long and warm summers and mild, wet, and relatively short winters. In the interior of the island, the climate is more continental, with lower average temperatures and occasional snow on the mountains. The island, and especially the south and the city of Cagliari, are well known for the high number of average yearly sunny days, as even winters are often characterized by many days of sun and warmer temperatures. Drought characterizes the area, especially during the summer and fall months when precipitations are often close to inexistent between May and November (Colomo 2007). The lack of water has always been a challenge when it comes to agriculture, which has to rely on dams that store water from precipitations in the winter months, while wild plants are well adapted to the long summers and sunny weather. Wildfires have become more common, with 2021 being a particularly difficult year, as the island experienced intense fires in the province of Oristano, leading to major damage. The wildfires hit forests, urban areas, agricultural fields, and infrastructures, and went on for a week, between July 23 and July 30.

As mentioned, Sardinia has often been metaphorically defined as a micro-continent due to the variety of ecosystems present on the island. From mountains to plains, from streams to coasts, from beaches to hills, such variety makes it an interesting case study for many issues, especially when it comes to environmental protection.
Both flora and fauna species are typically Mediterranean and highly influenced by the climate. Plants are usually evergreen due to the availability of sunlight all year round, and they are very well adapted to long warm seasons and water scarcity. Some of the most common bushes are strawberry tree, mastic, juniper, olive, cyst, myrtle, fillyrea, heather, broom, rosemary, viburnum, and euphorbia.
The island is also home to many animal species, which due to its insularity have had the chance to develop in unique ways. Some examples are muflons, Sardinian deers, fallow deers, white donkeys, Giara ponies, Sardinian wild boars, wild cats, and tortoises. It is also an interesting area for migratory birds, sedentary species, and nesting birdlife. Many species have been endangered by poaching and some, such as the fallow deer, were driven to extinction and later reintroduced from colonies in other parts of Italy. Some species, such as the white donkeys and Giara ponies, are currently protected, while others, such as the wild

boar, are not threatened by extinction, as their only predators are humans, and they have even experienced an expansion in the last few years (SardegnaForeste n.d.).

Some of the most common marine animal species are the corvine, bream, scorpion fish, snapper, sea bass, and lobster, which have always had an important role both in trade and in local cuisine. In recent years, jellyfish have become more and more common even near the coast due to higher water temperatures and a lack of predators (Brotz & Pauly 2012). One of the most important marine species is the Posidonia oceanica, a seagrass that is endemic to the Mediterranean Sea and with its meadows is a crucial part of the marine ecosystem. It blooms in autumn and spring and produces fruits commonly named "sea olives". Such meadows are home to many species that find protection from predators and food, but Posidonia is also known for its ability to sequestrate large amounts of carbon dioxide. Furthermore, it contributes to coastal protection by mitigating wave motion and stabilizing the seabed with its roots.

1.1.3 Demographics

In 2021 Sardinia had a population of 1.587.413 inhabitants. While from 1861 to 2010 and between 2011 and 2013 the population rose slowly but consistently, starting from 2014 the number of inhabitants has been slowly declining, with a loss of 3.2% in 2021.The island is not densely populated, with an average of 66 inhabitants per square kilometer (Adminstat Italia 2022). The island is going through a process of depopulation, especially in internal areas and small villages, with a loss of 21,000 inhabitants only in 2020 (Adminstat 2022). The average age is 48,1 years old, compared to the Italian average of 45.4, and life expectancy is 82 years old (85.0 years for women, 79.2 for men), which is one of the highest in the world (ISTAT 2022). In 2020, the aging index was 231.5, against the Italian average of 182.2. In 2022, 598 Sardinians were over 100 years old, making the island one of the areas with the most centenarians in the world (ISTAT 2022). 8.5% of the population is between 55 and 59 years old. In 2021, there were 232 elderly people for every 100 youngsters, highlighting how the population is extremely old, both due to the high life expectancy and the lack of job opportunities, which lead younger people to move elsewhere (Regione Autonoma della Sardegna 2022).

3% of the population is represented by foreigners, who in 2022 were a total of 48.400, with a prevalence of Romanians (ISTAT 2022). In 2019 only 12.8% of the population had a tertiary degree (university degree or post-secondary training courses).

1.1.4 Government and policies

The island is one of five autonomous regions in Italy, together with the Aosta Valley, Trentino-Alto Adige, Friuli-Venezia Giulia, and Sicily.

The administration is constituted by the Regional Council, which has legislative power, the Regional Junta, which has executive power, and the President of the Region, who is chief of executive power. It is divided into four provinces (Sassari, Oristano, Nuoro, south Sardinia) and the metropolitan city of Cagliari. The current administration was elected in 2019 and will end its mandate in 2024. The President is Christian Solinas, from Partito Sardo d'Azione (PSd'Az), a right-wing party supported by Matteo Salvini's Lega. Within this administration, the councilor of Tourism, Craftsmanship, and Trade (*Assessoradu de su turismu, artesania e cummèrtziu*) is Giovanni Chessa, and the department promotes touristic development, manages the hotel industry, programs touristic infrastructures, promotes craftsmanship and trade, and supervises fairs and markets (Regione Sardegna n.d.).

1.1.5 Economy

According to a report by CRENoS (2022), in 2020 the GDP of Sardinia was €30,2 billion, or €19.000 per inhabitant, settling at 182nd place out of the 242 European regions. In the same year, Sardinia scored €5,5 billion in trade, 63% more than the previous year, with 76,7% of trade being represented by oil products that are refined on the island. Other important products are metals (6,1%), chemical products (4,3%), and milk and cheese products (2,4%) (CRENoS 2022).

According to the same report, in 2021, the total number of active companies was 145 thousand, with 96% of them having less than 10 employees. More traditional businesses such as agriculture, silviculture, and fishing represented 24.1% of the total number of companies. The main productions are wheat, as flour-based foods are extremely common on the island, grapes for wine production, olives for extra virgin olive oil, and cork, as Sardinia produces 80% of all the cork in Italy (Renzulli 2021). The fishing industry is also relevant, especially tuna fishing on the island of San Pietro (Carloforte). Pastures for sheep and goats still cover much of the total area of Sardinia, although the number of livestock has been declining.

Industrial enterprises represented 21% of the total share of companies. including food processing, textile, leather production, and woodworking. There are a few petrochemical refineries, such as the one in Sarroch, in the south, which, as mentioned, represent the main

revenue stream for the Sardinian trade. The island is rich in minerals, but the mining industry never dealt with mineral processing and was eventually almost halted during the 1900s.

The remaining 54.8% is represented by services, including trade and tourism (Regione Autonoma della Sardegna 2022).

1.2 Tourism in Sardinia

In order to understand tourism in Sardinia, it is crucial to start from the economic and social context in which the industry developed. According to Ugolini (2015), in the '50s, the island's economy was compromised by the rocky and swampy territory which did not allow many economic activities to develop. At the time, only 20% of arable land was cultivated, and 25% of it was used for grazing, with 50% of workers working in the agropastoral sector. Among industrial workers, half of them were employed in zinc and lead mines, which only focused on extraction, as the processing phase of metals was never started on the island. Housing was still an issue, as after the Second World War almost one-third of the population still lived in houses without toilets or running drinking water, in areas that were often not connected by roads (Sechi 2002). Malaria also contributed to the general underdevelopment and was eradicated by the Rockefeller foundation only at the beginning of the 1950s.

This gloomy context was altered not by the development of industries, as had been happening all over Europe, but by the development of tourism, which meant a sharp turn from millennia of rural and pastoral traditions to a different kind of economy. In 1948 the island became an autonomous region with a special statute, and in 1949 the regional government established the department of the Interior and Tourism which focused on bettering road networks and connections with the rest of Italy, together with the accommodation capacity of the island. Subsequently, a new department of Tourism, Transport, and Entertainment was established. It passed a law on credit to the hotel sector (1. reg. 18 march 1964, nr. 8), which allowed the development of new accommodation facilities thanks to economic incentives. The birth of the ESIT (Ente Sardo Industrie Turistiche, Sardinian Institution for Touristic Industries) facilitated the construction of hotels in many areas of the island, not only on the coasts but also inland.

In the 60s, within the *Piano Nazionale di Rinascita* (National Plan of Renewal), the private accommodation sector was subsidized by the government. Only at the end of the '60s did

environmental protection become part of the district's agenda. In those years the process of urbanization of the coasts was just starting thanks to the urban planning law of 1942 which facilitated and simplified new building operations. But only in the '80s the Sardinian Region decided to strongly incorporate environmental protection in their actions with a law of regional parks in 1988 and the introduction of landscape plans (*piani paesaggistici*) which regulated the use of the territory (1. reg. 22 dic. 1989 nr. 45). At the end of the 20th century the Region started moving away from a "seaside monoculture" and begun expanding tourism both when it came to the area, moving inland, the season, moving away from a strictly summertime tourism, and the type, exploring rural tourism, cultural tourism and so on (Ugolini 2015). In the new century, Sardinia worked on its territorial governance by introducing, among other things, the Piano Paesaggistico Regionale of 2006 (Regional landscape plan), also named *Decreto Soru,* taking its name from Renato Soru, the President of the Region at the time, which regulated building operations linked to tourism development with environmental protection in mind (Donato & Mele 2009). The plan aimed at preserving, safeguarding, enhancing, and handing down to future generations the environmental, historical, and cultural identity of the island. It individuated the coasts as a strategic resource for the sustainable development of the area, but integrated management was deemed necessary for that to happen. The plan analyzed environmental, historical, cultural, and settlement characteristics, together with dynamics and risk factors. It divided the territory into 4 levels of decreasing importance, regulating construction based on the area. The plan prohibited the construction of new buildings which was initially set at 300 meters from the coastline and was later updated to 2000 meters.

It is important to note that the seaside was always negatively valued by the Sardinian population, as it was seen as hostile and even dangerous, besides being economically fruitless. The monetary value of the areas nearby the sea was therefore very modest, with estimates of around 100 lire per m2 (Bandinu 1980). Many plots that are currently used for tourism were bought for ridiculously low prices compared to the current monetary profits.

Tourism in Sardinia started in Gallura, a region of the island located in the northeast, where a consortium named Costa Smeralda (emerald coast) bought around 3.500 hectares of land in March of 1962. It initially had 6 members: Karim Āghā Khān, a young Ishmaelite prince, his stepbrother Patrick Guinness, a French lawyer, Felix Bigio, two Polish, Andrè Ardoin e René Podbielski, and a Scottish banker, John Duncan Miller (Trillo 2003). They bought

agricultural land from locals for as little as 2400 lire or €1.2 per m2 in current prices (Bandinu 1980) and began planning a tourism project.

The consortium had strict rules when it came to the building operations and the architecture, which had to blend in with the environment as much as possible. The buildings had a set maximum height, the vegetation could not be removed, it was prohibited to plant alien species, and the architecture had to be rustic, seamlessly incorporating with the surroundings. Thanks to foreign capital and to the previously mentioned law of facilitated loans for the building of accommodations by the Region of Sardinia (1. reg. 8 of 1964), in a matter of a year, the first accommodations were already running. The consortium also contributed to the development of services such as security, fire protection, a clinic, road maintenance, and street lighting, together with sewage systems and garbage collection (Ugolini 2015). Prince Karim Āghā Khān even started an airline (Alisarda, then named Meridiana) to compensate for the lack of connections with the rest of Italy and with other countries.

The consortium inaugurated the Cervo tennis club and the Pevero golf club. In the mid-'70s they opened the Marina di Porto Cervo and the Yacht club, but the consortium eventually began investing in the building of holiday houses, which were often more profitable.

In 1979, the consortium implemented an action plan, named Master plan, that updated the urban planning of the area with the introduction of new buildings, mostly holiday houses, which had strong environmental impacts. The developments of Costa Smeralda worried environmentalists, who were afraid of what had already been happening on many coasts of Italy, namely intensive building near the sea. The consortium proved to be responsive to their worries and began investing in buildings further away from the coast, together with implementing a "proactive management of natural and landscape resources, together with that of the seabed" (Ugoluni 2015: 16).

The municipality of Arzachena, where the Costa Smeralda is located, reduced the buildable volumes from 6 million m3 to less than half, while focusing on hotels rather than holiday houses, in order to make tourism less elitist (Ugolini 2015). The consortium went through a period of financial difficulties and the Prince was forced to give the majority of shares of CIGA (Compagnia Italiana Grandi Alberghi, Italian Big Hotels Company), and of his airline. An American billionaire, Tom Barrack, entered the consortium at the beginning of the century, and between 2004 and 2012 he enacted speculative operations, after which he transferred his shares to the royal family of Qatar (Ugolini 2015). To this day, Smeralda Holding, an Italian corporation, is owned by the Qatar Investment Authority. The consortium has 4 main organs: the assembly of members, the board of directors, the architecture

committee, and the president, currently the lawyer Renzo Persico, and the general manager, currently Massimo Marcialis (Costa Smeralda n.d.).

Costa Smeralda as a touristic project has significantly changed the economy of the island as a whole, not just in Gallura, as the number of tourists increased on all four coasts. In 1950 the island only had 30 hotels and around 175 inns (Giordano 1995) and the number of arrivals was around 72.000 a year. By the 2000s, this number grew 33-fold, skyrocketing to 2.360.000 arrivals and a total of 12.3 million nights spent on the island. The decade between 1960 and 1970 saw a growth of 249% in overnight stays in Sardinia (Battino 2008). It is important to underline that this data only refers to arrivals in official and registered accommodations, therefore not keeping into account tourists who choose to stay in holiday houses, which are usually not registered and whose data on arrivals is therefore not available. Since then, the industry has been growing steadily, with the only setbacks being the economic crisis of 2008 and the pandemic of 2020, although the sector has proved to be resilient in both cases.

The years 2015 to 2019 all experienced a growth in arrivals between 5 and 10% (Osservatiorio Regionale n.d.) with an average number of overnight stays on the island (4.6 nights) that is higher than the national average (3.5 nights) (Regione Autonoma della Sardegna 2018). The island reached 4988 hotels and other accommodations in 2017, with a total of over 210.000 beds. Around 37% of accommodations are localized in Gallura, in the province of Olbia, where Sardinian tourism began, while 21% is found in the area of Cagliari, in the south, and the remaining 41% is shared among the other 6 provinces (Regione Autonoma della Sardegna 2018). According to recent data, accommodations work at full capacity 60 to 70 days a year, most of which are in the months of July and August.

The previous regional government was led by Francesco Pigliaru starting in 2014 and with Barbara Argiolas as councilor of Tourism, Craftsmanship, and Trade. Within the Strategic Plan of Tourism 2017-2022 developed by the Italian Ministry of Heritage and Tourism, the councilor developed a plan titled *Destinazione Sardegna 2018-2021. Piano Strategico di Sviluppo e Marketing Turistico della Sardegna* (Destination Sardinia 2018-2021. Strategic Plan for Touristic Development and Marketing of Sardinia), which established an action program with 6 main objectives: governance, competitiveness, attractiveness, touristic offer, seasonality, and marketing. Starting from data on the trends of tourism in Sardinia, the plan individuated strategic areas to be worked on in the four-year period. It individuated strategic targets such as promising countries and market segments such as families, couples, and

low-cost tourism. The plan was implemented by the DMO (Destination Management Organization), established by the councilor, and involving the Sardinian Region, together with public and private actors.

As for the rest of the world, 2020 was a particularly tough year for tourism in Sardinia, which registered 1.5 million arrivals and 6.3 million nights spent on the island, with a decrease of about 58% compared to 2019 for both categories, and an 80% decrease in overnight stays of foreigners (CRENoS 2022). In 2020 the island had reached a total of 5.652 official accommodations offering 217.000 beds, 50% of which do not classify as hotels. In the same year capacity utilization of accommodations was 10% on average, with a peak in August at 40%. Foreign tourists were 25% of the total, a two-fold decrease compared to 2019. The estimate of the undetectable number of overnight stays in unofficial accommodations by Italian tourists is about 61% (CRENoS 2022).

According to the Sardinian Servizio della Statistica Regionale (Regional Statistics Service), in 2021 the island experienced a 67% increase in arrivals and a 68% increase in overnight stays, with a 140% increase in foreign arrivals and a 42% increase in national arrivals compared to the previous year (2022). Although official statistics for 2022 have not been released by the Sardinian Region, the season was extremely positive for the industry. According to an article published in November on the official website of the Region of Sardinia, the island registered over 7 million arrivals in 2022, with record-breaking figures also in the month of October, thanks to a particularly warm and sunny fall season, registering a 26.12% increase in arrivals by ferry compared to October 2019 and a 5.4% increase compared to October 2021 (2022). The positive trend is encouraging after a time of difficulties such as the pandemic and in a climate of uncertainty such as that created by the war initiated by Russia against Ukraine.

The current PNRR (*Piano Nazionale di Ripresa e Resilienza*, National Plan for Recovery and Resilience) involves a total of €6.68 billion in funds destined for culture and tourism, with a total of €2.4 billion destined for tourism itself (Ministero del Turismo 2021). The goal is that of raising competitiveness and promoting sustainable, innovative, and digital tourism.

The large share of funding destined for tourism suggests the importance the industry has in Italy, and should allow for the development of a type of tourism that is sustainable from an environmental, social, and economic point of view.

1.3 Ecosystem services

1.3.1 What are ecosystem services?

Ecosystem services, or ESs, are "outputs, conditions, or processes of natural systems that directly or indirectly benefit humans or enhance social welfare" (Johnston 2016). The concept of ESs was only introduced in the 1970s when the importance of the environment for social and economic well-being was recognized. As such services are provided by nature for free they had no market and were therefore difficult to quantify and compare to other types of capital, being consequently disregarded.

To be classified as an ecosystem service and to distinguish it from other processes, an ESs must be linked to a specific set of human beneficiaries and access constraints must not prevent people from taking advantage of those benefits (Johnson 2016).

The Millennium Ecosystem Assessment (2009) defines 4 categories of ecosystem services:

1. Supporting services

   All ecosystemic functions that indirectly contribute to human well-being and are the foundation of processes and functions of other ESs. Some examples are soil formation, nutrient cycling, biogeochemical cycles, and habitat formation.

2. Regulating services

   The services which regulate and mediate environmental processes. Some examples are water filtration, purification, pollination, parasite control, and climate regulation.

3. Provisioning services

   The services that humans directly obtain from ecosystems and which combine with built natural capital, human, and social capital to form provisioning. Some examples of such services are food, raw materials, energy, biochemical products, and water.

4. Cultural services

   The non-material benefits provided to humans by nature through cognitive development, aesthetics, education, and leisure. Some examples are spiritual and

religious values, knowledge systems, educational values, inspiration, social relations, sense of place, and tourism.

Classifying and defining ecosystem services is crucial in order to map, measure, and evaluate them. There are multiple types of capital involved in such assessments, therefore demanding a cross-sectoral approach.

The concept of ecosystem services flows is particularly useful when analyzing ESs, as it captures the interactions between humans and nature within a complex system rather than as individual elements (Chalkiadakis, Drakou, & Kraak 2022). Syrbe and Walz (2012) defined them as the spatial and temporal connections between service providing areas (SPA), service benefitting areas (SBA), and service connecting areas (SCA). ESs flows, therefore, indicate the real supply, the movement of value, energy, material, or information that are transferred through human activities. As illustrated by Rova and Pranovi (2017), ESs flows differ depending on how supply (resource systems and units) and demand (actors) interact. They differentiate between "direct flow type", which involves the delivery of services through ecological functions which do not require human intervention (e.g. soil formation), and "mediated flow type", where the resource unit becomes ESs when used through human activities (e.g. fishing).

The World Bank has initiated a partnership program named The Wealth Accounting and the Valuation of Ecosystem Services (WAVES) to calculate the capital and services nature and its ecosystems provide (Atkinson & Obst 2017). It is aimed at promoting sustainable development by ensuring that the value of natural resources is understood and mainstreamed in development planning. Wealth accounting measures manufactured capital, human, social and institutional capital, and natural capital, in order to give a comprehensive picture of a country's wealth. As many services provided by nature are invisible to the human eye, they are easily taken for granted, therefore natural capital accounting can help provide detailed information to better manage resources and generate sustainable economic growth (Atkinson & Obst 2017).

