



UNESCO Aspiring

**Geopark**

**Quarta Colônia**

# QUARTA COLÔNIA ASPIRING GEOPARK: TERRITORY AND HERITAGE



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DILSON CECCHIN, EDSON LUIZ BORTOLUZZI DA SILVA, DÉBORA MORO**



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# A

## AREA IDENTIFICATION

### A.1- Geopark name and identity

Quarta Colônia Geopark is the name of the Aspirant UNESCO Global Geopark. The name refers to the fourth center of Italian colonization in the center of the state of Rio Grande do Sul. Beginning in 1877, it was a new wave of immigration in the same region in which the German immigrant population had settled since around 1855. A “promising land” in which thousands of European settlers placed their hopes and dreams, facing a dense subtropical forest, between the deep fault valleys carved by a broad drainage network on the slope of the Serra Geral mountain range, and which

demarcates the southern border of the Brazilian Meridional Plateau (Planalto Meridional Brasileiro) (fig.1). This territory, home to the most varied forms of animal and plant life 230 million years ago at the dawn of modern ecosystems, today is endowed with Triassic fossils of great international relevance. The territory of European descendants and quilombolas, which has millennial traces of indigenous settlements, holds the records of the oldest dinosaurs on the planet, and welcomes its visitors for a real trip back in time, diving into the history of the Earth, of the ecosystems and of human culture.

re. In the Quarta Colônia Geopark, among fossils, trails and overlooks, among colonial villas, bountiful spreads and memories, time becomes scenery and space becomes an invitation to discovery. Since 1996, nine municipalities within the territory have united to create the Consórcio de Desenvolvimento Sustentável da Quarta Colônia (CONDESUS), a Sustainable Development Consortium, which currently leads the Quarta Colônia Geopark proposal as homage to those who knew how to build a future without destroying the past.

### A.2- Size and location

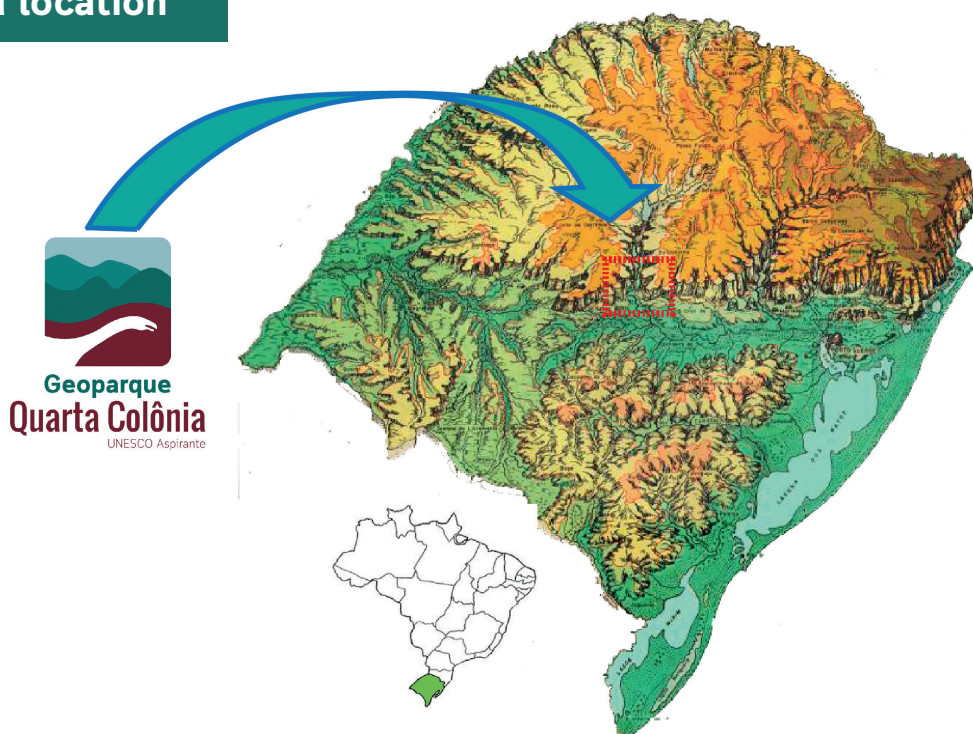


Fig.1- QCAG territory within Rio Grande do Sul (RS). Source : adapted from [https://www.ihgrgs.org.br/mapoteca/cd\\_mapas\\_rs/CD/imagens/mapas/cap\\_4/cap\\_4.2/390-146.htm](https://www.ihgrgs.org.br/mapoteca/cd_mapas_rs/CD/imagens/mapas/cap_4/cap_4.2/390-146.htm)



The Quarta Colônia Aspirant UNESCO Geopark (QCAG) occupies an area of 2,923 km<sup>2</sup>, comprising a territory that demarcates the transition between the Brazilian Meridional Plateau and the Sul-Rio-grandense Peripheral Depression (Depressão Periférica Sul-Rio-grandense). This geomorphological border is demarcated by the sandstone-basalt cliffs of the Serra Geral mountain range, which throughout history has served as a dividing line for human occupation pro-

cesses and is also a transition between two major Brazilian biomes: the Atlantic Forest and the Pampa, with enormous biodiversity encompassing forest and grassland ecosystems. The geopark territory (fig.2) is formed by the boundaries of nine municipalities (Silveira Martins, Ivorá, São João do Polêsine, Agudo, Dona Francisca, Restinga Seca, Nova Palma, Faxinal do Soturno and Pinhal Grande), which, all together, have a population of 62,193 inhabitants (IBGE, 2010).

The QCAG is bathed by the second largest and most important watershed of the state, the Jacuí river basin, and has a strategic location in the center of Rio Grande do Sul. It is accessible by an airport just over 20 km away in the city of Santa Maria, and is located at a road junction that connects to all regions of the state. The capital, Porto Alegre, is 270 km away, accessible by the RSC-287 highway.