The Economics of Ecosystems & Biodiversity (TEEB) project is a global initiative focused on "making nature's values visible" (2022). Through Natural Capital Accounting (NCA) they aim to mainstream the economic value of natural resources into decision-making processes at all levels worldwide. GDP has been found to be lacking many details needed to have a clear

picture of a country's wealth. As noted by Nobel Laureate Joseph Stiglitz (TEEB 2022), if a private company is evaluated both through its income and balance sheet, why should a country not be evaluated in the same way? GDP does not take natural capital into account, therefore giving misleading information about the economic performance and general well-being of a country. In 2012 the UN Statistical Commission adopted the System for Environmental and Economic Accounts (SEEA), which lead to "an internationally agreed method to account for material natural resources like minerals, timber, and fisheries" (WAVES 2015: 1).

Assessing the total value of ecosystem services around the world is no easy endeavor. As ESs intertwine with other elements such as human and material capital, it is particularly difficult to isolate their value from that of other assets. In 1997 a group of scientists attempted to estimate the total value of ecosystem services and natural capital worldwide. The value was estimated to be between US$16 and 54 trillion per year, with an average of US$33 trillion, which represented 1.8 times the global gross national product at that time. Due to the uncertainties surrounding this calculation, this value has to be considered a minimum estimate (Costanza et al. 1997). More recent studies on regulating ecosystem services only have estimated their value at US$29 trillion in 2015 (Balasubramanian 2019). As natural capital becomes depleted and ecosystem services become more stressed this value is expected to increase.

1.3.2 Ecosystem services in Sardinia

As mentioned, Sardinia is rich in ecosystems. As it is an island, it presents many variations from north to south, with a multitude of different biomes. There are plains, mountains, caves, forests, coasts, natural and artificial lakes, waterfalls, highlands, salt marshes, lagoons, rivers, and even biomes similar to deserts. The island is one of the few places in Europe where a diversified and modern economy coexists with a relatively pristine environment, mainly due to the low population density. The island is characterized by 575.000 hectares of protected natural areas, with 5 protected marine areas, 3 national parks, 4 regional parks, and 3 WWF oases (Regione Autonoma della Sardegna 2018).

Plains such as that of the Medio Campidano, in the southwest, are very fertile and are intensively cultivated with wheat, artichoke, and vineyards. The area provides multiple

services such as fertile soil for food production, water filtration, carbon sequestration, and cultural heritage.

The highest mountain on the island is named Punta la Marmora (1.834 meters) and it provides a habitat for a multitude of species, together with aesthetic values and tourism.

Forests such as that of Is Cannoneris, in the south, near the municipality of Pula, provide climate regulation services, education, and recreation, among others.

The four coasts are mostly known for their cultural ecosystem services such as that of tourism, but other ESs are often disregarded. The ocean contributes to pollution control and climate regulation, and it also provides food in the form of fish, which has always been a big part of the Sardinian diet.

As Sardinia did not go through an ice age, it only has one natural lake, named lake Baratz, in the northern part of the island. All other lakes have been formed artificially through dams in order to store water for seasons of drought which often affect the island. The most important artificial lake is lake Omodeo, in the province of Oristano, which has been recognized to be relevant from an environmental and landscape point of view. Overall, both natural and artificial lakes provide the island with water, they are habitats to many species, and they represent areas for recreation. The dams are also used to produce hydroelectric power.

Although the island only has one natural lake, it is characterized by a variety of ponds, lagoons, and wetlands, especially in coastal areas. Some examples are the Santa Gilla lagoon near Cagliari, the Mistras lagoon near Oristano, and the San Teodoro pond in the northeast. Such environments are home to many species such as the pink flamingo and the Audouin's gull. They are also used for recreational and commercial fishing.

The island has three main rivers, Tirso, Flumendosa, and Coghinas, which are all over 100km long, the longest being the Tirso, with 152km, and which are all torrential, and therefore characterized by the inconsistency of water flow throughout the year. As previously mentioned, they are dammed to form artificial lakes for water storage and to produce hydroelectric power. The only navigable river is the Temo, but all other rivers provide fresh water, climate regulation, and cultural services such as aesthetic values.

Wetlands have always been subject to criticism on the island, as they were perceived to be unhealthy and useless places that could not be cultivated and where malaria thrived. During the fascist regime, many areas of the island were reclaimed (most notably the area of Arborea, in the west, in the province of Oristano). Once malaria was eradicated and the regime came to an end, wetlands regained a better reputation and they are currently protected under the Ramsar convention of 1962 (Colomo 2007). Wetlands are essential ecosystems

because they are habitats to many species of birds and fish, they constitute a great form of coastal protection, as well as storing carbon.

Sardinia even has what is often called a desert, considered the biggest one in Europe. It is located on the west coast, in the municipality of Arbus. The desert of Piscinas, or Dunes of Piscinas, with its 28km2, is characterized by white sand dunes that reach up to 100 meters in height and overlook the sea. The dunes are a habitat for species such as the Sardinian deer and sea turtles, but also many trees and bushes. Before the 1950s, another ecosystem similar to a desert, named Is Arenas, was present on the island, in the Sinis peninsula, and extended for about 700 ha. In the '50s the area was subject to reforestation in order to prevent sand to be moved by the strong winds that characterize the area, which would have led to an expansion of the desert, disrupting agricultural activities nearby.

From this brief description, it is clear that Sardinia is rich in ecosystems which not only contribute to the quality of life on the island but are also relevant both for the industry of tourism and for environmental education efforts.

1.4 General considerations and disclaimers

I encountered many difficulties throughout the research process, especially when it came to gathering general data on the Sardinian economy, the monetary value of tourism, and ecosystem services in Sardinia. There is a general lack of relevant documentation on the island, which added another layer of complexity to the work.

As the virtual infrastructure is still flawed, many official websites are missing whole sections or do not work properly, complicating the process of retrieving official information from the relevant institutions.

Data on tourism in Sardinia in the year 2022 will probably be released around mid-2023, therefore making it challenging to include precise information on that year in this thesis. While the previous administration and directorate for tourism presented a strategic plan for the period 2018-2021, the current regional administration has not been providing clear information about their actions and plans until the end of their mandate, making it therefore hard to include precise details on where tourism might be headed.

I have no previous experience in the field of tourism but have lived in Sardinia for most of my life. I therefore also rely on my experience as a local, but much of the information presented in this thesis is the result of interviews with tourists and businesses operating in the

area, which have given me a chance to have a clearer picture of the industry from different perspectives.

1.5 Thesis statement

The main aims of this thesis are:

1) Understanding whether tourism can be more focused on ecosystem services and environmental education;

2) Evaluating knowledge of and interest in ecosystem services from the perspective of tourists and tourism operators;

3) Individuating the main stakeholders in Sardinian tourism in order to understand impacts of and influences on the industry;

4) Spatially evaluating ESs in Sardinia through GIS in order to evaluate proportions of natural and urbanized areas and to compare the coasts with inland areas.

2. Methodology and materials

2.1 Land use

In order to better understand how land is characterized and used in Sardinia, an analysis of land use was conducted through the open-source software QGIS, which visualizes, manages, modifies, and personalizes geodata. The analysis aimed to understand whether there is a significant spatial difference between inland areas and the coasts linked to land cover.

The area of study was the whole island of Sardinia and the data utilized was retrieved from the website of the European program Copernicus, which provides data on land cover and land use in an inventory named Corine Land Cover (CLC) which is updated every 4 years. The years taken into account were 2000 and 2018, in order to investigate whether there have been significant changes throughout the years. The Corine Land Cover inventory divides land use into 5 main levels, with different sublevels. Main class 1 indicates artificial areas, main class 2 indicates agricultural areas, main class 3 indicates forests and semi-natural areas, main class 4 indicates wetlands, and main class 5 indicates water bodies. The analysis focused on these 5 classes aggregating the sublevels. To create the indexes, all areas that were classified as CLC 1 and 2 were considered "artificial areas", while all other levels (CLC 3-4-5) were considered "natural areas". The land cover of natural categories was compared to the total area through the following formula:

$$NT = \frac{natural\ areas\ (cl\ 3,4,5)}{total\ area}$$

$$AN = \frac{artificial\ areas}{natural\ ares\ (cl\ 3,4,5)}$$

The data were used to calculate, through QGIS, the land cover of each class both in 2000 and in 2018, together with calculating the LCF (Land Change Flow) in order to better individuate affected by land use changes through time.

The areas analyzed with CLC and LCF for both 2000 and 2018 were:

- Sardinia as a whole
- the area within 2km from the coast
- the area within 10km from the coast

- Sardinia as a whole minus a 2km buffer from the coast
- Sardinia as a whole minus a 10km buffer from the coast

2.2 Cala Bernardini and Mari Ermi

The collection of data from tourists was focused on two main areas with different characteristics. One area, Cala Bernardini, is located in the south and is represented by a small beach often visited by locals and not provided with any services. On the other hand, another beach on the west coast named Mari Ermi is more spacious and particularly famous for its quartz sand and offers parking, restaurants, and showers. As with almost every beach on the island, both Cala Bernardini and Mari Ermi are free to access. The two areas were selected as they represent two different scales of tourism as well as different natural environments while still maintaining some elements of contact, allowing them to be compared.

2.2.1 Description of the area: Cala Bernardini

Cala Bernardini is a small beach located in the south of Sardinia, in the municipality of Pula, in the province of Cagliari, and near the beach of Santa Margherita di Pula and that of Chia. On the hill nearby the beach, a small residential area named Pinus Village was built at the end of the 1970s. The beach is approximately 100 meters long and 25 meters wide and characterized by fine white sand. The water is clear and blue, and the seabed becomes gradually deeper. The beach is surrounded by red rocks, pine trees, and bushes typical of the Mediterranean scrub. As the beach is relatively small, it is often crowded in July and August, but it is usually spacious during June and September, and nearly empty during the rest of the year. It is often attended by families with children, couples, and elderly people. A restaurant was located a few meters from the beach and was the only service available in the area. In recent years the restaurant has been closed and dismantled due to non-compliance with the law, and the beach now lacks services such as toilets.

2.2.2 Description of the area: Mari Ermi

Mari Ermi is a beach located on the west coast of the island, in the gulf of Oristano and the Sinis marine area. It is near other beaches such as Is Arutas and S'Arena Scoada. It is 2.5 kilometers long and it is characterized by quartz sand that resembles the looks of white rice,

which gives the water a bright blue color. It is part of the protected marine area "Penisola del Sinis - Isola di Mal di Ventre" or Malu Entu (bad wind), in Sardinian, to indicate the sudden changes in the weather that have always characterized the area, which often experiences strong mistral winds. It is surrounded by colorful rocks, Mediterranean scrub, and a pond that serves as a habitat for many species of birds, such as the pink flamingo. As the beach is long and wide, it is rare for it to be extremely crowded but, like many other beaches on the island, it is very busy in the months of July and August. It is attended by families with children and people who enjoy sports such as kite surfing or windsurfing. There are both free and paid parking spots in the area, together with two restaurants. There are also boardwalks to get to the beach and showers to avoid accidental removal of sand. As the sand in the area is aesthetically pleasing, it is often subject to theft by tourists. It is very common for authorities at the main airports and ports on the island to find bags of such sand in passengers' luggage (Rai News 2021). Sardinia has strict laws when it comes to the theft of sand, with fines going from €500 to €3.000 (Legge Regionale n° 16 of 28/07/2017, article 40, paragraph 2). There are many signs, both on the beach of Mari Ermi and many other beaches on the islands, stating that it is illegal to remove sand from the beach (Fig. 1). As will be explored later on, Mari Ermi is also a protected area for the Kentish plover.

Fig. 2: Sign on Mari Ermi beach stating that it is illegal to remove sand from the shore, photo taken by the author

2.2.3 Data collection

The data has been collected through the use of surveys on Google Modules (see Annex I). The surveys were developed in the month of July 2022 and were created in Italian and in English. The surveys were developed in order to understand the main elements of appeal of Sardinia, the knowledge of tourists of human-nature relations, and the concept of ecosystem services, together with their willingness to learn more about ESs and their preferred learning method during their stay on the island. The surveys were administered through direct interviews on the two beaches during the months of August and September 2022 with a total of 129 answers. Only 2 people, a French couple, refused to respond to the survey, probably because they were afraid I was a vendor, as they did not speak English very well. When approaching the tourists on the two beaches, I always asked them whether they preferred answering the questions on their own at home by scanning a QR code, or whether they would rather do a guided interview with me. Only 2 people preferred that I send them the QR code, and I, therefore, cannot know whether they actually filled it in. All other respondents asked me to fill in the questionnaire with me. While they answered the questions, I took notes in a notebook, as it often happened that I interviewed groups of up to 8 people at the same time, and it would have been difficult to submit a separate survey on Google Modules for each person during the interviewing process. I color-coded the answers in order to be able to recognize whom they belonged to and to group them together. After each interviewing session at the beach, I submitted the answers as individual surveys on Google Modules. The interviews were conducted in Italian with Italian speakers, and in English with foreigners.

Although some were skeptical when I approached them, I made sure to always underline that I was conducting research for my final thesis at Ca' Foscari University. After this specification, most respondents were willing to help me, showed enthusiasm towards the research overall, and answered the questions carefully. As many of them had a deep connection with the island, either directly or indirectly, they liked talking about how it was in the past and what they wish it will become in the future. Most interviews were around 30 minutes long, but it was not uncommon for me to talk to the same group for over an hour, which is indicative of their interest in the topic. After the end of the interview, most of the respondents actively asked me to tell them about ecosystem services, as they were curious whether they had chosen the right definition. I, therefore, gave them a brief overview of what ESs are and gave them some everyday examples, focusing on coastal ecosystem services, as we were at the beach and it was easier for them to visualize and understand them.

All questions in the survey were close-ended (multiple choice and linear scale). To begin, the questionnaires included questions on general information about the tourist, such as their country of origin, their age, the chosen mode of transportation to arrive on the island, whom they traveled with, and whether it was their first time in Sardinia. The second part of the survey was dedicated to questions about the elements that attracted them to the island, asking them to rate factors such as the presence of beaches, the quality of the waters, services, the availability of excursions and guided tours, and the presence of pristine nature on a scale from 1 to 4, together with asking them to select what made their stay ideal from a list of four elements (clean beaches and sea, services, accessibility, and contact with nature). They were asked whether they knew what the environmental impact of their stay on the island was, together with how much human life depends on nature on a scale from 1 to 4 in their opinion. The third part of the survey was dedicated to ecosystem services. Tourists were asked whether they had ever heard of ecosystem services. They were then given three options to choose from for the definition of ESs. They were asked if they were interested in knowing more about ESs and were given five options to choose from to indicate how they would like to learn more about ecosystem services during their stay. To conclude, they were asked to what extent, on a scale from 1 to 5, they were interested in participating in activities focused on ESs.

The main aims of the surveys were:
- understanding general knowledge of ecosystem services among tourists;
- understanding the potential of tourism in Sardinia to contribute to environmental education on ecosystem services;
- understanding tourists' willingness to participate to environmental education activities during their stay on the island;
- investigating the role of nature in tourists' choices;
- investigating whether tourists in Sardinia are ready for a shift towards slower tourism.

2.2.4 Data analysis

The data were analyzed through the use of Google Sheets. As the surveys included questions with multiple choices, the answers were standardized in order to better categorize and analyze them. The samples were analyzed separately because there emerged to be significant differences in the place of origin of tourists in the two areas, together with their rate of return

to the island and their knowledge of ecosystem services and their definition. All data were transformed into pie charts, column charts, and bar charts. The two samples were then compared as shown in chapter 3.

2.3 Tourism businesses

Businesses to be engaged in the research were identified by combining the results of the survey administered to tourists with purposive sampling. An initial list of businesses was suggested by tourists. The list was then employed to select businesses that may be interviewed, based on their relevance to this research and their willingness to participate. The list was plugged into a spreadsheet (Google Sheets) and the table obtained summarized the names, where the businesses operate, their website, their contact information, and a brief description of what they do.

The table was color-coded in order to better organize the interviewing process. Yellow represented accommodations, blue represented tour operators, green represents CEAS and other environmental education centers, red represented platforms for social and economic development, and purple represented businesses that did not mention environmental sustainability at all on their websites. The list kept on being updated throughout the interviewing process, as many operators suggested that I got in contact with other companies, therefore generating a snowball effect that allowed me to discover more businesses. I reached out to all businesses through an email, briefly explaining the aim of my research and asking whether they would be available to participate in a brief interview. After the first email only a handful of businesses responded giving me their availability. I, therefore, sent the same email again, reaching a total of 9 responses out of the 16 businesses I initially contacted. I started the interviews and added to the table any other interesting businesses that came out in conversation. One of the businesses I was put in contact with, Eager srl, and his founder Paolo Costa, put me in touch with the rest of the businesses I interviewed, introducing them to my work before asking them for their availability to help me. After he got in contact with them and got their approval, I contacted them via email or phone call. Some did not respond to my emails or calls, but I managed to interview 5 of them. As for the other businesses present on the list, those who have not been contacted were not deemed relevant for the research but were kept in the list as backup.

2.3.1 Description of businesses

A total of 14 businesses were involved in the data collection. Four are accommodations (hotels, b&bs, hostels), three are environmental education centers (CEAS or similar), five are tour operators that organize excursions, hikes, diving, workshops, etc., and two are networks that group and coordinate several different businesses. The majority of the businesses are vocally committed to carrying forward a philosophy of sustainable tourism for both the natural environment and its residents. Most businesses (9) worked near the coasts, therefore having experience with seaside tourism, while other businesses worked inland.

As the majority of interviews were carried out through phone or video calls, I was presented with the challenge of being brief while presenting the research in a complete and interesting manner. All 14 businesses listened carefully to my brief overview and responded to my questions in depth. The average length of each interview was around 1 hour, with many reaching over 1.30 hours, therefore being packed with information. Many of the respondents were happy to tell me the whole story of their business and what their aims, dreams, and concerns are, and they seemed enthusiastic about the research project. Many asked to see the final work once completed. They came off as very interested in the topic and seemed to believe that the research could be beneficial for the future of tourism in Sardinia.

The table 1 below summarizes the information on the businesses I interviewed. In this table, yellow represents accommodations, blue represents tour operators, green represents CEAS and other environmental education centers, and red represents platforms for social and economic development.

Name	Location	Website	Email	Short description
La fattoria delle tartarughe	Sinnai	http://www.lafattoriadelletartarughe.it/	info@lafattoriadelletartarughe.it	Accommodation, sustainable tourism project, respect for nature and for others. They offer vacations in nature and surrounded by animals.
Antica Locanda Lunetta	Mandas	https://www.anticalocandalunetta.it/	info@anticalocandalunetta.it	Accommodation facility from the 1600s managed by a family in a responsible way.
Aquae Sinis	Cabras	https://aquaesinis.it/	info@aquaesinis.it	Multi-building hotel offering cooking lessons, services for cyclists (bike hotel), typical dinners and excursions to discover the Sinis area.
Muma hostel	Sant'Antioco	https://www.mumahostel.it/	booking@mumahostel.it alessandra66.at	Accommodation near the sea that also deals with environmental education (CEAS).

			@gmail.com	
CEAS (Centro di Educazione Ambientale e alla Sostenibilità) Laguna di Nora	Nora		Modulo sito web	Environmental education centre for schools and private individuals. Theme tours, experiences and events on the lagoon. Guided tours, canoeing, snorkeling.
MareTerra Group	Alghero	https://www.mareterragroup.net/	mareterra.group@gmail.com	ProgettoNatura sea excursions for dolphin watching and guided snorkeling, certified mark and environmental education activities on board. Support for scientific research. NaturAlghero shore excursions, acheological tours, off-road, trekking, birdwatching, food and wine. Philosophy of ecotourism.
Alea Ambiente & Ricerca	Cabras	https://www.aleambiente.it/	info@aleambiente.it	Cooperative society that organizes excursions in the perspective of research-action as a result of the participation of all the parties involved in a project.
Bitan Daily Tours	Domus de Maria	https://www.bitan.it/it/	info@bitan.it	Cooperative that organizes activities of sustainable experiential tourism and excursions of various kinds in the southwest of Sardinia.
Upside down Sardinia Mauro Ecca Guida ambientale escursionistica	Cagliari		mauro.ecca@gmail.com	Underwater instructor and environmental hiking guide, AIGAE Guide and Asinara National Park Guide. Several experiences in the field of Environmental Engineering, waste sector. Experiences in the public field, regional council of Sardinia and directorate for the environment.
Lollovers Simone Ciferni	Lollove	https://lollovers.it/chi-siamo/	info@lollovers.com	Village experiences with direct contribution of its inhabitants, digital detox destination, organization of events, walks, educational workshops.
Sardinia Slow Experience	Posada	https://www.sardiniaslowexperience.com/it/guide-turistiche-sardegna/#contatti	info@SardiniaSlowExperience.com	Environmental guides who organize tours in small groups outside the classic tourist routes, respecting the environment. Excursions, cooking classes, culinary experiences, hiking...
Prima Sardegna	Dorgali	https://www.primasardegna.com/chi-	info@primasardegna.com	Tourist services company, they offer guided and autonomous excursions with kayak, sup, free climbing, mountainbike

		siamo/		etc. They do not mention the issue of sustainability.
Sardinia Spop Tourism (Sabrina Tomasi)	Centro Sardegna	https://www.sardiniaspoptourism.it/en/	info@sardiniaspoptourism.it	Project to communicate plurality of cultural identities that make up Sardinia, led by a group of women. It unites businesses against depopulation of the island
Rete Ecoturismo Sardegna		https://retecoturismosardegna.com/	info@retecoturismosardegna.com	Platform that brings together tour operators, accommodations, hiking guides, museums, archaeological sites and organizers of activities and experiences. Promotion of a varied and sustainable tourist offer.

Table 1: summary of the 14 businesses interviewed with brief description.

2.3.2 Data collection

The collection aimed at reaching a balance in the different types of businesses (accommodations, environmental education centers, tour operators, networks). The businesses selected for the interviews are mostly located in the areas near Cala Bernardini and Mari Ermi, while others are located in different areas of Sardinia but were still deemed interesting for the final work. The data was collected through in-person, phone, and video interviews in November and December 2022 through the use of structured questions that were later submitted as a survey on Google Modules by the interviewer. As the interviews were often very long, I only reported a short summary in the module, as it was easier to compare them in the phase of data analysis. To begin, I presented myself and briefly introduced them to the research I was conducting, touching on what the degree in Environmental Humanities is and what it aims at. The interview was structured into three main sections. The first section focused on general information about the business. The respondents were asked to briefly summarize what they do and how they came to do it, what their mission is, what type of tourists are interested in their tourism offer, who would be the ideal tourist for their business, and who would be the ideal tourist for Sardinia. They were also asked how much they felt supported by the institutions in Sardinia on a scale from 1 to 5, and what they believed to be critical issues in the tourism industry on the island. In the second part of the interview, the respondents were asked to rate from 1 to 4 several attractiveness factors, which were the same ones tourists were presented with (the presence of beaches, the quality of the waters, services, the availability of excursions and guided tours,

warm climate, and the presence of pristine nature). They were then asked what attractiveness factors characterized the area where they work. The final section was focused on ecosystem services. In this section, I made sure not to assume whether the respondents knew of ecosystem services or not, therefore asking the same questions even to the respondents whom I knew dealt with ESss in their work. The respondents were asked whether they had ever heard of them and they were given the same three options to choose from that tourists were presented with for ESss definitions. They were asked whether they thought that ecosystem services have the potential to be considered attractiveness factors on the island, how much tourism can contribute to environmental education about climate change and ecosystem services on a scale from 1 to 5, and whether they thought that tourists are ready for a slower, more sustainable way of doing tourism.

2.3.3 Data analysis

The data were analyzed through the use of Google Sheets. As the interviews were often long and rich in content, it was difficult to standardize all the answers. It was therefore challenging to transform all the data into graphs and analyze it in a standardized manner. Many of the considerations in the analysis of results will thus be qualitative rather than quantitative.

2.4 Stakeholder analysis

The stakeholder analysis was aimed at understanding who the leading players are when it comes to tourism in Sardinia. Stakeholder analyses are usually conducted with the help of experts in the industry who are enrolled in a two-stage Delphi survey (Hsu and Sandford, 2007) with standardized questions developed by Mason and Mitroff (1981) and adapted by Brombal et al. (2018: p. 56) which are reported as follows:

(a) Who have clear roles in the situation?
(b) Who have relevant policy responsibilities?
(c) Who take part in project/program activities?
(d) Who influences opinions about the issues involved?
(e) Who fall in social groups affected by the problem?
(f) Who live in areas adjacent to the situation?
(g) Who are the sources of discontent to what is going on?
(h) Who do you think others regard as 'important' actors'?

As the two-stage survey is time-consuming, the analysis was conducted through online research and utilizing the information gathered during interviews with businesses and tourists throughout the research phase, therefore employing key informants. I added some stakeholders, such as the Italian State and Legambiente, although they were not mentioned in the interviews, because of their self-evident importance on the issue. The Italian State provides funding to be destined for tourism, besides giving guidelines and developing policies that regulate it. Legambiente, on the other hand, has been present in Italy for many years through its advocacy and activism and has offered courses on sustainable tourism.

The stakeholders were analyzed based on the impact the issue has on them and on the influence each stakeholder has on the issue on a scale from 1 being "low" to 5 being "high". It is important to note that impact and influence are not used with a specific connotation, and can therefore identify both positive and negative aspects, which are further developed in the discussion of results. The analysis encompasses stakeholders within tourism in Sardinia in general, with the exception of the Kentish plover, which has been selected as a stakeholder in the area of Mari Ermi, and the Posidonia oceanica, which has been chosen as a stakeholder in the area of Mari Ermi.

Before organizing them in a table, the stakeholders were analyzed on a graph where the y axes represented the influence the stakeholders have on the issue, while the x-axis represented the impact the issue has on the stakeholders (fig. 2). Throughout the analysis, the impact is defined based on whether it is direct or indirect. The stakeholders were color-coded in order to individuate any patterns. In the original graph and in the summarizing table in the next chapter, yellow represents government agencies, green represents NGOs, light blue represents private entities, orange represents locals, purple represents other non-governmental entities, and pink represents habitats and ecosystems.
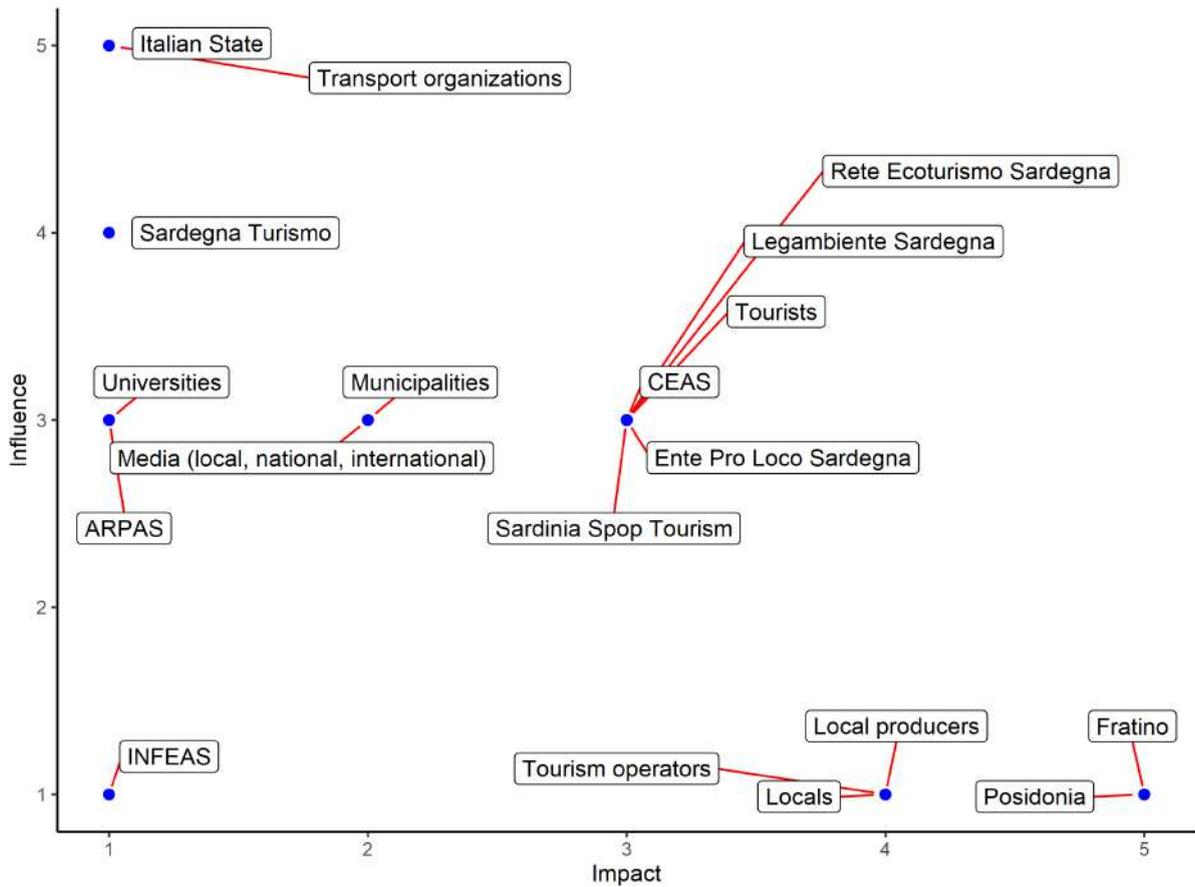
Figure 3: Impact on and influence of stakeholders involved in tourism in Sardinia

Besides the impact of the issue on the stakeholders and their influence on it, other key questions used for the analysis were: "what type of impact does the issue have on the stakeholder?", "what is important to the stakeholder?", "what is their role?", "how does the stakeholder contribute to tourism?", "who is regarded as important by others?", and "who are the sources of discontent?". The stakeholders and their information were then plugged into a Google sheet file to create a summarizing table which is presented in the next chapter.

3. Results

3.1 Land use

Although there are no significant changes between the year 2000 and the year 2018, a spatial analysis reveals interesting differences between the five areas considered. When considering only the year 2018, coastal areas are clearly more urbanized than inland areas, with the coastal buffer of 2km being the most urbanized, with 11,4% of the area being classified as artificial. The coastal buffer of 10km is more urbanized than the average, but only 7,3% is classified as artificial areas. When looking at Sardinia as a whole, it is clear that the island is dominated by natural areas (49,6%), followed by agricultural areas (46,4%). Only a very small percentage of the island (3%) is classified as an artificial area. The coastal buffer of 10km is the area that is most rich in natural areas, with 62% being classified as class 3 (forests and semi-natural areas). Although it is more urbanized, the coastal buffer of 2km preserves a high percentage of natural areas, with 47,4% being classified as class 3.

3.1.1 Corine Land Cover 2000 and 2018

Sardinia (whole)
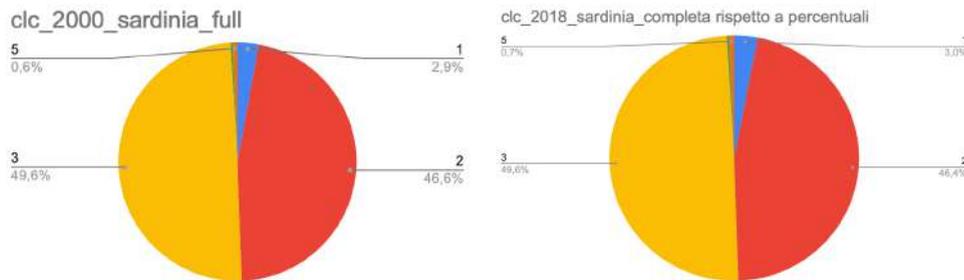
Figure 4: Corine Land Cover data on Sardinia as a whole for the years 2000 and 2018

There have been no significant changes in the land cover of the island between 2000 and 2018.

Buffer coasts (10km)
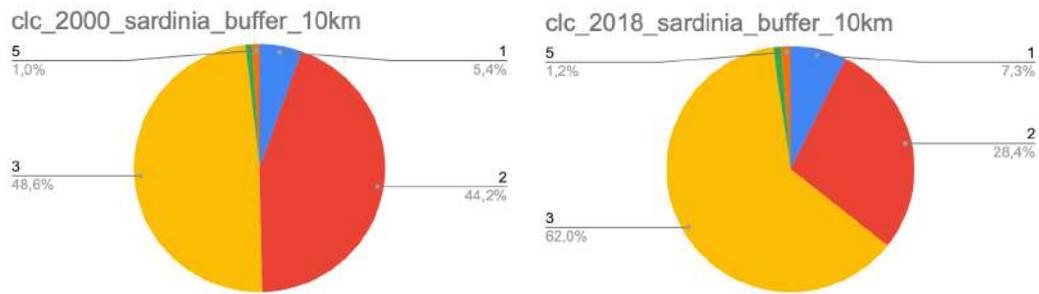
Figure 5: Corine Land Cover data of the coastal buffer of 10km for 2000 an 2018

There was a 1,9% rise in artificial areas, a 15% decrease in agricultural areas, and a 13,4% increase in forests and semi-natural areas in the 10 km coastal buffer.

Inland area minus 10km buffer
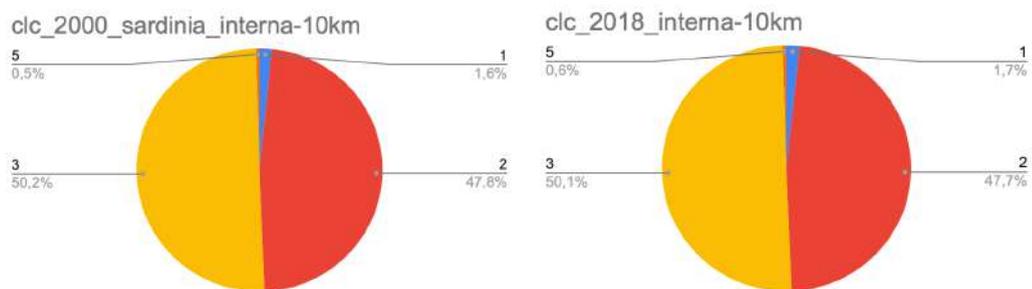
Figure 6: Corine Land Cover data of the inland area minus the 10km coastal buffer for 2000 and 2018

There were no significant changes in land use in the inland area minus the 10km buffer.

Buffer coasts (2km)
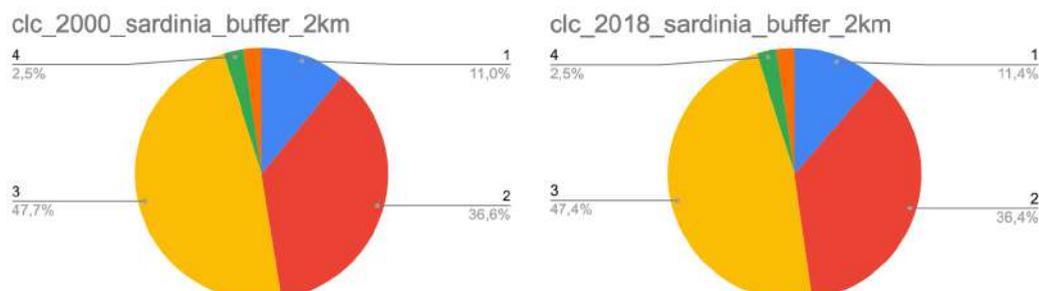
Figure 7: Corine Land Cover data of the coastal buffer of 2km for 2000 and 2018

There was a 0,4% rise in class 1 (artificial areas) between 2000 and 2018.

Inland area minus 2km buffer
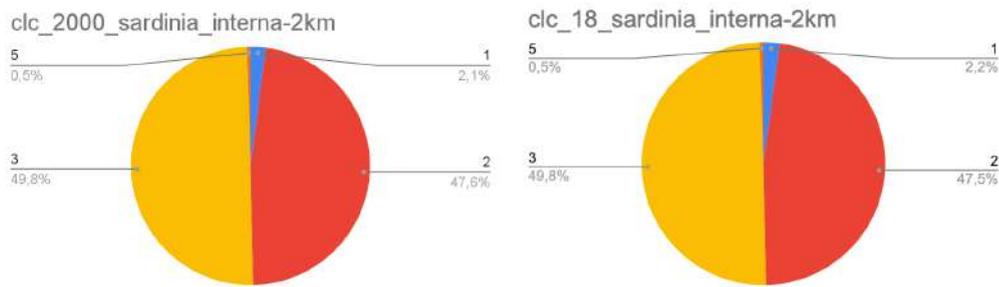
Figure 8: Corine Land Cover data of the inland area minus the 2km coastal buffer for 2000 and 2018

There was no significant difference in land use in the inland area minus the 2km coastal buffer.

3.1.2 Comparison of inland areas and buffers

Inland area minus 2km and buffer (2km)
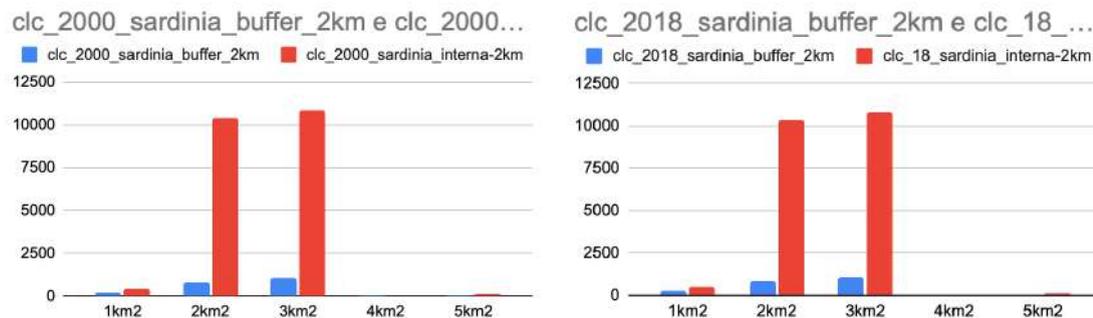
Figure 9: Comparison of CLC data of the inland area minus the 2km buffer and the 2km buffer for 2000 and 2018

In the buffer of 2km there are drastically fewer agricultural areas and forests and semi-natural land in both years.

Inland area and buffer (10km)
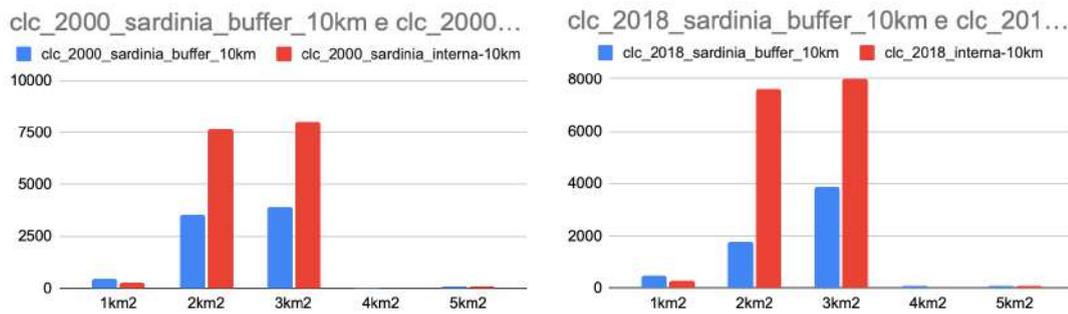
Figure 10: Comparison of CLC data of the inland area minus the 10km buffer and the 10km buffer for 2000 and 2018

The buffer of 10km is more urbanized in both years. Both in the buffer and inland there are fewer agricultural areas and more forest and semi-natural areas in both 2000 and 2018.