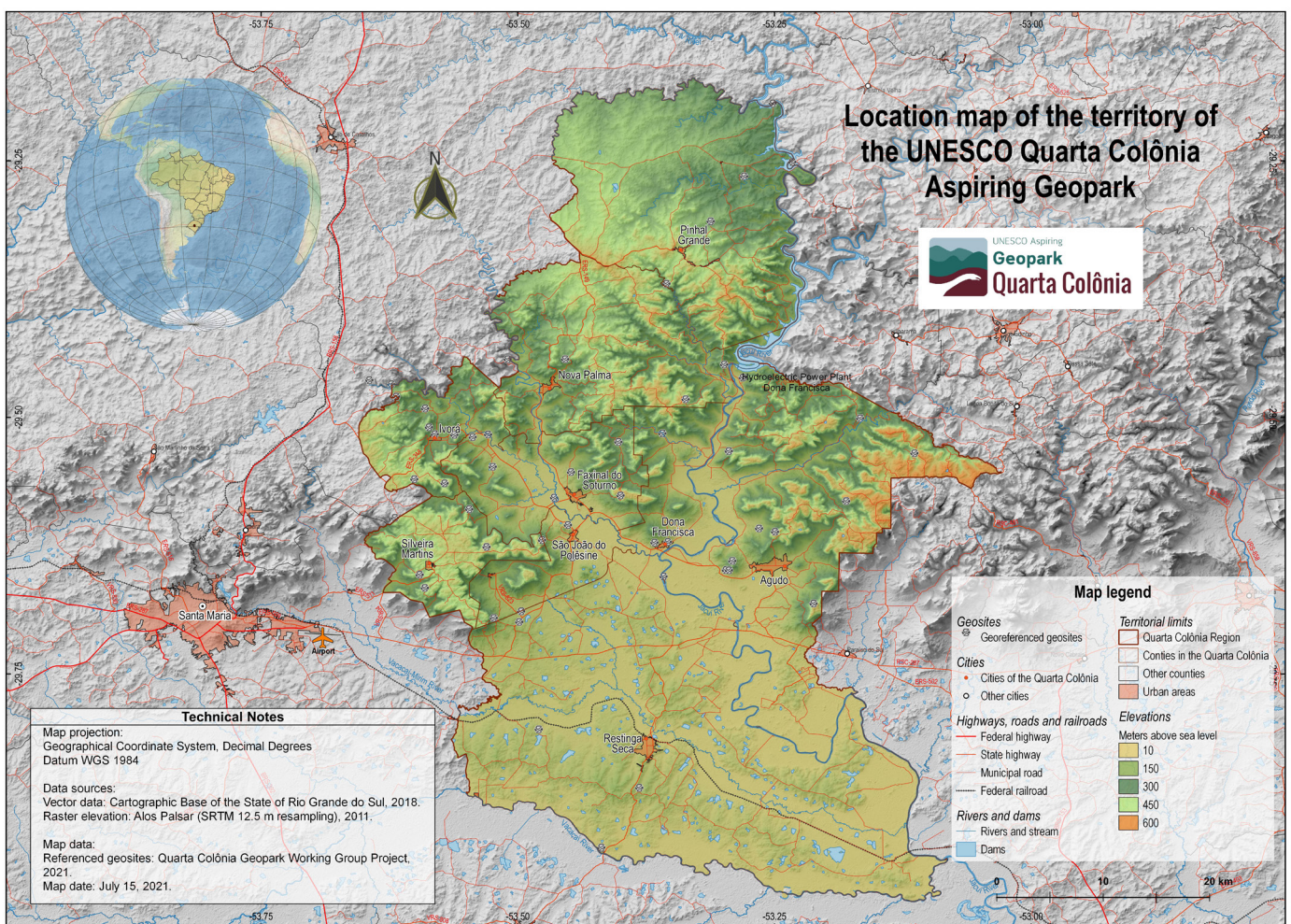


Fig.2- Map of the Quarta Colônia Aspirant UNESCO Geopark (QCAG)

### A.3- The landscape and territory of Quarta Colônia: brief description of physical and human characteristics

#### A.3.1- Geodiversity

The territory of the QCAG blends breathtaking scenery and verdant nature with a rich geological history. From the deep valleys to

the hilltops, the rock successions comprise a record of more than one hundred million years bearing witness to some of the most remarkable events in our planet's past. It was here that dinosaurs

took their first evolutionary steps. The fossils of the first representatives of one of the most successful lineages in the history of life on our planet are present in the Triassic rock formations, which





Fig.3- Panoramic view of the Geopark's Southern portion with volcanic cliffs

are more than 230 million years old. A unique fauna lived alongside them which included gigantic predators, robust herbivores and small, inconspicuous insectivores that represented the modest dawn of our own lineage. Southern Brazil witnessed not only the dawn of the dinosaurs, but also saw a group of small animals, the cynodonts, flourish and give rise to the lineage that would culminate in today's mammals. And if this were not enough, the sandstone and basalt walls that mark the southern border of the Brazilian Meridional

Plateau bear silent witness to an epic saga of continental proportions. The 130-150 million year old sandstones, today covered by forest vegetation, are testimony to one of the most arid deserts in the history of our planet, the Botucatu Desert, which extended over more than one million km<sup>2</sup>. Now only rock pockets remain, which paradoxically shelter one of the largest deposits of drinking water on Earth: the Guarani Aquifer. The black basalts that cover the hills, deposited between 130 and 125 million years ago, are remnants of one of

the greatest events ever recorded in our geological history: the rupture of the supercontinent Pangea. Successive volcanic events would culminate in the separation of the South American and African continents, giving rise to what we know today as the Atlantic Ocean. In a true trip through time, visitors to the now tranquil and pastoral region (fig. 3) can contemplate the traces of a journey of millions of years that molded not only life as we know it, but also the very foundations of our planet.

### A.3.2- Biodiversity

During his travels through the Quarta Colônia region in 1893, the Swedish researcher and biologist Carl Axel Lindman (1856-1928) wrote that the territory was "among the most picturesque and wonderful forest sites in all of Brazil (LINDMAN; FERRI, 1974). Lindman portrayed what we know today as an Ecotone formed by the interpenetration of the Mixed Ombrophilous Forests,

Dense Ombrophilous Forests and Deciduous Seasonal Forests of the Upper Uruguay (with predominance of the latter), all belonging to the Atlantic Forest Biome, the most biodiverse and most degraded biome in Brazil. As a result, part of the territory makes up the Atlantic Forest Biosphere Reserve. Some of the species that are easily found in the Geopark territory are classified as vulnerable to extinction by the state Red List (SEMA, 2014), such as: *Apuleia leiocarpa*

(Garapa), *Myrocarpus frondosus Allemão* (cabreúva), *Araucaria angustifolia* (Paraná pine) and *Machaerium nyctitans* (Bico-de-pato). According to Kilka and Longhi (2011), the forested area presents 165 tree and shrub species, 151 tree species from upper strata and 13 shrub species common in the understory, distributed into 118 genera and 49 botanical families, the Fabaceae Family being the most important of this association. Additionally, the forest is habitat

to several Bromeliads including *Dyckia agudensis* Irgang & Sobral (critically endangered), endemic to the rocky cliffs of the Brazilian Meridional Plateau where it occurs as a heliophytic species. The specific epithet “agudensis” is due to it occurring only in Agudo, one of the municipalities of the Geopark. The fauna of the region includes animals such as the jaguar (*Panthera onca*), the golden lion tamarin (*Leontopithecus rosalia*), the South American coati (*Nasua nasua*), the capybara (*Hydrochoerus hydrochaeris*) and the ocelot (*Leopardus pardalis*). Among the birds, Deprá and Venturini (2015) have identified 138 species of 40 different families in the territory (fig. 4). The brassy-breasted tanager (*Tangara desmaresti*), the blue manakin (*Chiroxiphia caudata*), the green-crowned plovercrest (*Stephanoxis lalandi*), the great kiskadee (*Pitangus sulphuratus*) and the blond-crested woodpecker (*Celeus flavescens*), among others, are most commonly found in the biome. In addition to the Atlantic Forest Biome, the Geopark also preserves an important portion of the Pampa Biome, whose grassland vegetation is formed predominantly by creeping or erect grass, small herbs, shrubs and small-sized trees. This biome presents relictual xerophytic species in microrefuges, where geodiversity is determinant in their control. They bear witness to the great Pleistocene semi-arid corridor of the Brazilian territory, which extended as far as northeastern Argentina. Here, there are

several cactus plants, mainly the columnar *Cereus sp.* (tuna). In addition, a wealth of medicinal species can be found within the territory (such as *Achyrocline satureioides* (Lam.) DC.-calming properties; *Matricaria chamomilla*—calming; and *Solidago chilensis*—anti-inflammatory, healing and analgesic properties) and fruit species such as *Butia capitata* (Mart.)(Becc.) (jelly palm), *Myrcianthes pungens* (guabiju) and *Eugenia uniflora* L. (surinam Cherry), for example. Among the native animals of the Pampa Biome are the anteater (Myrmecophagidae) and Flamarion’s tuco-tuco (*Ctenomys flamarioni*). Virtually the entire forest area of the territory lies within the Atlantic Forest Biosphere Reserve, whose protection is reinforced by the presence of the Corredor Ecológico da Quarta Colônia (Quarta Colônia Ecological Corridor), recognized by the state through the administrative order SEMA Nº 143/2014. In this sense, the forests and fields of the Quarta Colônia region have the basic fundamental attributes for the development of ecological tourism programs, environmental education and scientific research due to their size, distribution, composition and diversity, uniqueness, rarity and beauty. These programs are developed throughout the

territory, but with a special focus on the Quarta Colônia State Park (in Agudo) and the Municipal Nature Park of Monte Grappa (in Ivorá).



Fig.4- Examples of birdlife present in the Quarta Colônia Aspirant UNESCO Geopark.



### A.3.3- Sociodiversity

The Quarta Colônia region has been inhabited for at least three thousand years (Brochado and Schmitz, 1976). Hunter-gatherer societies whose traces are found in the center of the state of Rio Grande do Sul may be even older. Other horticultural groups inhabited the territory until the arrival of the Europeans, such as the ancestors of the Guaranis and Kaingang, who arrived in the region more than two thousand years ago. Archeological sites associated with these cultures are found throughout the territory. There are records of sites where indigenous artifacts have been found, which infers the presence of indigenous people in the Quarta Colônia region. In the second half of the nineteenth century, the territory received Italian and German immigrants, whose cultural expressions are still present in the communities (approximately one hundred and forty-seven communities) that make up the nine municipalities of Quarta Colônia (Ceretta, 2017).

The region is multiethnic, due to the presence of African and Portuguese descendants, in addition to the descendants of immigrants, especially Italian and German. In this context, the region is rich in socially diverse cultural expressions, whether in architecture, gastronomy, handicrafts, dances or spoken dialects. In a territory so diversified in terms of nature, the ethnic and cultural diversity endow the region with its multicultural development (fig.5), marked by the importance given to cultural aspects throughout its history, the cultural, affective and cognitive bonds between community members and the valuing of subjective aspects specific to the place itself (Pecqueur, 2005). The feelings of community and social configurations show subjective values and actions that form the social representations themselves, the knowledge and practices that are seen in various festivals and religious performances, in municipalities' anniversary celebrations, in gastronomic and thematic festivals such as those of held in the month of

June, in agricultural food products, sports, music and dance festivals and even festive dances hosted by community organizations present in many communities. These social representations are manifested in the daily dialogues, in social interactions, in the narratives of family meetings, in the facades of commercial establishments and even in the media of the municipalities. This immigrant culture coexists and hybridizes with the typical gaúcho and quilombola heritage, an expression of the cattle rancher economy of colonial Brazil, which is very strongly expressed in the Centros de Tradições Gaúchas - CTGs (Gaúcho Tradition Centers), which contribute to the preservation of gaúcho culture, customs and heritage, especially the typical cuisine (notably the churrasco), dances (traditional, ballroom, gaúcho and chula dances), songs and poetry, mate drinking circles and the use of clothing and symbols that portray the life of the gaúcho (DOTTO et al, 2017).