3.1.3 Land cover flow

The following tables illustrate land cover flow (as to say, changes in the land cover classes) between 2000 and 2018. The highlighted cells represent significant changes in land cover. Cells colored in red represent changes from natural classes (3-4-5) to artificial classes (1-2). Cells colored in yellow represent changes within natural classes, but from a higher class to a lower one. Cells colored in green represent no changes within natural classes or changes for the better, meaning from a lower class to a higher one.

Sardinia (whole)

2000	2018	Sardinia (total island extension)
from class	to class	changed area (km2)
agricultural	artificial	25,7
forested	artificial	11,42
forested	agricultural	12,52
forested	forested (other types)	349,07
agricultural	natural classes	17,59

Table 2: land cover flow data of Sardinia as a whole from 2000 to 2018

25,7 km2 have changed from agricultural to artificial land. 11,42 km2 have shifted from forested areas to artificial land, for a total change of around 37 km2 changing from natural or semi-natural to artificial from 2000 to 2018.

12,52 km2 have changed from forested areas to agricultural land, while 349,07 km2 of forested land have changed to other subcategories of class 3 from 2000 to 2018.

Buffer coasts (2km)

2000	2018	coastal area (2 km width)
from class	to class	changed area (km2)
agricultural	artificial	3,72
forested	artificial	2
forested	forested (other types)	24,74

Table 3: land cover flow data of the 2km coastal buffer from 2000 to 2018

3,72 km2 have changed from agricultural to artificial land. 2 km2 have changed from forested to artificial land, for a total of 5,79 km2. 24,72 km2 have changed from forested areas to other subcategories of class 3. The index on coastal areas shows that the most relevant changes have taken place in this buffer, especially in areas that are highly touristic. The coastal area 2km away from the coast went from 52,5% of natural areas in 2000 to 52,2% in 2018.

Inland area minus 2km buffer

2000	2018	inner area (2 km away from the coast)
from class	to class	changed area (km2)
agricultural	artificial	21,38
forested	agricultural	10,52
forested	artificial	6,88
forested	forested (other types)	324,33
agricultural	forested	11,29

Table 4: land cover flow data of the inland area minus the 2km coastal buffer from 2000 to 2018

21,38 km2 have changed from agricultural to artificial areas and 6,88 km2 have changed from forested to artificial areas, for a total of 28,26 km2. 10,52 km2 have changed from forested areas to agricultural land. 324,33 km2 have changed from forested areas to other subcategories of class 3 and 11,29 km2 have changed from agricultural to forested areas.

Buffer coasts (10km)

2000	2018	coastal area (10 km width)
from class	to class	changed area (km2)
agricultural	artificial	14,47
forested	agricultural	96,33
forested	artificial	4,84
40 hectares have been affected by fire and changed in burnt areas		
water bodies	wetlands	140,49
agricultural	forested	4,43

Table 5: land cover flow data of the 10km coastal buffer from 2000 to 2018

14,47 km2 have changed from agricultural to artificial land, and 4,84 km2 have changed from forested to artificial land, 96,33 km2 have been changed from forested areas to agricultural land, for a total of 115,64 km2. 40 hectares of forested area have been affected by wildfires, therefore changing to burnt areas., and 140,49 km2 have changed from water bodies to wetlands. 4,43 km2 have changed from agricultural areas to forested land.

Sardinia_interna-10km

2000	2018	inner area (10 km away from the coast)
from class	to class	changed area (km2)
agricultural	artificial	11,23
forested	artificial (1-2)	11,35
forested	forested	252,74
argricultural	natural	13,16

Table 6: land cover flow data of the inland area minus the 10km coastal buffer from 2000 to 2018

11,23 km2 have changed from agricultural land to artificial areas, and 11,35 km2 have changed from forested areas to artificial areas, for a total of 22,58 km2. 13,16 km2 have changed from agricultural land to natural areas and 252,74 km2 changed from forested areas to other subcategories of class 3.

3.2 Tourists

The results of the surveys conducted at Cala Bernardini and Mari Ermi beach are reported in this chapter. The graph on the left always refers to the sample of Cala Bernardini, while the graph on the right always refers to the one of Mari Ermi.

Place of origin
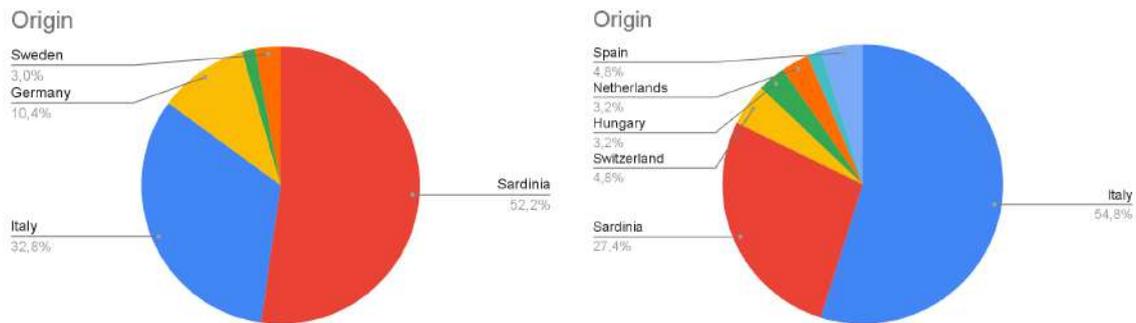
Figure 11: Place of origin of respondents

While most of the respondents at Cala Bernardini beach were from Sardinia (52%), the majority of respondents at Mari Ermi beach is represented by tourists coming from other areas of Italy (55%), and only 27% were Sardinian. The percentage of foreigners is comparable, with 15% in Cala Bernardini and 17% in Mari Ermi.

Age
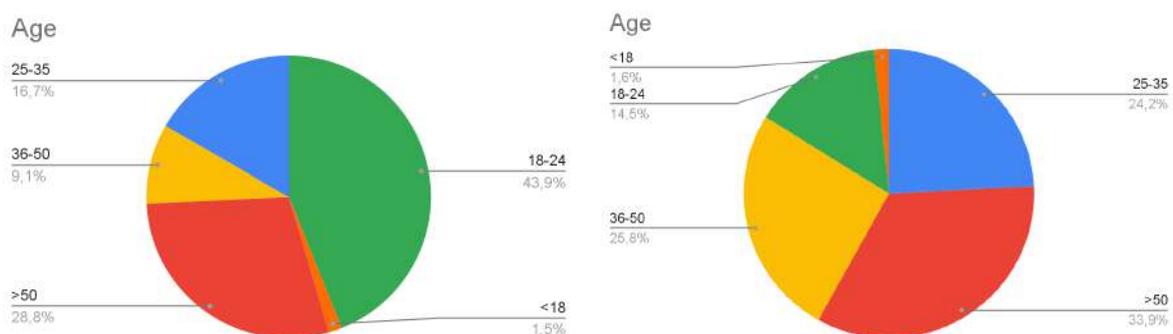
Figure 12: Age of respondents

In Cala Bernardini most of the respondents (44%) were between the ages of 18 and 25, while in Mari Ermi the prevailing age group was the one over 50 years old (34%). The average age in Cala Bernardini was therefore much lower.

## How did you arrive on the island? (Only answer if you are not from Sardinia)
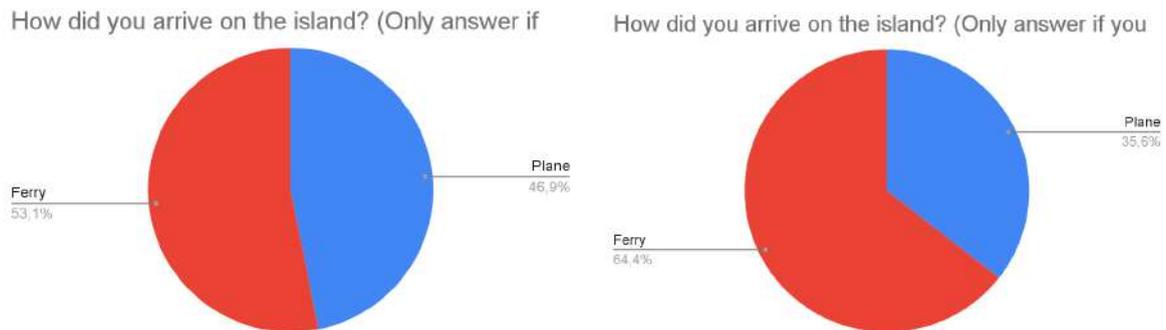
Figure 13: Means of transport to the island of respondents only among non-Sardinians

Respondents who were not from Sardinia and traveled to Cala Bernardini took the plane more (47%) than those going to Mari Ermi (35%). This is likely because ferry connections are more frequent in the port of Olbia, in the northeast, than in that of Cagliari, in the south.

## Is it your first time in Sardinia? (Only answer if you are not from Sardinia)
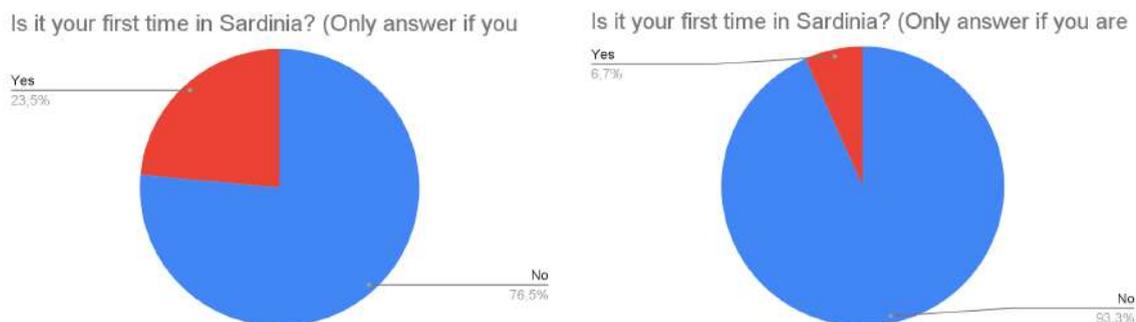
Figure 14: First-time visitors and seasoned visitors only among non-Sardinians

Non-Sardininan respondents in Mari Ermi were very familiar with the island, with only 7% of them visiting for the first time. In Cala Bernardini, 23% of the respondents had never been to Sardinia.

Who are you traveling with?
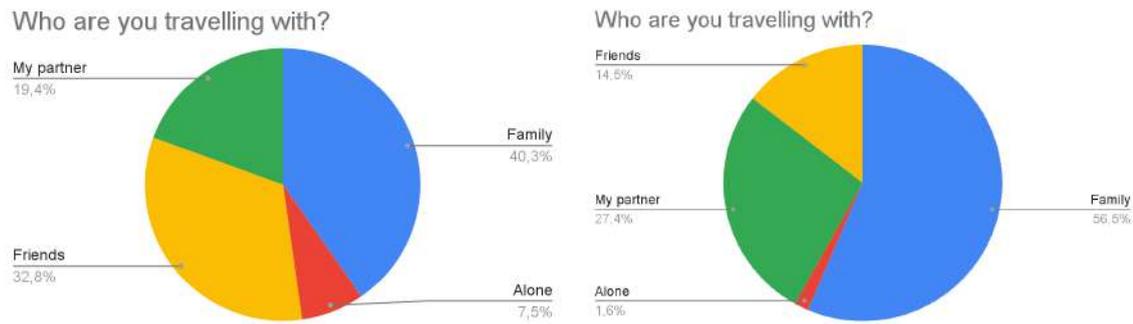
Figure 15: Travel companions of respondents

Both in Cala Bernardini and Mari Ermi, most respondents traveled with their families (respectively 40% and 56%). Mari Ermi seems to be often visited by couples (27%), while in Cala Bernardini groups of friends are more common (33%).

Do you know the environmental impact your stay on the island has?
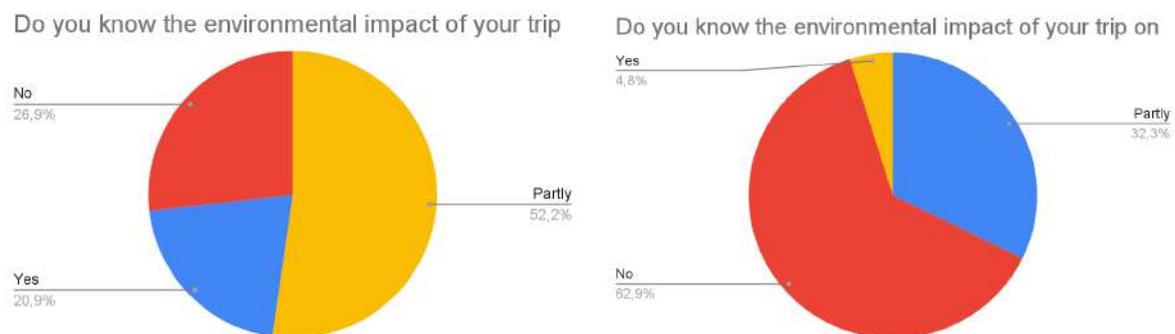

Figure 16: Respondents' awareness of the environmental impact of their vacation

While in Cala Bernardini most respondents stated that they were at least partially aware of the environmental impact of their trip (52%), in Mari Ermi the large majority of respondents said they do not know what their footprint on the island is. This might be related to the average age of the respondents.

On a scale from 0 to 4, how much does human life depend on nature?

Cala Bernardini: 3,6/4 Mari Ermi: 3,9/4

There seems to be less awareness of the importance of nature for human life in the sample collected in Cala Bernardini, although in both samples respondents seemed to be highly aware of their dependence on nature.

What are the attractiveness factors of Sardinia? (rate each factor from 1 to 4)
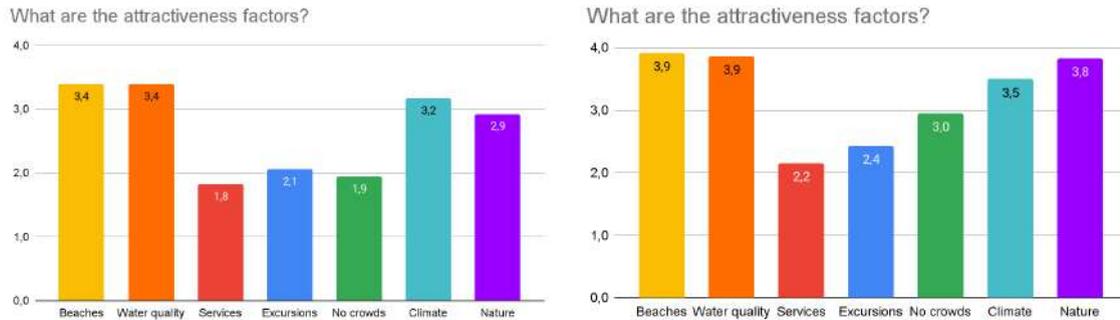

Figure 17: Attractiveness factors rated by respondents from 1 (lowest) to 4 (highest)

The attractiveness factors seem to be valued similarly, although respondents in Mari Ermi were more attracted by the lack of crowds and the uncontaminated nature of the area. In both cases, services are rated as relatively unimportant.

What makes a vacation ideal?
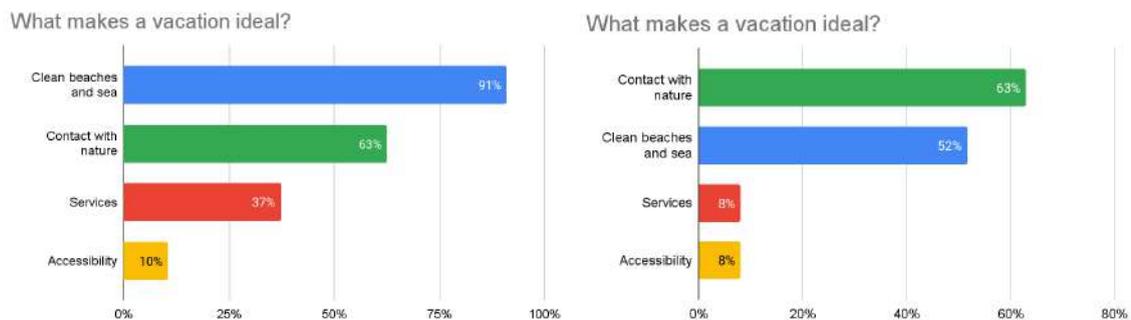
Figure 18: Factors making a vacation ideal

The majority of respondents in Cala Bernardini selected "clean beaches and sea" as one of the elements contributing to an ideal experience (92%), followed by "contact with nature" (63%). In Mari Ermi the majority of respondents selected "contact with nature" (63%), followed by "clean beaches and sea" (52%). Respondents in Mari Ermi seemed less interested in services.

Have you ever heard of ecosystem services?
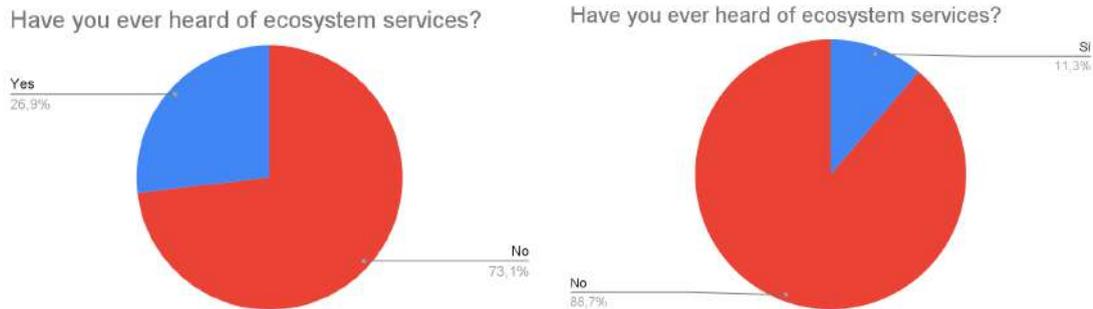
Figure 19: Respondents' knowledge of ecosystem services

In both samples, most respondents had never heard of ecosystem services (73% in Cala Bernardini, 89% in Mari Ermi). The higher percentage of respondents having heard of ESs in Cala Bernardini (27%) might be linked to the younger average age of the sample.

In your opinion, what are ecosystem services? one definition of ecosystem services choosing from:

- What humans do to keep the ecosystems healthy
- The services natural ecosystems provide to humans
- The monetary value of nature and its ecosystems
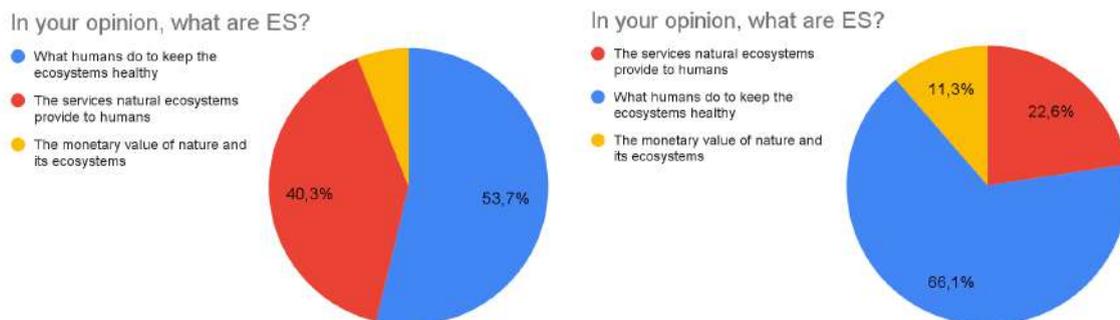
Figure 20: Respondent's definition of ecosystem services

When asked what the definition of ecosystem services is, in both cases, most respondents selected "what humans do to keep ecosystems healthy" (54% in Cala Bernardini and 66% in Mari Ermi). 46% of respondents in Cala Bernardini answered correctly, while only 34% gave the correct answer in Mari Ermi.