Fig.5- Sociodiversity of the territory

## A.4- Responsible organization and management structure

### A.4.1- Legal form, Management structure and Management committee

The QCAG management is directly linked to the CONDESUS Consortium (Consórcio para o Desenvolvimento Sustentável da Quarta

Colônia), gathering the nine municipalities that comprise the territory and a head office at São João do Polêsine, next to the CAPP

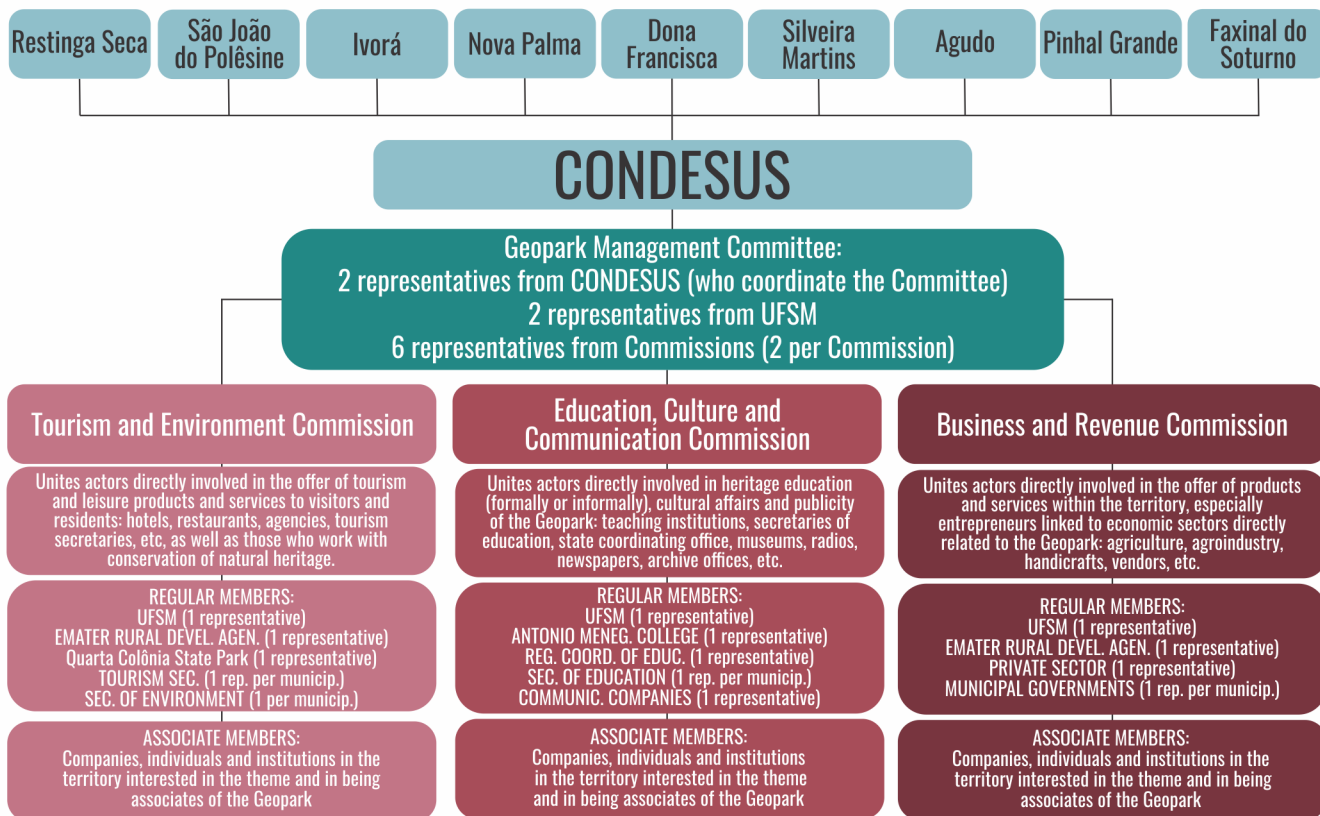


Fig.6- Management structure

(Centro de Apoio à Pesquisa Paleontológica, a Center for Support to Paleontological Research) and the Geopatrimony Interpretive Center of Quarta Colônia. In 2020, the management committee and the three Geopark Committees (fig. 7) were instituted and included in the CONDESUS statute, becoming part of the territory management board, ensuring participation of civil society and UFSM, which foster the implementation of the geopark. Its structure was defined according to the following composition: The management committee also has a scientific consultant to advise on aspects of heritage conservation of the territory, who must be from the geosciences area and have a specific weekly workload to dedicate to the activity. Besides this consultant, CAPP, a UFSM unit linked to the Center of Natural and Exact Sciences and located in the Quarta Colônia (in São João do Polêsine), has three

paleontologists on staff, with a workload of 40h weekly, as well as 15 undergraduate, master's

and doctoral students who develop their research at the Center. CAPP/UFSM also works in part-



Fig.7- Management Committee staff in 2021

nership with external researchers on an occasional basis, according to the needs of their research. The Geopark also has a Scientific Committee composed of researchers from Brazil and abroad, with experience in the Geopark's areas of activity, in order to ensure the quality of publications, projects and programs. The thematic commissions that

support the management committee are composed of full members - appointed by their respective entities, preferably related to the commission's theme - and associate members - any citizen residing in the territory of Quarta Colônia and willing to collaborate with the specific theme. Some attributions of these commissions are: to identify the de-

mands of the territory under the Geopark; to define priorities and urgencies to obtain and maintain the seal of UNESCO Global Geopark; to raise awareness on the themes related to the conservation of the territory's natural and cultural heritage; to create strategies for action in the territory through the creation of networks of partners, etc.

## A.4.2- Scientific committee

Agustin Guillermo Martinelli Museo Argentino de Ciencias Naturales	Raquel Lunardi IFFAR	Juliana Petermann UFSM
Atila Augusto Stock Da Rosa UFSM	Ricardo Nogueira Martins UMINHO	Suzane B. Marcuzzo UFSM
Bruno Ludovico Dihl Horn CPRM	Adriano Severo Figueiró UFSM	Alessandro Carvalho Miola UFSM
César A Goso Aguilar UDELAR	Flávio Augusto Pretto UFSM	José Luiz de Moura Filho UFSM
Emanuel de Castro Geopark Estrela	Neila S.P.S. Richards UFSM	Flavi Ferreira Lisboa Filho UFSM
Francisca Ferreira Michelin UFPEL	André Luis Ramos Soares UFSM	Jaciele Carine Sell UFSM
Leonardo Kerber Tumeleiro UFSM	Maria Medianeira Padoin UFSM	Adriano Simon UFPeI
Luiz Oosterbeek IPT	Dalva Maria Righi Dotto UFSM	Sonia Cecchin UFSM
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Michel Marques Godoy- Superintendência Regional de Porto Alegre - RS	Caroline Ciliane Ceretta UFSM	Marcelo Serrano Zanetti UFSM
Rafaela Vendruscolo IFFAR	Lucas Veiga Avila UFSM	

Fig.8- Scientific committee



## A.4.3 Application contact person



### Jaciele Carine Vidor Sell

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## A.4.4 Women's roles in the Proposed Geopark Management

Since the beginning of the discussions, gender equality has permeated the process of building the QCAG's strategy, be it through actions, leadership or the higher proportion of women in the management bodies. Seven of the ten members of the QCAG's management committee are wo-

men who are strong community leaders, local entrepreneurs and researchers representing municipalities, non-profit organizations, universities and businesses. In the thematic committees, women are also in the majority. Moreover, the Executive Secretary of CONDESUS is in tune with the importance of women's participation in the UFSM Project Coordination, whose technical staff

team is composed of all women. Also within the scope of UFSM extension activities, 46 actions coordinated by women were developed in Quarta Colônia between 2019 and 2021, compared to 35 actions coordinated by men. This fact speaks to the quantity and the competence, qualification and professionalism of women at the head of innovative development initiatives for the territory.

Nº	NAME	EMPLOYMENT	FUNCTION	SKILL	% TIME	GENDER
01	Jaciele Carine Vidor Sell	Permanent	Institutional coordinator	UFSM Geopark Project coordinator	80%	F
02	Flavi Ferreira Lisboa Filho	Temporary	Provost of Extension	UFSM Provost of extension	25%	M
03	Clovis Alberto Montagner	Temporary	Mayor of Faxinal do Soturno	President of management committee	10%	M
04	Valserina Maria Bulegon Gassen	Permanent	Executive secretary	Condesus Executive secretary	50%	F
05	Leandro Gabbi	Permanent	Administrative Officer	Economist	80%	M
06	Juliana Paula Vendruscolo	Permanent	Administrative Officer	CONDESUS Administrative Officer	50%	F
07	Airton Lorenzoni	Temporary	Accounting assistant	Accounting	10%	M
08	Erivaldo Facco Michelon	Temporary	Law assistant	Lawyer	10%	M
09	Patricia Freitas Ferreira	Permanent	Administrative	Administrator	10%	F
10	Giséli Duarte Bastos	Permanent	Administrative	Biologist	50%	F
11	Angelita Zimmermann	Permanent	Administrative	Geographer	50%	F
12	Michele Hennig Vestena	Temporary	UFSM Geopark Project vice director	Geographer	50%	F
13	Adriano Severo Figueiró	Temporary	Geography researcher	UFSM representative on the tourism and environment committee	25%	M
14	Maria Medianeira Padoin	Temporary	History researcher	UFSM representative on the education, culture and communication committee	50%	F
15	Lucas Ávila	Temporary	Representative of the business and revenue committee	Administrator	10%	M
16	Caroline Ciliane Ceretta	Temporary	Tourism researcher	UFSM representative on the tourism and environment committee	25%	F

Fig.9- Role and presence of women in the management of the UGGp and within all other employment categories of staff and support network as a whole.

Nº	NAME	EMPLOYMENT	FUNCTION	SKILL	% TIME	GENDER
17	Jorge Alberto S. Cruz	Temporary	Archival researcher	UFSM representative on the education, culture and communication committee	25%	M
18	Silvia Fioreze	Temporary	Municipal secretary of finance	Representative of the business and revenue committee	10%	F
19	Mara Rubia Da Cas	Temporary	Entrepreneur	Representative of the business and revenue committee	10%	F
20	Eloi Piovesan Scapin	Temporary	Municipal teacher	Representative of the education, culture and communication committee	10%	M
21	Vanessa Baccin	Temporary	Municipal tourism secretary	Representative of the education, culture and communication committee	10%	F
22	Bianca Trindade	Temporary	Municipal tourism secretary	Representative of the tourism and environment committee	10%	F
23	Edicleia Iesen Cherobini	Temporary	Municipal tourism secretary	Representative of the tourism and environment committee	10%	F

Fig.9- Role and presence of women in the management of the UGGp and within all other employment categories of staff and support network as a whole.