Did you know that tourism is an ecosystem service?
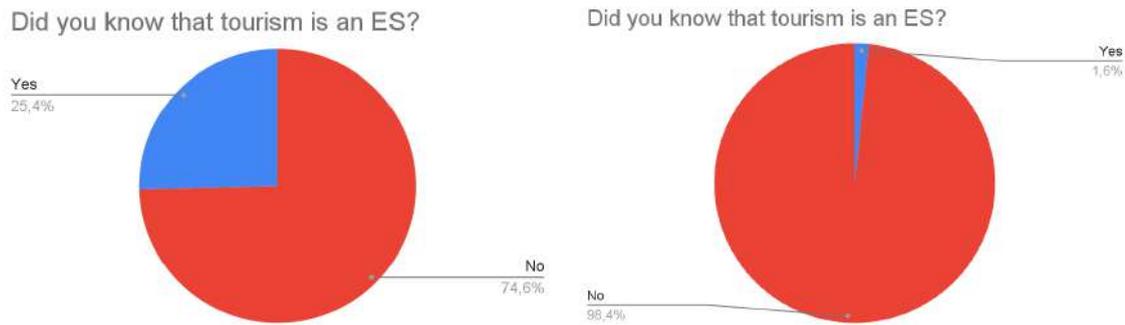
Figure 21: Respondents' knowledge of tourism as an ecosystem service

As most respondents had never heard of ecosystem services, in both cases the majority did not know that tourism is an ESs. As respondents in Cala Bernardini had heard of them more, 25% of them knew that tourism is a cultural ecosystem service.

Would you be interested to know more about ecosystem services?
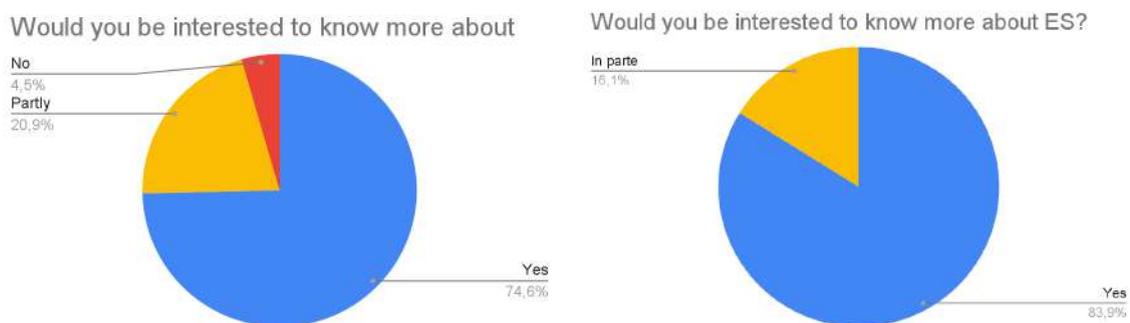
Figure 22: Respondents' interest in knowing more about ecosystem services

In both samples, most respondents said they would be interested in knowing more about ecosystem services, with people in Mari Ermi being slightly more interested (84% "yes") than those in Cala Bernardini (75% "yes").

How would you like to learn more about ecosystem services during your stay?
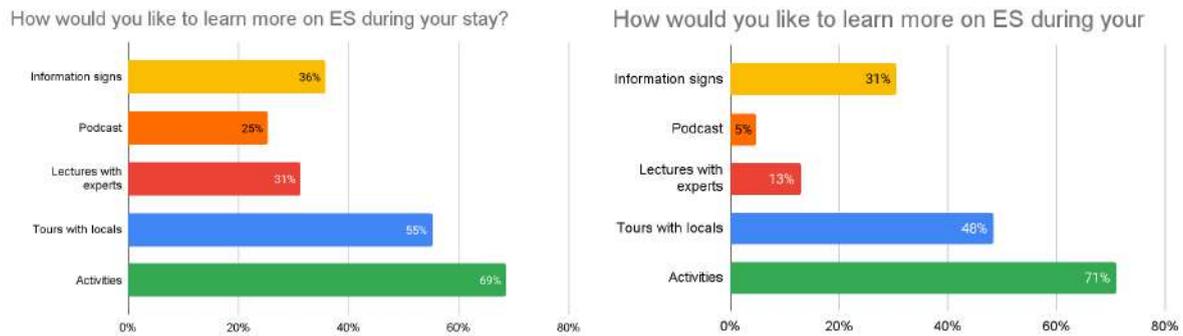
Figure 23: Respondents' preferred ESs learning methods

In both samples, respondents selected "activities" (respectively 69% and 71%) and "guided tours with locals" (respectively 55% and 48%) as the best way to learn more about ESs during a vacation. People in Cala Bernardini seemed to be more interested in podcasts and lectures with experts, while in both samples around 30% of respondents would like to see more information signs around the island.

If activities on ESs were to be available, to what extent would you be willing to participate from 0 to 5?

Cala Bernardini: 4/5 Mari Ermi: 4,2/5

In both samples, people stated they would be interested in participating in activities such as snorkeling, hiking, or birdwatching, with people in Cala Bernardini rating their interest at 4 out of 5 on average, and people in Mari Ermi rating it at 4,2 out of 5.

3.3 Businesses

The results of interviews with operators working in tourism are reported in this section. As mentioned, many interviews were long and rich in information. The data reported below is therefore more qualitative than quantitative. I have selected some keywords that were frequently occurring during the interviewing process.

What do you do in your business and why?

Some keywords that were recurrent in the answers to this question are:
- sustainable tourism
- community building
- contact with nature
- going beyond beaches
- Sardinia as a sustainable destination
- environmental education
- network building
- showing the real Sardinia

Many entrepreneurs aim at basing their work on the real Sardinia, which is often represented in a unidimensional picture of a white empty beach, that according to them does not match reality. The respondents want tourists to experience the many facets of the island through contact with nature and with local communities, promoting Sardinia as an all-around sustainable destination. Some have environmental education as their main mission, as they stated to believe the environment is the best teacher when it is experienced purposefully. Others mainly aim at creating a network, a community of businesses that all believe in the same ideal of tourism and support each other to make it a reality. The idea of creating a connection between nature, locals, and tourists was particularly recurrent, as operators often aim at integrating tourists into the local community.

What types of tourists are interested in your offer?

Some answers mainly focused on the origin of the tourists, indicating that many visitors come from abroad. Germany, France, and northern Europe were often named as some of the most popular places of origin for tourists visiting the island. Other respondents said many visitors are "interested in the wilderness", "looking for complementary services to those of hotels",

and "mainly coming from big cities and looking for peace". Many reported the prevalence of families, couples, and school classes.

Is there an ideal tourist for your business?

Some keywords were:

- respectful of nature

- interested in learning

- sporty and adventurous

- mindful of sustainability

When asked who the ideal tourist would be for their business, many named visitors who are respectful of nature, willing to learn from the environment and locals, ready to explore the island in its true form, mindful of sustainability in their everyday life.

Is there an ideal tourist for Sardinia?

Some keywords were:

- interested in traditions and the real Sardinia

- aware of the importance of nature

- without preconceptions about Sardinia

- less interested in beaches

Many lamented that tourists are often too focused on the seaside and believe there is nothing more that Sardinia has to offer. Business owners would like visitors to come to the island with no preconceptions, ready to learn about its history, environment, and traditions, while being aware of the importance of nature. They noted that Sardinia is rich in traditions, history, and cultures to be explored which are often not promoted as should.

How well do you feel supported by the institutions on a scale from 1 to 5?

Vi sentite adeguatamente sostenuti dalla regione e dalle istituzioni?
14 risposte
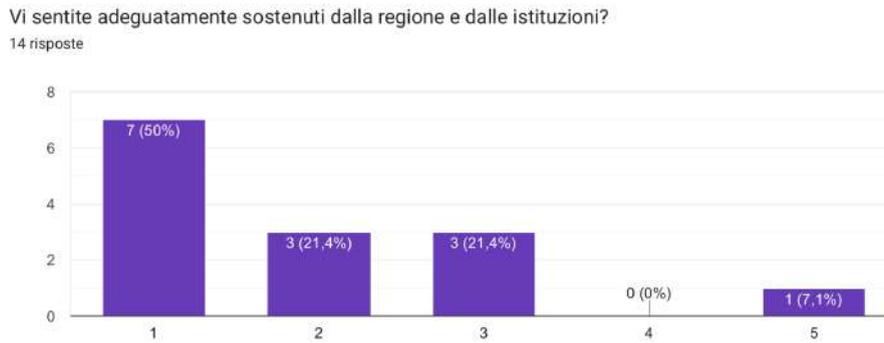
Figure 24: Support by the institutions as perceived by tourism operators

When asked to rate the support they get from the institutions from 1 to 5, 50% of respondents reported not feeling supported at all. The only respondent who selected 5 is the head of a CEAS (Center for Environmental Education and Sustainability) in Nora. The center is in close contact with the municipality of Pula and reported having an enriching dialogue on policies and environmental protection.

What are some critical issues of tourism in Sardinia?

Some recurrent keywords were:
- transportation (both to and from the island and within)
- lack of planning
- ineffective advertisement
- too much focus on the seaside
- too seasonal

Critical aspects seemed to be particularly recurrent and businesses seemed to all have a clear picture of what needs improving. Transportation was a focal point, as recent political developments have seen the issue at the center of many debates. Almost every respondent named transportation both to and from and within the island as an issue to be solved as soon as possible, as it hinders the development of Sardinia in many ways. Sardinia is only a destination from April to October, while during the winter months, it is completely isolated due to a lack of frequent connections or unaffordable tickets.

The lack of medium-to-long-term planning was also recurrent and blamed on the political leaders and their short-sighted 5-year agenda, which often leads to the ineffective advertisement of the island which keeps the focus on the seaside.

What are the attractiveness factors in Sardinia?
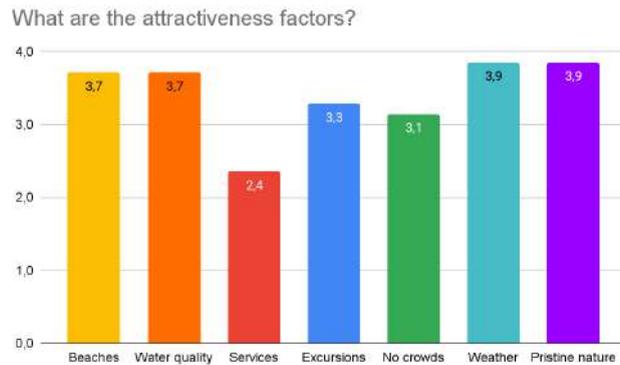
Figure 25: Sardinia's attractiveness factors according to tourism operators

Tourism businesses seem to have a similar perception of the main attractiveness factors on the island compared to tourists, although they seem to overestimate the attractiveness of excursions and guided tours, together with that of weather and pristine nature, which are not valued as highly by tourists themselves.

What are the attractiveness factors in your area?

Some of the keywords that were used more often were:

- nature
- authenticity
- archeological sites
- beaches
- good food
- welcoming population

Operators were asked to list a few factors they think are particularly important in the area where they operate. Nature was the most recurrent, with many believing it plays a crucial role in tourist choices. As many operators work on the coasts, the presence of beaches and sea was also named often, together with the authenticity of the area and the good food it offers.

Archeological sites were named by those who operate near them but have been reported to be undervalued. Operators were proud of the Sardinian hospitality, which in their opinion is what keeps tourists coming back.

Have you ever heard of ecosystem services?
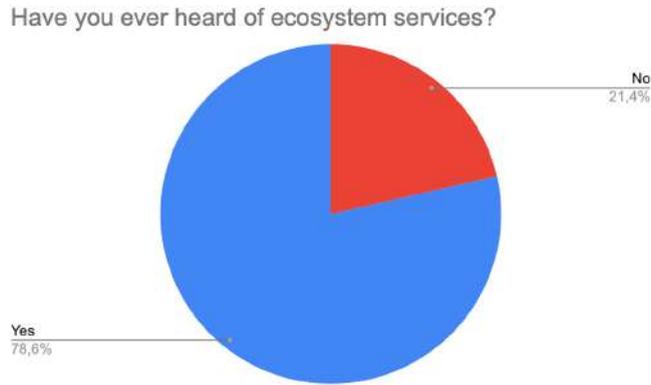
Figure 26: Operators' knowledge of ecosystem services

Businesses had heard of ecosystem services more than tourists, with 79% of respondents having heard of them, compared to an average of 20% in Mari Ermi and Cala Bernardini.

What are ecosystem services?

When it came to defining ecosystem services, respondents were given the same three options tourists were provided with:

- What humans do to keep the ecosystems healthy
- The services natural ecosystems provide to humans
- The monetary value of nature and its ecosystems
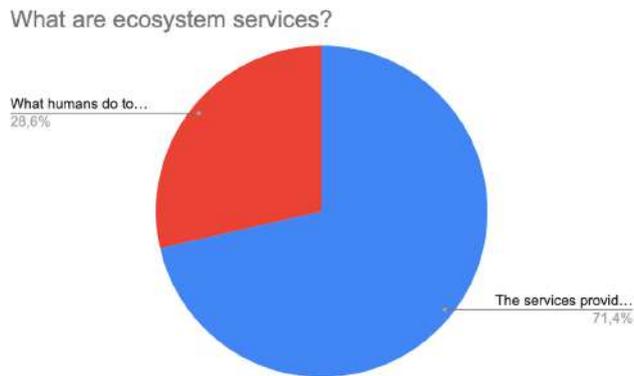
Figure 27: Operators' definition of ecosystem services

Although one respondent had heard of ecosystem services but was not able to link it to the right definition, 71% of respondents knew what the correct definition of ecosystem services is.

Do you think ecosystem services can be an attractive factor?
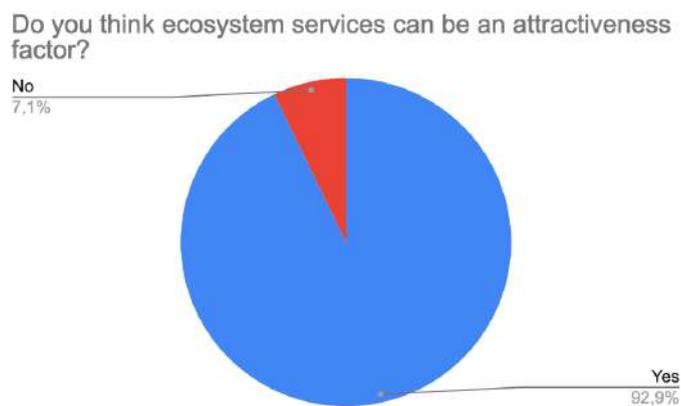
Figure 28: Operators' opinion on ecosystem services as an attractiveness factor

The majority of respondents (93%) believe that ecosystem services have the potential to be attractive factors for tourists.

How much can tourism contribute to educating on climate change and ecosystem services on a scale from 1 to 5?
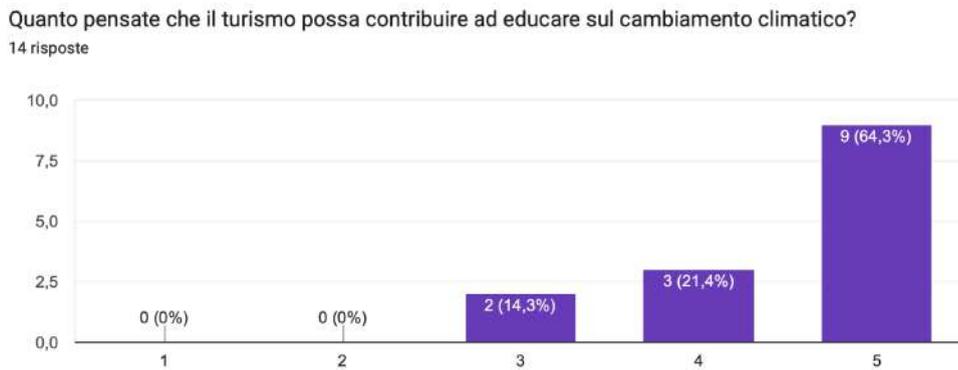
Figure 29: Operators' opinion on tourism's contribution to environmental education

When asked whether tourism has potential in environmental education on climate change and ecosystem services, 64% strongly agree with the statement, while 21% agree and 14% are neutral.

Are tourists ready for a new way of doing tourism (slower and more sustainable)?
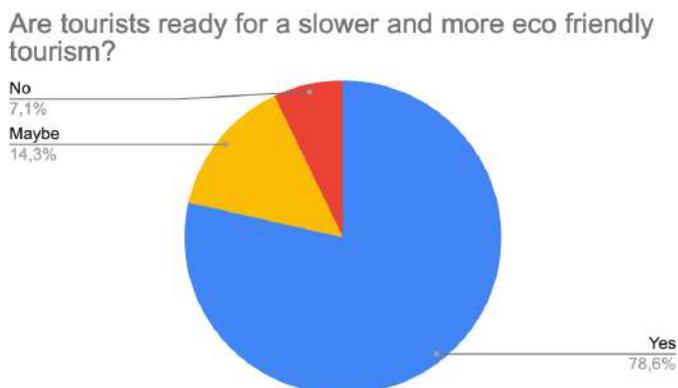
Figure 30: Operators' opinion on tourists' interest in slower tourism

79% of respondents believe that tourists are ready to experience a slower and more eco-friendly way of doing tourism. The remaining 21% who responded "No" or "Maybe" often referred to tourism in general (including businesses).

3.4 Stakeholder analysis

The table below (table 7) summarizes the stakeholders individuated in the stakeholder analysis. It outlines the name or title, the impact tourism has on them on a scale from 1 (low) to 5 (high), and the type of impact (economic, social, socio-cultural, environmental, health-related). It indicates the influence each stakeholder has on tourism on a scale from 1 (low) to 5 (high), what is important to the stakeholder, what their role is, and how they contribute to tourism. The stakeholders regarded as important by others and those that appear to be sources of discontent are indicated by an X.

Stakeholder	Impact (How much does the project impact them? 1-5)	Type of impact	Influence (How much influence do they have over the project? Low, Medium, High)	What is important to the stakeholder?	Role of the stakeholder	How does the stakeholder contribute to the issue?	Regarded as important by others (interviews)	Sources of discontent
Italian State	Low (1)	Economic	High (5)	Economic growth of region	Policymaking, funding	Develops policies to regulate the industry, allocates funds		
Sardegna turismo (Amministrazione regionale, Assessorato del turismo, artigianato e commercio, assessore Giovanni Chessa)	Low (1)	Economic	Medium-high (4)	Advertising the area for economic growth	Planning	Website department of tourism on the island, co-funded by the EU, gives overview of touristic offer	X	X
Amministrazioni comunali	Medium-low (2)	Economic	Medium (3)	Well-being of the community	Planning	Policy responsibilities	X	X

Arpa Sardegna (Agenzia Regionale per la Protezione dell'ambiente)	Low (1)	Environmental (?)	Medium (3)	Environmental protection	Environmental Protection, techno-scientific advisory	Supports local authorities in management of territory and ecosystems		
INFEA (INFormazione Educazione Ambientale)	Low (1)	Socio-cultural (?)	Low (1)	Environmental education at national and regional level	Environmental Education	Program promoted by the Ministry for the Environment for the dissemination of environmental information and education.		
CEAS	Medium (3)	Socio-cultural	Medium (3)	Environmental education, environmental protection	Environmental Education	Influence on local administration in policy development (from what was reported in interviews)		
Legambiente Sardegna	Medium (3)	Socio-cultural	Medium (3)	Scientific environmentalism	Advocacy	Volunteering, activism, courses on sustainable tourism (2019)		
Media (local, national, international)	Medium-low (2)	Economic	Medium (3)	Economic gain	Information provision	Influence opinions		
Transport organizations	Low (1)	Economic	High (5)	Economic gain	Provision of transport services	Allow movement of people	X	X
Local producers	Medium-high (4)	Economic	Low (1)	Economic gain	Production	Produce high quality products		
Tourism operators	Medium-high (4)	Economic	Low (1)	Work	Tourism services	They offer tourism services		

Tourists	Medium (3)	Socio-cultural and health	Medium (3)	Enjoyable vacation	Payment of tourism services	They pay for services	58
Posidonia	High (5)	Environmental	Low (1)	Healthy ecosystems	Ecosystem services	Ecosystem services	
Fratino	High (5)	Enviornmental	Low (1)	Healthy ecosystems	Ecosystem services	Ecosystem services	
Locals	Medium-high (4)	Socio-cultural and health	Low (1)	Enjoyable life on the island	Advocacy, activism	Can vote for goverment at national, regional and local level	
Rete Ecoturismo Sardegna	Medium (3)	Socio-cultural and economic	Medium (3)	Connection between sustainable tourism operators	Networking	It connects many operators and promotes sustainable tourism on the island	
Sardinia Spop Tourism	Medium (3)	Socio-cultural and economic	Medium (3)	Stopping depopulation through the right advertising of the island	Networking	It connects operators and promotes the island in its real form through the eyes of locals	
Universities	Low (1)	Socio-cultural	Medium (3)	Generating new knowledge and skills	Research	Research, education of future professionals	
Ente Pro Loco Sardegna	Medium (3)	Socio-cultural	Medium (3)	Advertisement of the area	Advertisement and event planning	Support to local Pro Loco for event planning and advertisement of the area	

Table 7: summary of stakeholders, the impact tourism has on them, their influence on the industry, and other key elements for the analysis.