### A.4.5- Webpage and social media

 Facebook:  
 3.257 followers  
 3.156 likes from 7 countries in the last year  
 4.925 people reached

 Instagram:  
 1.507 followers

 Youtube:  
 646 subscriptions since 2020  
 72 videos posted

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Fig.10- Webpage and social media



# B

## GEOLOGICAL HERITAGE OF QUARTA COLÔNIA ASPIRING GEOPARK

### B.1- Main geological highlights

The Quarta Colônia Geopark is located in the southern portion of the Paraná Basin, an intracratonic

basin directly related to the tectonic evolution of southwestern Gondwana. Due to its paleogeographic

proximity to other units, this basin presents geological continuity with basins in South Ameri-



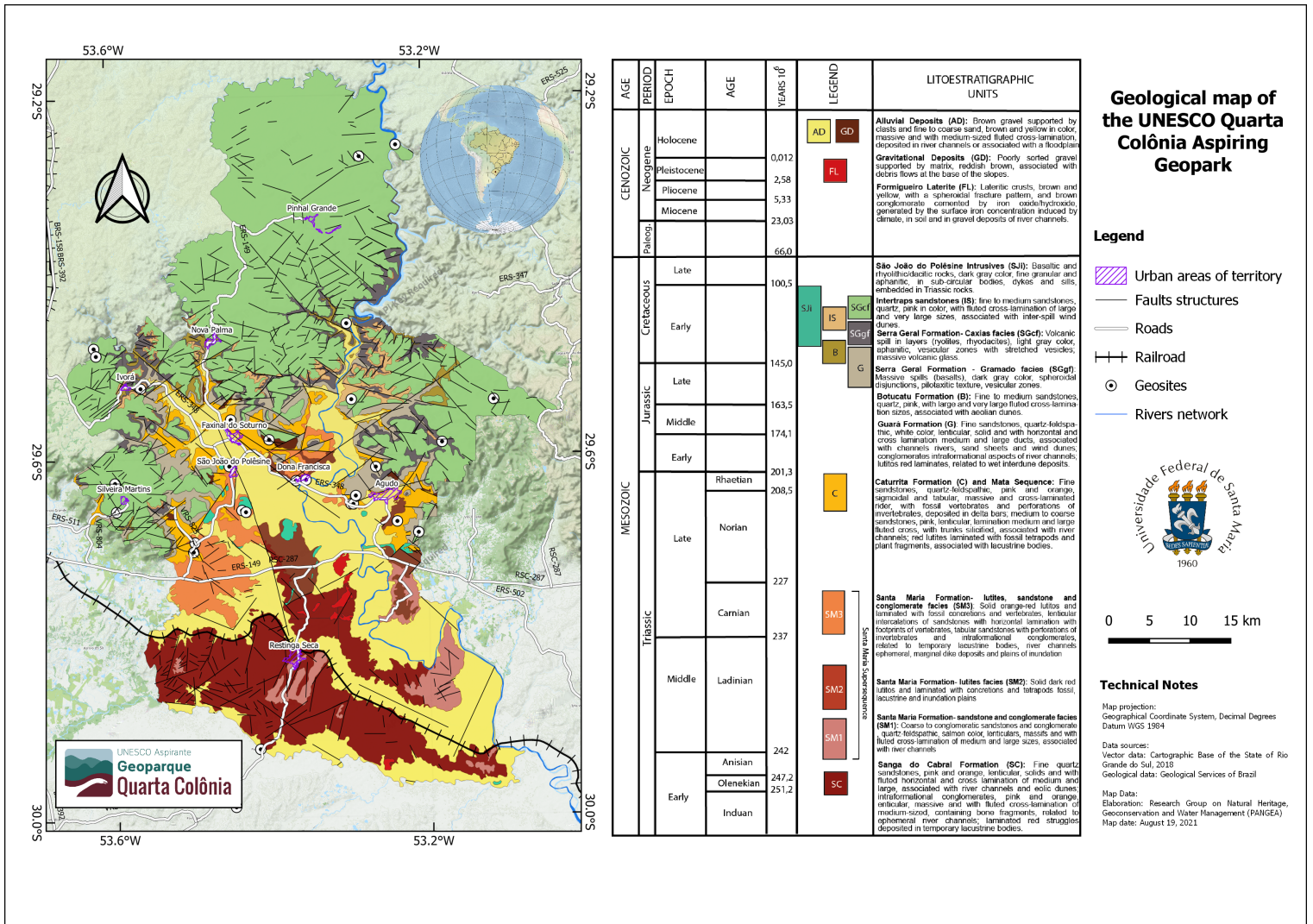


Fig 11- Geological Map of the QCAAG.

ca (such as in Argentina) and southern Africa, including the great Karoo Basin. The depositional gap of the Paraná Basin extends from the Ordovician through the Cretaceous and the region of the QCAAG encompasses strata that discontinuously extend from the Early Triassic through the Early Cretaceous (Fig.6). It is precisely this temporal amplitude, associated with the evolutionary and tectonic events that took place during the Mesozoic (Zerfass et al. 2004; Schultz et al. 2020) that give the region its main geological and geo-heritage value.