3.4.1 Stakeholder description

In the following section, each stakeholder is briefly described in order to better understand their role in Sardinian tourism.

Italian State

The Italian State plays an important role in tourism in Sardinia, but it is not highly impacted by it. Its main interest is for the region to develop economically and it contributes to it through funding the industry, together with developing policies to regulate it. It was not mentioned by tourists or operators, therefore suggesting that it is not regarded as particularly important by those working in the industry and enjoying the services. Regardless of the perceived importance, the Italian State has the potential to transform tourism on the island through funding and the development of new policies.

Sardegna Turismo (regional department of tourism, craftsmanship, and trade, Sardinian Region)

Sardegna Turismo combines the regional department of tourism, craftsmanship, and trade, with Giovanni Chessa as the councilor, and the Sardinian Regional administration and it is co-funded by the European Union. It has less influence on the issue than the Italian State, as it has to follow guidelines and only has limited economic resources available to invest in the industry. However, it still has power over it, while not being impacted by it in any significant way. Its main interest is the region's economic growth, and its main role is planning the tourist season and advertising the region. The website offers information on events and gives an overview of the tourist offer on the island, together with news and practical tips for tourists to enjoy their vacation to the fullest. Sardegna Turismo has often been mentioned, especially by tourism operators, as an important industry stakeholder. It was often regarded negatively, as many believed the current administration has not been planning appropriately. An aspect that came up in conversation multiple times during the interviews was that of the latest advertising campaign funded by the administration in the form of a 90-second video named "Sardegna, Un Mondo Straordinario", which according to many locals and operators does not represent the island in its true form.

Municipalities

Municipalities are moderately impacted by tourism, as many of them, especially on the coasts, mostly rely on the industry for their economic development. They exercise medium influence on the issue and their main concern is the well-being of the community. They plan events and are responsible for the distribution of funds received by the region and to be destined for tourism. They were often mentioned as important during the interviews and they often came up as sources of discontent, especially regarding spacial planning and infrastructures.

Arpa Sardegna (regional agency for environmental protection)

Arpa Sardegna is a regional agency that promotes sustainable development and safeguarding and improvement of the quality of natural and anthropogenic ecosystems through techno-scientific competencies. The agency is the technical body that supports authorities at all levels when it comes to planning, authorizing, and imposing penalties in environmental matters on the island. The agency also publishes calls for funding businesses that contribute to environmental protection.

Tourism has little impact on Arpas, while the agency has a medium influence on the issue. Its main aim is to protect the environment and it does so through techno-scientific advisory. It was not mentioned during the interviews, suggesting that it is not regarded as particularly important.

INFEA (Information and environmental education)

The INFEA program was developed by the Ministry for the Environment and is aimed at creating new infrastructure for dissemination, training, and environmental education. The regional administration coordinates the work, together with suggesting new activities and listening to the program's advice. The program allows continuous networking among those involved in environmental education. It is not directly impacted by the industry of tourism and does not have a relevant influence on it. It is concerned with environmental education at the national and regional level and was not mentioned as particularly important or as a source of discontent.

CEAS (Centers for environmental education and sustainability)

In Sardinia there are a total of 48 official CEAS, or centers for environmental education and sustainability, scattered around the island. Many of them focus on environmental education and research on ecosystems, while others are found within accommodations such as hotels or hostels. They play a more active role in tourism, as they perform environmental education for groups of tourists as well as for schools. They also represent an important medium, as through their research they often inform the municipalities and therefore influence the local administration in policy development.

Legambiente

Legambiente has a long history of advocacy for environmentalism in Italy. As it is composed of activists, they are often locals and are therefore more directly impacted by the tourism industry. They are focused on scientific environmentalism and Legambiente Sardinia has also provided courses on sustainable tourism.

Media (local, national, international)

Media provide information on the island and are able to influence opinions on it, therefore directing tourism flows in one direction or the other. They are not directly impacted by the industry but have a medium influence on it.

Transport organizations and regional department of transportation

Transportation has proved to be perceived as a crucial part of tourism in the perception of both tourists and tour operators I conducted interviews with. Lack of transportation means to and from the island and within the island represents a limitation for the development of tourism in Sardinia. Although their main interest is economic gains, tourism has a relatively low impact on transportation. On the other hand, transport organizations strongly influence tourism and particularly sustainable tourism. The lack of public transport makes transportation less sustainable, as many move around the island with a private car, either bringing it by ferry or renting it. The two main companies operating in transportation within Sardinia are Trenitalia for trains and ARST (Azienda Regionale Sardegna Trasporti) for buses. Connections, especially to smaller towns, are often perceived as not sufficient or unreliable. Many connections are seasonal, meaning that during fall, winter, and spring many areas of the island are difficult to reach without a car.

Local producers

Local producers, especially small businesses that produce cheese, honey, bread, handicraft items, and other typical products, are highly impacted by tourism, as a big part of their income often comes from sales to tourists who are fascinated by Sardinian traditions. If tourism flows drop, their sales will drop with them. On the other hand, they do not have an influence on the issue, therefore representing a vulnerable category.

Tourism operators

With the term tour operator I refer to all businesses working in tourism, although in different ways. As seen in the chapter about businesses, some organize guided tours, some provide accommodations, and some offer environmental education services. They are highly directly impacted by the industry and have low influence on it as individual businesses. They are another category that is particularly vulnerable.

Tourists

Tourists are looking for an enjoyable experience on the island, and they are willing to pay for the services provided by other stakeholders, therefore generating wealth in the area. They are moderately impacted by tourism because the availability of services and healthy ecosystems is crucial for them to enjoy their vacation. They have a medium influence on the issue because they have more market power than, for example, locals and producers.

Kentish plover (Mari Ermi)

The area of Mari Ermi, besides being a protected marine area, is also home to the Kentish plover, a small bird that populates Italian beaches, especially those characterized by sand dunes. This species is highly impacted by tourism, as the health of its habitat heavily depends on anthropogenic pressure on the coastal ecosystem (LIPU n.d.). On the other hand, the Kentish plover has no influence on the issue, therefore being an extremely vulnerable stakeholder.

Figure 31: sign on Mari Ermi beach indicating the protected area of the Kentish plover, photo taken by the author

Posidonia oceanica (Cala Bernardini)

Posidonia oceanica is a seagrass that is endemic to the Mediterranean sea. As has been mentioned previously, this seagrass is very commonly found on Sardinian coastlines and shores. In recent years it has been particularly common to find large amounts of dead Posidonia on the shore of Cala Bernardini. This species provides many ecosystem services such as carbon sequestration and seabed stabilization, and it is a crucial bioindicator (Bonanno & Raccuia 2018). It is highly impacted by tourism, as the seaweed that washes ashore, which should be left there, is often removed through mechanical means in order to make the beach more aesthetically pleasing. As with the Kentish plover, the Posidonia does not have any influence on the issue, therefore being another vulnerable stakeholder.

Locals

The locals are one of the most vulnerable groups of all because they are highly socially impacted by tourism development, often in the long term, while not having much influence on the issue besides the possibility to vote for national and regional administrations. All land used for tourism is land that is either taken away from nature or from locals, while their only aim is to be able to live an enjoyable life on the island.

Rete Ecoturismo Sardegna

Rete Ecoturismo Sardegna is the main platform of social and economic sustainable development on the island. It consists of around 40 businesses working in tourism that have decided to focus on sustainability in their work. The main aim of the platform is that of creating a network of different businesses that can support each other, while simultaneously giving tourists interested in sustainable tourism the opportunity to find all sustainable businesses in one place. As a platform working in a niche part of tourism, it is moderately impacted by the industry while also having a moderate influence on it. It is regarded as important by those who are part of it but is not well known in Sardinia.

Sardinia Spop Tourism

Sardinia Spop Tourism is another platform for social and economic sustainable development. It consists of around 50 businesses, mostly from inland, that have decided to work together to tell the story of Sardinia in order to reduce depopulation. The platforms create "postcards from those who stay to those who travel", therefore targeting tourists and telling them a new story about the island. As with Rete Ecoturismo Sardegna, this platform is moderately impacted by the industry and has a medium influence over it. Its main aim is creating a network of businesses that can work together, while its overarching goal is stopping the depopulation of inland areas of Sardinia.

Universities

Sardinia has three universities: Università degli Studi di Cagliari, Università di Oristano, and Università degli Studi di Sassari. Universities are not impacted by the industry of tourism, but they do have a medium influence on the industry itself. Their main role is that of research, also in the realm of tourism, generating new knowledge and skills, and educating the future professionals of the field. Within the three universities, there are many degrees focused on tourism such as Economics and Tourism Management at the University of Sassari, or Management and Monitoring of Sustainable Tourism at the University of Cagliari.

Ente Pro Loco Sardegna

Pro Loco are usually at the service of residents, but because tourism is such a crucial part of the Sardinian economy, many operate in the industry. Ente Pro Loco Sardegna is a body that supports and coordinates local Pro Loco in planning events, providing services, and

advertising the area. They are moderately impacted by tourism, as their main aim is to support locals who often lose access to services that have been directed to tourists. They also have a moderate influence on the industry, as they advertise the area and plan events, therefore having power over the narrative used to present the island.

3.4.2 Comparison of categories

Governmental stakeholders

Governmental stakeholders generally have the highest influence on the industry, while simultaneously being subject to the lowest impact from it. Generally, the main impact such stakeholders bear is economic, as tourism is a source of income for many in Italy, therefore being strictly linked to the country's GDP and economic well-being. If the industry experiences a crisis, as has happened during the COVID-19 pandemic starting in 2020, there is a consequent loss in jobs, tax revenue, and GDP in general. The main aims of governmental actors such as the Italian State, the Sardinian Region, and the municipalities, are to create the preconditions for economic growth, advertise the area at a national and international level, and improve the well-being of the community. Such stakeholders generally deal with policy-making in the industry, allocate funds for development, act as mediators with, for example, airlines and ferry companies, interact with operators working in tourism, and plan events and such. During the interviews both with tourists and with operators, the Regional administration, the Directorate of tourism, craftsmanship, and trade, and the municipalities were often brought up as sources of discontent, mostly when it came to planning for the tourist season and supporting new and existing businesses in the industry.

Other governmental actors such as ARPAS and INFEA are subject to low impacts but have less influence on tourism. They deal with environmental protection and education but both have a relatively marginal role, as they were not mentioned often.

Strictly non-governmental organizations

Stakeholders such as Legambiente and the CEASs, many of which are also ONLUS (Organizzazione Non Lucrativa di Utilità Sociale), play the role of advocating for the territory and locals, together with organizing volunteering activities, doing activism, and delivering courses on environmental education and sustainable tourism. They are moderately subject to the socio-cultural impacts of tourism, but they also have moderate influence over it,

as they have some leverage with local administrations when it comes to policy development by providing them with technoscientific advice.

Private-sector

Members of the private sector such as tourists, media outlets, and tourism operators, cannot be grouped under one single category of impact and influence. As shown in figure 2, they are scattered around, signifying how they all play different roles in the industry. General organizations such as transportation companies and media outlets are subject to a lower impact by tourism and exercise much more influence on it, as they control how people move to, from, and within the island, together with influencing opinions on the island and tourism at the local, national, and international level. On the other hand, those working "on the field", such as tourism operators and local producers, are much more vulnerable, as their income is directly dependent on the ebbs and flows of the industry year by year. For many companies, such ups and downs have long-term negative impacts. During the 2020 pandemic and in the following year many businesses had to cease operations due to the drastic loss in tourist flows and the lack of support from the official institutions (Mariotti, Camerada, & Lampreu 2020). Lastly, tourists are moderately impacted by the industry because, depending on how tourism is managed, the availability of services and the health of the ecosystems can have negative impacts on their experience on the island. Compared to those working in the industry, they have more influence on it, as they represent the demand, which often strongly affects the offer, together with having themselves a strong negative impact on the island, especially when in large numbers.

Ecosystems

As it is often difficult to visualize ecosystems as real stakeholders because they are not regarded as such by many, I have chosen to focus on two actors that are representative of the two areas of Mari Ermi and Cala Bernardini. Although the two actors are not fully comparable, they bring forward interesting reflections. To represent Mari Ermi, I have chosen the Kentish plover, as the site is a protected area for this species. This small bird is considered a good indicator of the health of an ecosystem, as it is extremely vulnerable to any changes. It is therefore highly impacted by tourism, as a higher number of tourists often means a higher rate of pressure on the ecosystem, leading to changes in its equilibrium. To represent Cala Bernardini, I have chosen the Posidonia oceanica. This species, although it provides countless

ecosystem services, is not protected as the Kentish plover is, and it is often seen as disturbing, as something to be removed because it is aesthetically unpleasant. Although it is prohibited to remove dead Posidonia from beaches, it is not uncommon for municipalities to mechanically remove it and dump it back into the sea in order to make their beaches adhere to the standards that tourists expect from Sardinia. The Posidonia is highly impacted by tourism, and especially by yachting tourism, as anchors on Posidonia meadows cause the plants to detach from the seabed (Montefalcone et al. 2008). Both the Kentish plover and the Posidonia provide many ecosystem services and help marine ecosystems keep their balance, but they have the lowest influence on the industry, therefore being the most vulnerable stakeholders of all.

Locals

Locals, both Sardinians in general, and people from the municipalities that are most impacted by tourism, which are often found on the coasts, are interested in enjoying life on the island all year round. The tourism industry has medium-high impacts on them, both socio-cultural and health-related. As the industry represents one of the main income streams for the island, many services are targeted to tourists rather than locals, therefore being provided only during the summer months. Transportation, for example, is subject to such changes throughout the year, meaning that locals often find themselves struggling to get around the island or go abroad as many connections are ceased during the winter months. Opening times of stores and restaurants are also affected by tourism, meaning that many businesses are completely closed for months at a time. Housing represents another problem, as it is more profitable to rent holiday houses to tourists and many have been transformed into accommodations, making it difficult for locals to find long-term housing. This problem is especially relevant in Cagliari, where many students and workers struggle to find housing. Other impacts to be considered are health-related ones, as tourism can be a vehicle for disease transmission (Chen, Law, & Zhang 2021). Although they are so highly impacted by the industry, they only have a moderate influence on it, mostly through their ability to vote for the administration at the national, regional, and local levels.

Non-governmental organizations in general

All organizations generally defined as non-governmental can be placed in the middle of the map (figure 2), as they are oftentimes moderately impacted by the industry while also having

a moderate influence on it. As businesses have had to compensate for the lack of support from institutions, and as they have felt the need to create a structured network that could be beneficial for both businesses and tourists, platforms such as Rete Ecoturismo Sardegna and Sardinia Spop Tourism have developed in order to connect operators, promote sustainable tourism on the island, and help stop depopulation. Universities are less impacted by the industry, but they have a medium influence, as they contribute to the generation of knowledge and the education of future professionals. Lastly, Ente Pro Loco Sardinia is moderately impacted and has a moderate influence on the issue as they support local Pro Loco in advertising the area and planning events. All non-governmental organizations are subject to tourism's sociocultural impacts, but members of the two platforms are also impacted economically, as their income fully depends on the industry.

4. Discussion

Sardinia is a world-renown destination, with millions of tourists visiting its coasts every year. The tourism industry is essential for the economy of the island while being detrimental to its environment, as anthropogenic pressure rises significantly during the summer often leading to irreversible damage such as wildfires and habitat loss. Tourism is also responsible for heavy urbanization on the coasts. As the industry has a wide reach and involves millions of people, it is interesting to investigate whether it can be a source of change. Looking at tourism through the lens of ecosystem services, for instance, can be useful in order to investigate whether the industry can facilitate environmental education on ESs and climate change. Ecosystem services can be a tool to teach tourists about not only the Sardinian environment, but nature in general, leading them to be more aware of their surroundings and their impact on them. To do so, it is necessary to understand whether the current land use is compatible with environmental education, whether tourists and operators within the industry are ready for the introduction of ESs in tourism, and whether the industry and its stakeholders are prepared for a shift towards more sustainable tourism, which could contribute to the fight against climate change.

To begin, the land use analysis was conducted to determine whether there are differences between land use in coastal areas of Sardinia compared to the inland, together with understanding whether there have been significant changes between the years 2000 and 2018. When analyzing the land change flow between the years 2000 and 2018, it is noteworthy that a significant portion of all 5 zones has been transformed from natural to artificial areas with class 1 or 2. This is particularly visible in the coastal buffer of 10km, where the majority of areas changed have gone from a higher to a lower class, meaning that they were urbanized or destined for agriculture. When it comes to the temporal analysis of the Corine Land Cover data, there are no significant differences, probably due to the fact that by the year 2000, the industry of tourism had already mostly developed, as it had its rise during the '60s. The only interesting thing to note from the temporal analysis is linked to the coastal buffer of 10km where between 2000 and 2018 a 2% rise in artificial areas, a 13% rise in forest areas, and a 15% decrease in agricultural areas were registered. Since 2006 building activities within 2km from the coasts have been restricted, the area 10km from the coasts is the one being urbanized the most for touristic purposes. It is interesting to note the rise in forested areas and the decrease in agricultural areas, which potentially have to do with the abandonment of

agricultural land to dedicate time and space to the tourism industry, which is more profitable. It is also important to note that 40 hectares in the buffer of 10km have been lost to wildfires. The recurrence of wildfires in the areas near the coasts might indicate the higher anthropogenic pressure due to tourism.

When spatially analyzing the area, there are clear differences between the coasts and the inland areas of the island. While in 2018 only 3% of Sardinia as a whole was classified under class 1 of CLC, the coastal buffer of 10 km registered 7,3% of artificial areas. However, the most significant difference is found in the coastal buffer of 2 km, where 11,4% of the area is artificial. It is interesting to note that, although it is more urbanized, the coastal buffers of 10km and 2km maintain a high level of 'wilderness', with over 64% of the area being classified under class 3, 4, or 5 of CLC in the 10km buffer and 52,2% of natural areas in the 2km buffer. The high percentage of natural areas in the buffers underlines how, although tourists visit the island for its coasts, there is potential for more nature-oriented tourism to develop in the area.

Tourists clearly appreciate pristine nature, and it could be assumed that they subconsciously choose the island not only for its beaches and clear waters, but also for the rich ecosystems that provide them with services they are not aware of, but that still make their stay more enjoyable. This would demonstrate that there is an interest, although subconscious, in ecosystem services, as was confirmed by the survey.

As the surveys to tourists and the interviews to operators are not fully comparable because of the different methodologies used and the different aims of the two instruments, some aspects will be compared, while others will be explored separately.

When comparing Cala Bernardini with Mari Ermi, it is clear that the latter is more frequented by Italian and foreign tourists, while the majority of respondents in the former are from Sardinia. This is probably because Cala Bernardini is a small and little-known beach that is not advertised and is mostly known through word of mouth. It is perceived as a serene environment, and many locals prefer to attend such beaches to avoid crowds. On the other hand, Mari Ermi is well known for its quartz sand, which is not common on other beaches on the island, attracting more tourists from other areas of Italy and Europe. Sardinians attend Mari Ermi less potentially because, especially during the summer, the beach is crowded. When it comes to foreigners, businesses indicated the presence of tourists from northern Europe, e.g. Germany, the Netherlands, Norway, but also France. Although the sample size

was small, this data is partially confirmed by the results of the surveys (figure 8), together with general data provided by the Sardinian region from previous years.

The average age of tourists in Cala Bernardini is lower, potentially because many families own a house in the nearby village and come back to the same beach every year.

Most people in Mari Ermi arrived by ferry. This is likely because ferry connections are more frequent to the port of Olbia, in the northeast, than in that of Cagliari, in the south. This trend is also likely linked to the lack of public transportation in the area of Oristano, near Mari Ermi, which makes tourists more prone to wanting to drive their own car, also due to the high prices of rentals in recent years.

Although the beach is not well known, for 23% of respondents in Cala Bernardini it was their first time in Sardinia. Their presence on the beach might be linked to the previously mentioned word of mouth. Some tourists have reported finding Cala Bernardini by chance while looking for a beach, while others have reported having heard of the place from friends or relatives. On the other hand, only 6% of people in Mari Ermi had never been to Sardinia, indicating their loyalty to the island.

Both in Cala Bernardini and Mari Ermi, most respondents traveled with their families, suggesting Sardinia is an ideal destination for families with children, but also that it becomes a meeting point for families to gather throughout the years, as many come back periodically because of their deep connection with the place. In Cala Bernardini, it was more common to encounter groups of friends, suggesting that the area around the Cala offers more services for a younger target, such as bars and nightclubs. In Mari Ermi it was more common to find couples, suggesting that the area is ideal for partners who are looking for a romantic vacation immersed in nature.

Respondents in Cala Bernardini seemed generally more aware of the environmental impact of their stay on the island, probably due to the younger average age. In Mari Ermi, 63% of the respondents did not know what their impact was. The general lack of awareness of the environmental impact of a vacation indicates that tourists do not grasp how tourism is often the mere exploitation of natural resources, oftentimes leading to significant damage to the natural environment of the area. Although this data is discouraging, there is room for improvement when it comes to educating tourists during their stay.

Respondents in Mari Ermi seemed to be more aware of the importance of nature for human life compared to respondents in Cala Bernardini. This might be due, once again, to the average age of respondents, as adults might be more aware of how they depend on nature. Environmental education on ecosystem services could be useful to rise awareness of the full

dependence of humans on nature through everyday examples that would underline how vital ecosystems are.

Many of the 14 operators interviewed were vocally committed to offering sustainable tourism in Sardinia. As most of them are from the island, and all of them have a deep connection with it and do not run their businesses only for profit, they seemed to all deeply love and care about the territory and its environment and want to transmit such love to their guests. Many respondents reported that Sardinia is too often seen as a postcard with clear blue waters and white sandy beaches. Although many of them work on the coasts, they made it clear that they do not support such a portrayal, as the island has much more to offer. The concept of "going beyond beaches" was recurrent throughout the interviews, with operators wanting tourists to experience the real Sardinia, with its many facets and its downsides. Many mentioned the role of the community in tourism, as many businesses are strongly connected either through official or unofficial networks. The community aspect is crucial in the context of semi-isolation, as operators have to support each other, also to overcome the lack of support coming from official institutions such as the Sardinian Region or the Directorate of tourism. Some operators had environmental education as their focus, and they all reported that the environment itself is the best teacher when it comes to learning about nature.

When asked who the ideal tourist is for their business, many of them reported wishing for tourists who are respectful of nature and interested in learning from it and about the real Sardinia from both the environment and locals. Some reported wishing for sporty and adventurous people ready to explore the island in its purest and most wild form, while others noted that they are interested in tourists who are mindful of sustainability both during their vacations and in their everyday lives. When asked about the ideal tourist for Sardinia overall, many would like to see less interest in beaches and more interest in the inland areas with their traditions and rich nature. They also noted that tourists should not have preconceived notions about Sardinia, as that often leads them to focus on the negative aspects of the island and takes the focus away from elements such as the importance of nature. Overall, operators are looking for a tourist interested in spending time in nature and planning their vacation based on the rhythm of life in Sardinia. This suggests that operators would potentially be willing to integrate nature-oriented activities into their offer, leading to the indirect environmental education of visitors.

When it came to feeling supported by the institutions, 50% of the respondents declared that they do not feel supported at all. 43% gave a rating of 2 or 3 on a scale from 1 to 5, signifying

that they felt partially supported through, for example, calls for funding start-ups and other businesses in the industry of tourism. Only one respondent declared that he felt fully supported by the institutions. It is the CEAS in Nora, in the municipality of Pula. The head of the center said that they are in close contact with the municipality as all projects are developed together with the Region, the province, the city of Cagliari, and the municipality of Pula. The center and the municipality also exchange opinions when it comes to the needs of the area and urgent matters. Although it is not common for operators to be in such close contact with institutions as many reported feeling abandoned by them, the experience of the CEAS in Nora gives hope that there can be cooperation between institutions and tourism businesses. The discontent of operators might be linked to the expectations they lay upon the institutions, as they might wish the Region would give more funding, better regulate the industry, and create opportunities for entrepreneurship. Many lament the long bureaucratic processes behind any request, while others point out that the only ones benefitting from incentives given by the Region are big hotel companies and never small businesses. Some remark that there is no continuity from one administration to the other, and planning is usually short-sighted, as it stops at the 5-year mandate to begin again with a different councilor and different goals. It is often difficult for businesses to stay updated on the different requirements and possibilities offered by each administration.

For years, the Region and the Directorate of tourism have talked about a "deseasonalization" of the island, but with no concrete results. As will be discussed later on, Sardinia is literally isolated, and it therefore fully relies on airlines and ferries for tourists and locals to get to the island. As with transportation within Sardinia, the majority of air and sea connections are limited to the summer months, leaving locals isolated for a large part of the year, together with not allowing a homogeneous distribution of tourists throughout the year. Tourism operators compensate for the lack of support from institutions by building official and unofficial communities whose members provide support, especially when it comes to advertising their touristic offers.

The attractiveness factors of Sardinia seem to be valued similarly both by tourists on the two beaches and by operators. Although Mari Ermi is a more popular and larger beach, therefore often being busier, respondents at this beach seemed more attracted by the lack of crowds than visitors of Cala Bernardini. This might be linked to the fact that many surveys were conducted during the month of September, which is generally less crowded and chosen by people who look for a quiet vacation. It might also have to do with the size of the beach,

which gives tourists the impression of having more space. People in Mari Ermi also rated "pristine nature" higher than respondents in Cala Bernardini. This may be linked to the fact that the area around Mari Ermi is still perceived as wild and untouched by humans, as the west coast has not been urbanized like the north coast, and it is less visited than, for example, the coast of Cagliari. Mari Ermi is also further away from other urbanized areas, as it is connected to the main road by an unpaved road, meaning the area is mostly surrounded by agricultural fields and pastures, giving it a natural feel. On the other hand, Cala Bernardini is dominated by the holiday house village, meaning that there is a high concentration of houses that can be seen from the beach. Although the beach is also surrounded by pine trees and bushes, nature is not the focal point. As Cala Bernardini is more frequented by locals, it might be that Sardinians are generally less interested in pristine nature than other Italians or foreigners, as they might be more used to being in contact with nature considering the generally low rate of urbanization of the island.

In both samples, respondents said that "clean beaches and sea" and "contact with nature" are what make a vacation ideal (figure 15). In Cala Bernardini, 91% of respondents selected "clean beaches and sea". This might be linked to the fact that in recent years the beach has been perceived as "dirty" due to the large amounts of Posidonia that washed ashore. It might also refer to the fact that in recent years finding pieces of plastic on the shore or in the water is more and more common. Respondents in Mari Ermi selected "contact with nature" 63% of the time. This might be linked to the fact that the beach is far away from any urbanized area. Although there are parking lots and restaurants nearby, it is still perceived as a place where one can be in contact with nature without being disturbed by anthropic elements.

When it comes to businesses, they seemed to have relatively similar perceptions of the main attractiveness factors of Sardinia, although they overestimated some elements. They were aware of the attractiveness of beaches and the quality of water, together with the lack of crowds, but they overestimated the importance of the availability of guided tours and excursions. This is mainly due to the fact that many of them either organize or offer guided tours through other companies and therefore often deal with tourists who are interested in such activities. They were aware of the moderate importance of services in tourists' choices, as they all pointed out that there is much work to be done in that sector. They slightly overestimated the attractiveness of the sunny weather and of pristine nature, which was not rated as highly by tourists. This is potentially linked to the fact that many operators are locals who have a deep connection with the area and many of them work in and with nature in their

everyday life. When it comes to the weather, this overestimation might be due to a preconception according to which tourists are mainly looking for sun and heat.

The majority of respondents both in Cala Bernardini and in Mari Ermi had never heard about ecosystem services. However, 27% of respondents in Cala Bernardini had heard about ESs before, compared to 11% in Mari Ermi. This difference might be linked to the younger average age of the sample in Cala Bernardini. Businesses, on the other hand, were much more aware of ESs, with only 21% of respondents being completely new to the term, suggesting the importance of such a concept for tourism on the island.

When given three options to choose from for the definition of ecosystem services ("what humans do to keep the ecosystems healthy", "the services natural ecosystems provide to humans", or "the monetary value of nature and its ecosystems"), in both Cala Bernardini and Mari Ermi most respondents selected "what humans do to keep the ecosystems healthy", suggesting a lack of clarity of the term, as more often than not "services" seemed to be linked to anthropogenic action. However, 46% of the respondents in Cala Bernardini answered correctly, while only 34% did in Mari Ermi. Once again, this difference might be linked to the average age of the two samples. Contrary to tourists, operators were much more aware of the definition of ESs, with 71% of them responding correctly. Yet again, this data suggests that operators have heard of ESs and believe they are important for their work.

Tourists were asked whether they knew that tourism is an ecosystem service, with the majority of respondents answering "no" in both areas. Tourism is mostly seen as a service provided by humans through infrastructure such as accommodations, restaurants, and transportation, rather than as something that is only possible through ecosystems.

When asked if they were interested in knowing more about ecosystem services during their stay in Sardinia, most respondents answered "yes" in both areas, with people in Mari Ermi being more interested (84% "yes", 16% "partly", with no "no"), and people in Cala Bernardini being slightly less interested (75% "yes", 21% "partly", 4% "no"). This can be interpreted through the lens of the composition of the two samples, as many in Cala Bernardini traveled with their group of friends, which are often less prone to seeking education activities during their vacation. The general data, with an average of 79% of people being interested in knowing more about ESs, suggests that there is potential for ESs to be integrated into tourism. 93% of operators are convinced that ESs have the potential to be an attractive factor for tourism in Sardinia, meaning that people in the industry have already picked up on such interest.

Tourists were presented with a list of 5 ways they could learn more about ecosystem services during their stay on the island, from which they could choose as many as they liked. Both in Cala Bernardini and Mari Ermi the options that were selected more frequently were "activities" (respectively 69% and 71%) which were presented with examples such as snorkeling, photography, hiking, birdwatching, and cycling. The second most selected option was "tours with locals" (respectively 55% and 48%), indicating that the community of locals can play a fundamental role in showing tourists the real Sardinia and in educating them about its natural environment. Both groups were relatively interested in information signs, while the sample in Cala Bernardini was more interested in podcasts and lectures with experts, potentially because of their higher education level due to the difference in average age.

Respondents in Mari Ermi declared to be slightly more willing to participate in activities such as snorkeling, photography, hiking, birdwatching, and cycling with the aim of environmental education, with an average rating of 4,2 out of 5, compared to an average of 4 in Cala Bernardini. Once again, this might be linked to the younger age of the sample, as young people often look for enjoyment rather than learning from their vacation. They also have less purchasing power, leading them to look for cheaper activities.

It is important to note that both tourists and operators seemed to respond enthusiastically to the idea of incorporating the notion of ecosystem services into tourism. They asked questions on definitions and asked for examples if they had never heard of them, and generally seemed to enjoy talking about the possibility of the notion of ESs contributing to educating about the environment and climate change.

Tourism operators were asked to rate the potential of tourism in educating about climate change and ecosystem services on a scale from 1 to 5. 64% of the respondents strongly agree that the industry has the potential to educate visitors on the importance of the environment and on the relevance of the fight against climate change. This figure is reassuring, as operators in the industry can see environmental education being incorporated into tourism activities, allowing people to learn about nature and its ecosystems while being immersed in it.

When asked whether tourists are ready for slower and more sustainable tourism, 79% of operators answered "yes", proving that they have seen a shift in interest from tourists. Although sustainable tourism is still a niche of the market, operators seem confident in saying that such a niche will grow in the future.

Social capital is a crucial part of tourism, especially considering Sardinia's state of isolation. It is defined by the Oxford Dictionary as "the networks of relationships among people who live and work in a particular society, enabling that society to function effectively" (n.d.). They are non-instrumental relations that aid cooperation. Higher social capital within a community is linked to higher trust among members, together with lower costs of transactions and relations between them. Within a society with high social capital, it is easier to get information, distances are not as relevant, and it is easier to form associations.

There are two types of social capital: bonding social capital, which indicates close ties between individuals of the same network and which does not aid development, and bridging social capital, which indicates the creation of links between communities that are distant not only geographically, but also culturally. The latter type has the potential to help all communities involved develop economically (Statzu 2022).

A report by SWG-IARESs on social capital in Sardinia (2022) focused on analyzing bridging social capital on the island through a score obtained from the sum of different variables such as trust in others, happiness, perceived personal circumstances, perceived financial situation, and perceived health. The report found that since 2017 the social capital of Sardinia has been drastically decreasing, going from a score of 8,35 in 2017 to one of 2,52 in 2021. Only 2 out of 5 Sardinians have a high social capital, with women having the lowest score, probably due to illegal employment and many of them being housewives. There was no relevant difference between the different areas of Sardinia. Freelancers had higher social capital compared to employees, probably due to the necessity to adapt to a constantly evolving market. Social capital was also linked to the importance of the third sector, as those who had higher scores assigned more importance to it.

The steady decrease in social capital on the island should worry politicians and policymakers, as a regional community that is not able to be connected will be much less likely to develop socially and economically.

When it comes to tourism, its development is strictly linked to social capital. Contrary to the industrial development that politicians attempted to induce on the island through a top-down approach, tourism developed from the bottom, up. Social capital is crucial in an industry like tourism, especially when it evolves on an island, as it somehow requires the participation of several different members of the community, from tourism operators to local producers, to people living in the area.

From the interviews, it was clear that the majority of operators have high social capital, as they often reported being in close contact with many other operators in the area and in Sardinia in general. Many said that they often help tourists build their vacation by suggesting where they can stay, what they can see, and where they can eat, choosing among their contacts based on the tourists' preferences. When I introduced my work and said I was interviewing different operators, they often asked me whom I had talked to, as they were curious to know whether they knew them. It often happened that they knew many of them by name and would then suggest that I talk to other operators in their network. It was interesting to see how such connections are not only among operators but also with local producers. Many accommodations have close links with bakers, cheese makers, butchers, beekeepers, wine producers, and artisans, who provide them with fresh and local products that tourists can appreciate and who often organize workshops to teach visitors how such products are made. The two owners of La Fattoria Delle Tartarughe, who invited me to the Fattoria for the interview, told me the story of how they built a close bond with a local carpenter who, when they began renovating the building where they were going to start their business, was going through financial difficulties. They met him through mutual connections and he offered to make them some windows and doors since the building did not have any at the time. He made some functional pieces for an affordable price, and the operators commissioned him more projects during the renovations. They now have a close relationship and have recommended the carpenter's work to their friends, many of whom have accommodations themselves, therefore allowing his business to thrive. This is only one of the many examples that could be made of how social capital can have the potential to create new businesses and save old ones. As I had the chance to visit La Fattoria while tourists were still there, it was interesting to see how the owners created a bond with tourists, who would go back to their accommodation up to once a year, bringing their family and friends with them. The owners knew them by name and had dinner with them a few times a week, therefore creating a strong connection with the visitors who, as they say, end up becoming their friends. This is an example of how tourism in Sardinia has the potential to loyalize visitors, which would create a safety net for businesses, making them more resilient. Besides the economic benefits, such a model of accommodation is what truly connects tourists to the place they are visiting. They are no longer visitors, as they become part of the community, they get to interact with the other members, they learn about the island and its environment from those who have experienced it best, and they begin to care for it as if it was their own. More official platforms such as Rete Ecoturismo Sardegna and Sardinia Spop Tourism, which are aimed at aiding social and

economic development, contribute to the creation of social capital by creating ties between businesses that would otherwise not have had a chance to come in contact. This allows for the exchange of ideas and for new collaborations to happen. The platforms also help tourists discover new businesses and plan their vacations according to their needs and values.

Social capital is a crucial part of tourism on the island, but creating it is no easy endeavor. Both official and unofficial ways of creating a network require time, care, and the right attitude. Many of the operators who are part of an official platform such as Rete Ecoturismo Saregna and Sardinia Spop Tourism have underlined how being part of such a platform requires the willingness to invest time and monetary resources into a goal they want to pursue. Some, such as MareTerra Group, were part of such platforms but eventually decided to exit them, as they could not dedicate the right efforts to it.

The Rete Ecoturismo Sardegna was born in 2019 at a fair on sustainability from the idea of three entrepreneurs. They planned to participate in a call by Sardegna Ricerche, which was offering to fund new startups in sustainable tourism.

The pandemic in 2020 made the initial phases of building the platform much harder, as it was difficult to contact and meet with businesses, but the project went on through weekly video calls with the participating companies, which soon became 30, building the platform's mission and vision and planning together for the future. When they participated in the call by Sardegna Ricerche, they were not admitted due to technicalities, but the platform was already economically sustainable, as each member had invested a small amount of money to build a website, social media platforms, and booking software. All participants were already heavily invested in sustainable tourism and strongly shared a culture and values, which allowed the platform to build resilience not only economically, but also socially. The platform currently has 40 members between tour operators, accommodations, guides, and museums, who are actively involved in a variety of activities aimed at building awareness of environmental issues, connecting different communities, and organizing events.

Many recognize the importance of such platforms and more generally of social capital, but there are considerable difficulties linked to such activities. One is the generally low social capital of Sardinia, which suggests a general lack of ability to get in touch with others and cooperate, as has been suggested by an operator during the interview. Sardinians are often described as solitary and proud people who are skeptical about not just foreigners but even people from the same island. As Sardinians have lived apart from each other for so long, they have built completely different cultures when it comes to all areas of life. Being so isolated

from the rest of Italy and Europe has likely also contributed to the lack of social capital. The pandemic has certainly cut distances when it comes to organizing meetings, as video calls have become more common and can represent a tool for businesses to build their connections.

Another difficulty behind creating official platforms that many have brought up is the bureaucracy behind the process, which is time-consuming and often extremely specific, leading many to abandon the idea. Even those who push through encounter many difficulties especially when it comes to financing the project. As mentioned, many have reported feeling abandoned by institutions, which do not contribute to the creation of connections. Many operators believe that the Region should promote a network of tourism businesses in order to connect them, but also in order to allow tourists to easily plan their vacation on the island by having a clear overview of the options available to them that meet their needs.

Nevertheless, regardless of the many difficulties and efforts required, what emerged from the interviews is a clear awareness of the importance of not working individually but as a community of operators who can help each other in different situations. Only one operator was not convinced by the idea of platforms, as they believed them to be superficial and not actually building real connections.

The community has an important role in tourists coming back to Sardinia year after year, as many value the Sardinian manner of welcoming visitors. This is clear from the surveys conducted on the two beaches. When asked how they would like to learn more about ecosystem services during their stay on the island, many selected "guided tours with locals" suggesting that the community could play a big role in delivering environmental education in the context of ecotourism. Their knowledge is valued because they have experienced that environment for years, therefore being considered experts on the matter.