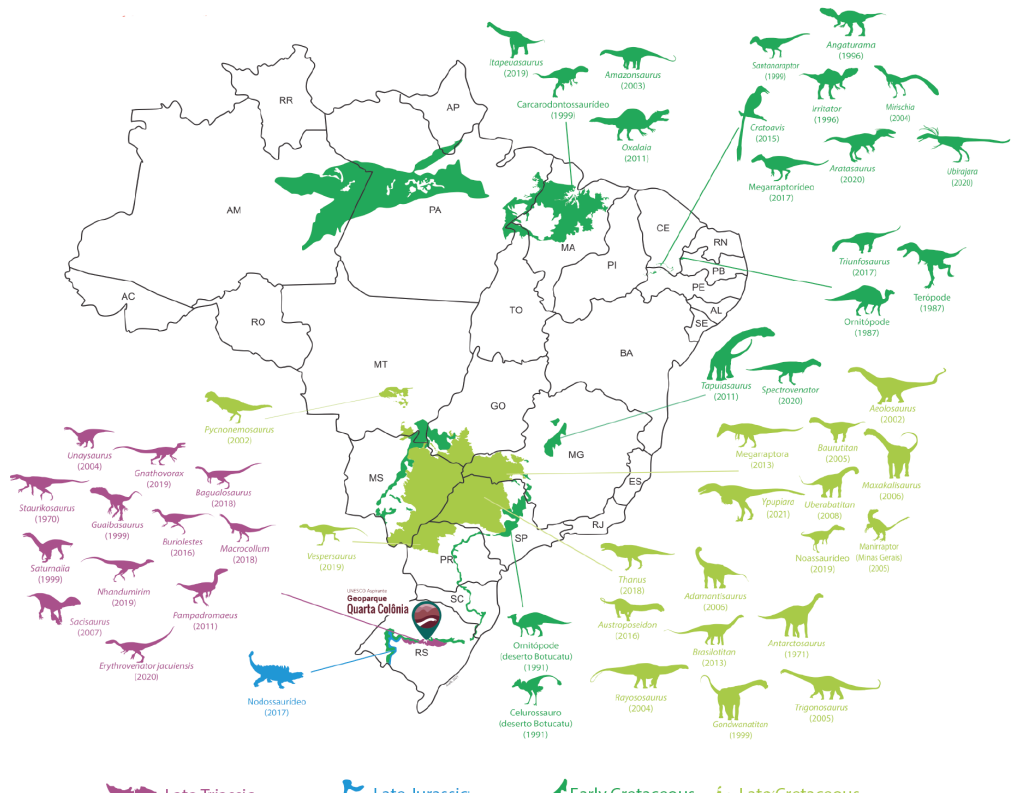


Fig 12- Map of fossil distribution of dinosaur findings in Brazil, highlighting the QCAAG territory. Triassic (purple), Jurassic (blue) and Late Cretaceous (light green) are comprised within the Paraná Basin, i.e. in the southern half of Brazilian territory. Source: Adapted from Anelli (2020).



## B.2- Geological features of the territory

### B.2.1- Geological evolution of the Paraná Basin

The Triassic layers of the central region of RS have been studied both from sedimentological and fossil approaches, taking into account their paleoenvironmental formation (fig.13) and the fossil assemblages found within these layer sequences. Lithostratigraphically, the Middle-Upper Triassic layers of the Paraná Basin are divided into two units: the Santa Maria Formation and the Caturrita Formation (Andreis et al. 1980), with an older underlying formation, the Sanga do Cabral Formation (see Zeffass et al. 2004 and Horn et al. 2014 for an overview). The recurrence of depositional and formational processes and environments led to a lithological homogeneity in many of these layers (represented mostly by pelites and red sandstones resulting from successive energy variations of ephemeral channels on a seasonal climate), which results in significant practical nomenclature problems for these formations. In addition, that there is great lateral discontinuity between outcrops. This discontinuity results both from the current thick vegetation coverage and also from the tectonic fragmentation of the area into structural blocks, which hinders the lateral correlation of facies. In fact, one of the main indicators of temporal correlation of the Triassic strata lies in the abundant fossil records of the Central Region (Região Central), which allows the division of Triassic strata into

different coenozones or Assemblage Zones (AZs) that represent different biostratigraphic markers for the Rio Grande do Sul Triassic layers (see Schultz et al., 2020 for a review). Starting in the early 2000s, a number of studies began to integrate the concepts of Sequence Stratigraphy into current biostratigraphic schemes, accompanied by increased availability of radiometric dating (e.g.: Zeffass et al. 2003; Horn et al. 2014). Thus, the following sedimentary packages of biostratigraphic sequences, from bottom to top, are recognized in addition to the lithostratigraphic sequence (Fig. 8):

- 1) Sanga do Cabral Supersequence, *Procolophon* AZ (equivalent to Sanga do Cabral Fm.), Early Triassic (?Olenekian)
- 2) Pinheiros-Chiniquá Sequence, *Dinodontosaurus* AZ (equivalent to part of the Santa Maria Fm.), Middle Triassic (?Anisian-Ladinian)
- 3) Santa Cruz Sequence, *Santacruzodon* AZ (equivalent to part of the Santa Maria Fm., but not found within the Geopark's territory), Middle Triassic (Ladinian)
- 4) Candelária Sequence, *Hyperodapedon* AZ + *Riograndia* AZ (equivalent to the upper part of the Santa Maria Fm. plus the lower part of Caturrita Fm.), Late Triassic (Carnian-Norian)
- 5) Mata Sequence, without a fossil tetrapod AZ (equivalent to Mata Fm.), Late Triassic (?Rhaetian)

From a sedimentological point of view, the oldest layers of the QCAG territory correspond to the Sanga do Cabral Supersequence (Zeffass et al. 2003), which extends beyond the limits of the Geopark

area. This unit, originally proposed by Andreis (1980), is recognized by interspersed successions of very thin sandstones - of aeolian origin - and abundant intraformational conglomerates frequently including reworked fossils (Schultz et al. 2020). Additionally, lacustrine facies occur with well-preserved fossil records (Da-Rosa et al. 2009), although fossils have not yet been recovered in outcrops of this unit in the Geopark area. This unit's age is attributed to the Early Triassic by the notable presence of the parareptile *Procolophon trigoniceps* (Dias-da-Silva et al., 2017), which co-occurs in Africa, in the Katberg Formation (Karoo Basin). Additionally, Zeffass (2003, 2004) observes that the change in the water regime in this unit correlates with the Gondwanide paroxysm I, also observed in South Africa (Smith, 1995), which mainly results in a diminishing sinuosity in the fluvial systems, indicating an uplift resultant of tectonic reactivation. Thus, the previously meandering system of the underlying units (Rio do Rastro Fm., Permian) changes to a braided system in the Sanga do Cabral Supersequence, with high energy and seasonality, responsible for the facies reworking. The Middle-Upper Triassic lithological successions are part of the Santa Maria Supersequence (Zeffass et al., 2003), and are divided into three third-order sequences, as shown in Fig. 8 (Horn et al., 2016). Two units of the Santa Maria Supersequence occur in the QCAG territory and correspond to the sequences Pinheiros-Chiniquá (Middle Triassic, Anisian-