Many tourists come from big cities in Europe and are looking for a drastically different experience, as they are not used to small and close-knit communities. Some businesses, such as Lollovers, in Lollove, a small medieval village in the center of the island, focus their work on giving visitors the experience of a community. Lollove only has 12 residents who all know each other and who have different skills. As soon as they arrive, the tourists are introduced to the community and become members of it. They have the opportunity to follow workshops held by community members on cheese making, bread making, and winemaking, therefore being able to experience firsthand what nature can provide. Such workshops are a great way for visitors to learn about provisioning ecosystem services, as many of them are not used to making food from scratch due to the lack of time and the frenetic lifestyle of cities. Thanks to

these workshops, they get to reconnect with nature and understand its crucial importance for human life.

The community of operators is obviously very relevant, as many have reported it is a way of growing together and learning from each other, creating connections that go beyond formal networks.

As reported by both tourists and operators working in the industry, there definitely is room for improvement when it comes to tourism management in Sardinia.

Transportation came up very frequently, with both tourists and operators complaining about the high prices of flights and ferries, the lack of affordable rental places, and the inefficiency of public transport. Being an island forces Sardinia to rely on such transportation services, meaning that when those are inefficient, the whole industry of tourism suffers. Tourists often struggle to get to the island, and families spend too much on the trip, therefore having less purchasing power during their actual stay.

The issue of transportation to and from the island has been at the center of the political debate for years. Since the year 2000, a new law has introduced what is called "*continuità territoriale*" (territorial continuity), which involves set prices for flights and ferries connecting Sardinia to the airports of Milan and Rome and the ports of Genoa, Civitavecchia, and Livorno. This measure is addressed to all residents in Sardinia, young people under 21 years of age, students, people with disabilities, and people over 70 years old.

The operation of such continuity was assigned to different companies throughout the years. When it came to air connections, the main airline was Alitalia, which connected the airports of Cagliari, Alghero, and Olbia to those of Milan Linate and Rome Fiumicino. After the company closed in October 2021, the Region started an urgent call for a new airline to operate the connections. Volotea has temporarily operated the continuity until October 2022. In recent months, the issue has once again been at the center of the debate, as the Regional Administration and the airlines were not able to come to a final decision. After months of negotiations, starting from January 2023 Ita Airways is operating flights connecting the airport of Cagliari to those of Milan Linate and Rome Fiumicino. It is crucial to note that, although such measures are important for the development of tourism on the island, locals are those who are most affected by the inefficiency, costs, or complete absence of connections to the peninsula and the rest of Europe, as it is much more difficult, more expensive, and occasionally impossible to go from the island to other destinations, especially during the winter months. The Regional Administration must keep in mind that local residents should

come first and have the ability to move around Italy as all other citizens, despite the geographic disadvantages they have to bear. Transportation within the island is also perceived as lacking, although it is not reported as being as important as the connection to the rest of the country. Arst and Trenitalia, the two companies operating on the island, are often perceived negatively. As most towns in Sardinia are small and are found inland, many reported how difficult it is for them to move around the island without a private car. The coasts, on the other hand, are slightly more connected, although once again connections are strictly linked to the tourism season. This condition makes it difficult for tourism to develop inland, as tourists have a hard time reaching the areas they might want to visit if they do not have their own car or do not have the means to rent one. The lack of stable connections year-round contributes to making tourism in Sardinia strictly linked to the summer season, therefore leading to higher anthropogenic pressure on the environment during the months of July and August, leading to water stress, wildfires, and general loss of ecosystem services. The Sardinian climate and its different ecosystems have the potential to allow tourists to visit it all year round, as both the spring and fall seasons are sunny and warm and still allow to enjoy the beach, while the winters are not excessively rainy, allowing for hiking excursions or archeological and historical tours. This would also allow the island to move away from the "seaside monoculture" it has been focusing on for the past 60 years, allowing both tourists and locals to discover new parts of Sardinia that have not been promoted as much.

The general instability of the transportation infrastructure is strictly linked to the ability of tourists to plan their vacations on the island. Many operators have reported that tourists, especially from northern Europe, prefer to book their vacations in advance, which is impossible for them to do as flight schedules are interrupted during the winter and are not available for several months, and are often only published right before the start of the summer season. In addition to transportation, the Regional Administration and the municipalities often do not plan for summer events in advance, therefore leaving tourists wondering what will happen on the island during the season. Such factors all contribute to tourists deciding to spend their vacations elsewhere, depriving the island of income.

The Regional Administration has been heavily criticized for its most recent advertisement of the island, the previously mentioned 90-second video titled "Sardegna, Un Mondo Straordinario", which was released in the fall of 2022 to promote the island in the world for the next season. The video, which plays with different registers of fantasy and reality, has been brought up by many operators I interviewed, as in their opinion it does not represent the real Sardinia. The video presents many shots of empty beaches and has as a protagonist a

Mammuthone, a typical carnival mask from the inland of Sardinia, which emerges from the sea revealing to be a woman. Other shots represent forests, traditional costumes and jewelry, and the nuraghes. Although the images in the video are impressive and do illustrate the beauty of many areas of the island, they do not represent the reality of Sardinia during the summer months. The video pictures Sardinia as an empty land, only populated by surfers and older people. But the island swarms with life, both human and non-human, which could potentially be even more attractive than a completely empty beach. The 2023 tourist season will show whether the narrative of the video was effective at captivating tourists from other parts of the world.

Overall, it is important to note that there is a general distrust in the current Regional Administration and especially toward the councilor for tourism Giovanni Chessa.

The two universities on the island have been developing new degrees aimed at educating new professionals that will make tourism in Sardinia more sustainable. Some examples are Management and Monitoring of Sustainable Tourism at the University of Cagliari, and Sustainable Tourism and Local Development at the University of Sassari. The development of such degrees proves the responsiveness of universities on the island that have understood the potential of ecotourism for Sardinia.

When asked how they would be interested in learning more about ecosystem services during their stay in Sardinia, most respondents both in Mari Ermi and in Cala Bernardini have selected "activities". When presented with the different options, they were given some examples of activities such as snorkeling, photography, underwater photography, birdwatching, hiking, and cycling. The answers suggest that teaching about nature through nature itself could be the most efficient way to build awareness of the importance of ecosystem services through tourism.

One of the businesses interviewed, MareTerra Group, organizes boat trips to do dolphin watching in Alghero. They collaborated with the university of Cagliari to build a study titled *Sustainable dolphin watching tours as a tool to increase public awareness of marine conservation – a comparative analysis between two Mediterranean destinations and implications for management* (La Manna et al. 2020), which, through two surveys that were delivered before and after the tour, demonstrated that by the end of the experience, the environmental awareness of many tourists had increased. This suggests that carefully crafted

education within tourism experiences can maximize the learning experience, therefore creating more awareness of the environment and of target species such as dolphins.

In this case, knowledge is constructed through the experience of the learner, and such construction is done actively and cannot happen through passively receiving information (Lowenthal & Muth 2008). Therefore, according to Suhendi and Purwarno (2018), some crucial aspects of constructing knowledge are "(1) prioritizing real learning in the relevant context, (2) giving priority to the process, (3) inculcating learning in the context of social experience, (4) learning is done in order to construct experience" (p. 89). Applying such theories, a study conducted by Aswita et al. (2020) on Sabang Island, in the Philippines, explored the natural resources potency of marine ecotourism as a source of environmental education. The authors believe that "[t]ourism can provide context for learning experiences, can be integrated into environmental education programs, and can be used as a source of learning to increase a learner's awareness and concern for the environment and it is also committed to preventing environmental damage" (p. 996). The definition of environmental education developed in the Tbilisi Declaration at the International Conference held by the United Nations Education, Scientific and Cultural Organization (UNESCO) and the UN Environment Programme in 1977 states that:

"A basic aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments resulting from the interaction of their biological, physical, social, economic and cultural aspects, and acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and the management of the quality of the environment."

UNESCO & UNEP 1977: p. 25

The same Declaration also states that the basic concepts of environmental education are knowledge, awareness, attitudes, skills, and participation. The study conducted by Aswita et al. built on such definitions and concepts in order to create a table that summarized the objectives of environmental education, the teaching and learning activities, and ecotourism activities connected to such concepts in the context of coral reef ecosystems. The following table is an adaptation of the one developed by Aswita et al. to the context of tourism in Sardinia. As tourists seemed to be willing to participate in activities centered on environmental education on ecosystem services, such a table can be useful to guide operators in the process of introducing EE into their work.

EE Concept	Expected Objectives	Teaching and learning activities	Ecotourism activities
Knowledge	Help tourists gain experience and a basic understanding of what it means to maintain a sustainable environment	1. observing species based on diversity, interactions, and distribution 2. understanding physical factors	1. Snorkeling 2. Scuba diving 3. Hiking 4. Birdwatching 5. Beach cleanups 6. Dolphin watching 7. Tours on dunes 8. Culinary tourism 9. Underwater photography 10. Trail running 11. Mountain biking 12. Cooking classes
Awareness	Help tourists gain awareness of the importance of the environment and its sensitivity to human actions	1. learning about behavior to hold when entering certain areas and habitats 2. learning about impacts of human actions on habitats 3. learning about ecosystem services	
Attitude	Help tourists obtain values and feelings of concern for the environment and motivation to act to protect it	1. not removing organisms, sand, rocks, and plants from their habitat 2. not stepping on dunes 3. properly disposing of garbage 4. not disturbing animals	
Skills	Help tourists gain skills to individuate, prevent and solve environmental problems	1. pointing out signs of changes in the environment 2. understanding interconnectedness 3. learning about solutions 4. learning to cook with local products	
Participation	Give tourists opportunities and motivation to get involved in protecting the environment	1. understanding human dependency on the environment 2. understanding the impacts of tourism on the island 3. understanding what ecotourism is and why it is important 4. learning how to be sustainable in everyday activities	

Table 8: tourism in Sardinia as a source of environmental education on ecosystem services

As demonstrated by the study conducted by the University of Cagliari with MareTerra Group, tourism has the potential to lead to more awareness and, eventually, behavior change, as after the tour participants to the study became significantly more aware of their responsibility for marine pollution and marine protection and were more willing to pay an additional fee to support marine conservation (La Manna et al. 2020).

As Rachel Carson put it:

"Mankind has gone very far into an artificial world of his own creation. He has sought to insulate himself, in his cities of steel and concrete, from the realities of earth and water and the growing seed. Intoxicated with a sense of his own power, he seems to be going farther and farther into more experiments for the destruction of himself and his world.

There is certainly no single remedy for this condition and I am offering no panacea. But it seems reasonable to believe — and I do believe — that the more clearly we can focus our attention on the wonders and realities of the universe about us the less taste we shall have for the destruction of our race. Wonder and humility are wholesome emotions, and they do not exist side by side with a lust for destruction."

<div align="right">Rachel Carson, April 1952, Acceptance Speech for the John Burroughs Medal</div>

The American biologist, with her essay *The Sense of Wonder*, published in 1965, and her speech of acceptance for the Burroughs Medal, underlines how learning about the environment and noticing its beauty is possibly the best way to avoid the self-destruction of the human race. If we are aware of the importance of something, we are more prone to protect it, value it, and enhance it.

If we become more aware of what ecosystem services are and how much we depend on them, we will likely notice them more, therefore assigning more value and importance to something that is often invisible to the eye. Nature has sustained us for thousands of years without humans noticing. It is now our responsibility to treasure nature and enrich it for the generations to come. There is no one-size-fits-all solution to such a complex endeavor that requires multiple approaches. As tourism is the industry with the widest reach in Sardinia, it represents a great opportunity to integrate environmental education through Carson's sense of wonder, providing locals and visitors with "reserves of strength that will endure for as long as life lasts" (Carson 1965: p. 32).

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Annex I: Tourism and Ecosystem Services in Sardinia

Hi! I'm Eleonora, I'm a student in Environmental Humanities and I am writing my thesis on how environmental education can be integrated into tourism in Sardinia. Thank you for your help!

*Required

1. Where are you from? *

   _____

2. How old are you?

   Mark only one oval per row.

   ☐ <18
   ☐ 18-24
   ☐ 25-35
   ☐ 36-50
   ☐ >50

3. How did you arrive in Sardinia? *

   Mark only one oval.

   ☐ *Ferry*
   ☐ Plane

4. Is it your first time visiting Sardinia? *

   Mark only one oval.

   ☐ *Yes*
   ☐ No

5. Who are you traveling with? *

   Mark only one oval.

   ☐ My Partner
   ☐ Alone

☐ Family

☐ Friends

6. What attracts you to Sardinia? (1 being the least, 4 being the most) *

Mark only one oval per row.

	1	2	3	4
Beaches				
Quality of the waters				
Services (cafes, restaurants, hotels)				
Excursions and guided tours				
Fewer crowds				
Warm and sunny weather				
Pristine nature				

7. What makes a stay ideal? *

Check all that apply.

☐ Clean beaches and sea

☐ Services

☐ Accessibility

☐ Contact with nature

☐ Other: _____

8. Do you know what environmental impact your stay on the island has? * *Mark only one oval.*

☐ Yes

☐ No

☐ Maybe

9. In your opinion, how much does human life depend on nature and its services? *

Mark only one oval.

	1	2	3	4	
Not at all	☐	☐	☐	☐	Completely

10. Have you ever heard of ecosystem services? *

Mark only one oval.

☐ Yes

☐ No

11. What do you think ecosystem services are? *

Mark only one oval.

☐ The benefits to humans provided by the natural environment

☐ The monetary value of nature and its ecosystems

☐ What humans do to support nature's ecosystems

12. Did you know that tourism is an ecosystem service? *

Mark only one oval.

☐ *Yes*

☐ No

13. Would you be interested to know more about ecosystem services? *

Mark only one oval.

☐ Yes
☐ No
☐ Partly

14. In your opinion, how could you learn more about ecosystem services during your stay in Sardinia?

Check all that apply.

☐ Information signs
☐ Podcasts
☐ Lectures with experts
☐ Guided tours with locals
☐ Activities (snorkelling, photography, birdwatching, hiking)
☐ Other: _____

15. If such activities were available, to what extent would you be interested in participating? *

Mark only one oval.

	1	2	3	4	5	
Not at all	☐	☐	☐	☐	☐	Very much

Annex II: Il turismo e i servizi ecosistemici in Sardegna

Attività del settore

1. Qual è il nome della vostra attività?

   _____

2. Su cosa puntate in particolar modo nella vostra attività? Perchè fate quello che fate?

   _____

3. Che tipologia di turisti sono interessati alla vostra offerta?

   _____

4. Qual è il turista ideale per la vostra attività?

   _____

5. Qual è il turista ideale per la Sardegna?

   _____

6. Vi sentite adeguatamente sostenuti dalla regione e dalle istituzioni?
   Contrassegna solo un ovale.

	1	2	3	4	5	
Per niente	☐	☐	☐	☐	☐	Molto

7. Quali sono le criticità del turismo in Sardegna?

   _____

8. Quali sono i fattori di attrattività della Sardegna?

   Contrassegna solo un ovale per riga.

	1	2	3	4
Beaches				
Quality of the waters				
Services (cafes, restaurants, hotels)				
Excursions and guided tours				
Fewer crowds				
Warm and sunny weather				
Pristine nature				

9. Quali sono i fattori di attrattività della zona in cui operate?

_____

10. Avete mai sentito parlare di servizi ecosistemici?

Contrassegna solo un ovale.

☐ Sì

☐ No

11. Secondo la vostra opinione, cosa sono?

Contrassegna solo un ovale.

☐ I servizi che i sistemi naturali generano in favore del genere umano

☐ Il valore monetario della natura e dei suoi ecosistemi

☐ Ciò che gli esseri umani fanno per mantenere gli ecosistemi in salute

12. Pensate che i servizi ecosistemici siano fonte di potenziale attrattiva per i turisti?

Contrassegna solo un ovale.

☐ Sì

☐ No

13. Quanto pensate che il turismo possa contribuire ad educare sul cambiamento climatico?

Contrassegna solo un ovale.

	1	2	3	4	5	
Per niente	☐	☐	☐	☐	☐	Molto

14. Sentite che i turisti sono pronti ad un nuovo modo di fare turismo (più slow/ecosostenibile)

Contrassegna solo un ovale.

☐ Sì

☐ No

☐ In parte

Annex III: QGIS maps

Land cover macro-classes

- Artificial
- Agricultural
- Natural
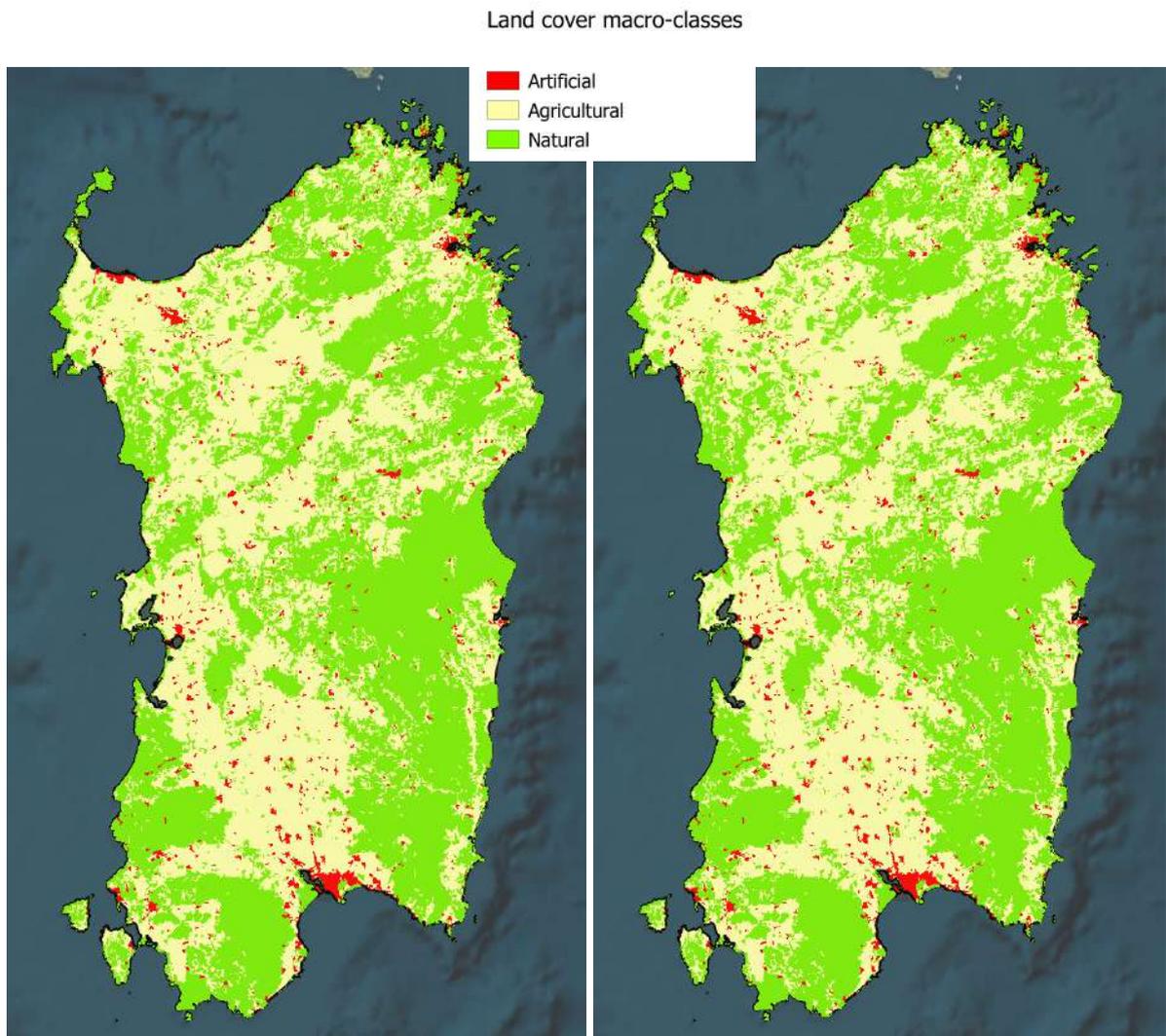
Land use comparison between 2000 and 2018