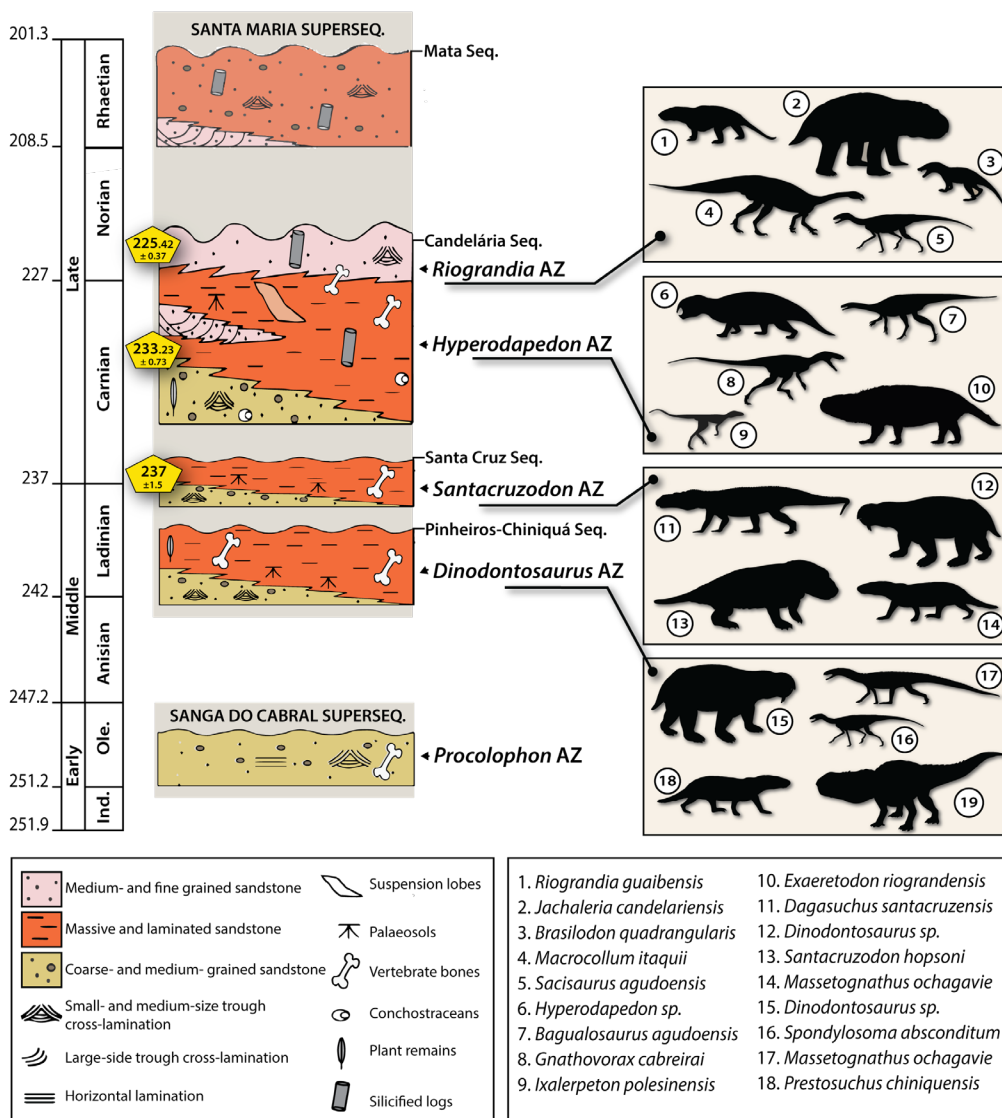


Fig 13- Biostratigraphic sequence of the Triassic layers found in RS, with the respective fossil records.

-Ladinian) and Candelária (Late Triassic, Carnian-Norian). These two sequences extend laterally through most of the Triassic belt of Rio Grande do Sul. However, the Santa Cruz Sequence, which overlies the Pinheiros-Chiniquá Sequence, has a smaller amplitude not covered by the QCAG area. The Pinheiros-Chiniquá Sequence represents the oldest unit of the Santa Maria Supersequence. Lithologically, it is characterized by a package of grayish conglomeratic sandstones at its base, which are marked by planar and channeled

cross-stratifications, representative of a moderate-to-high energy interlaced fluvial system (Zerfass et al., 2003; Horn et al., 2018; Da-Rosa et al., 2005; Horn et al., 2013). These strata, in turn, are overlain by reddish massive mudstones up to 50 meters thick. Its paleoenvironmental interpretation corresponds to broad loess plains, occasionally disturbed by fluvial channels. This stratigraphic unit is associated with a rich tetrapod fauna dominated by dicynodonts (Schultz et al., 2020) in what is called the *Dinodontosaurus* Assemblage Zone (AZ) (see

item B.1.2). This unit does not have an absolute dating recorded yet, relying on the overlying unit (Santa Cruz Seq.) age of 237 Ma (Phillip et al., 2018) as temporal reference. Biostratigraphically (see Schultz et al., 2020, for an overview), the *Dinodontosaurus* AZ (and the Pinheiros-Chiniquá Seq., by extension) has close correlation with the Chañares Formation in Argentina, as well as with Namibia (Fm. Omingode), Tanzania (Lifua Member), and Zambia (Fm. Ntawere). The Candelária Sequence, overlying the Santa Cruz Seq. (not preserved in the QCAG area), like the other stratigraphic sequences of the Middle-Late Triassic in southern Brazil, has its base marked by sediments deposited in interlaced ephemeral fluvial systems (Zerfass et al., 2003; Horn et al., 2018). These systems are diagnosed by the presence of white to reddish sandstones with inclusions of mudstone intraclasts. Packages of red massive mudstones and very thin sandstones, occasionally marked by cross-channel stratifications, are found overlying these systems. Unlike the dry loess plains found in the lower levels (see Pinheiros-Chiniquá Seq.), the layers of the Candelaria Seq. indicate a deltaic environment, with ephemeral lacustrine systems, both suggestive of an increase in overall paleoenvironmental moisture. Two distinct fossil assemblages dominate the Candelaria Seq. In the lower portion, a rich fauna of tetrapods, dominated by rhynchosaurs and traversodontid cynodonts, extends over practically the entire Triassic belt where the

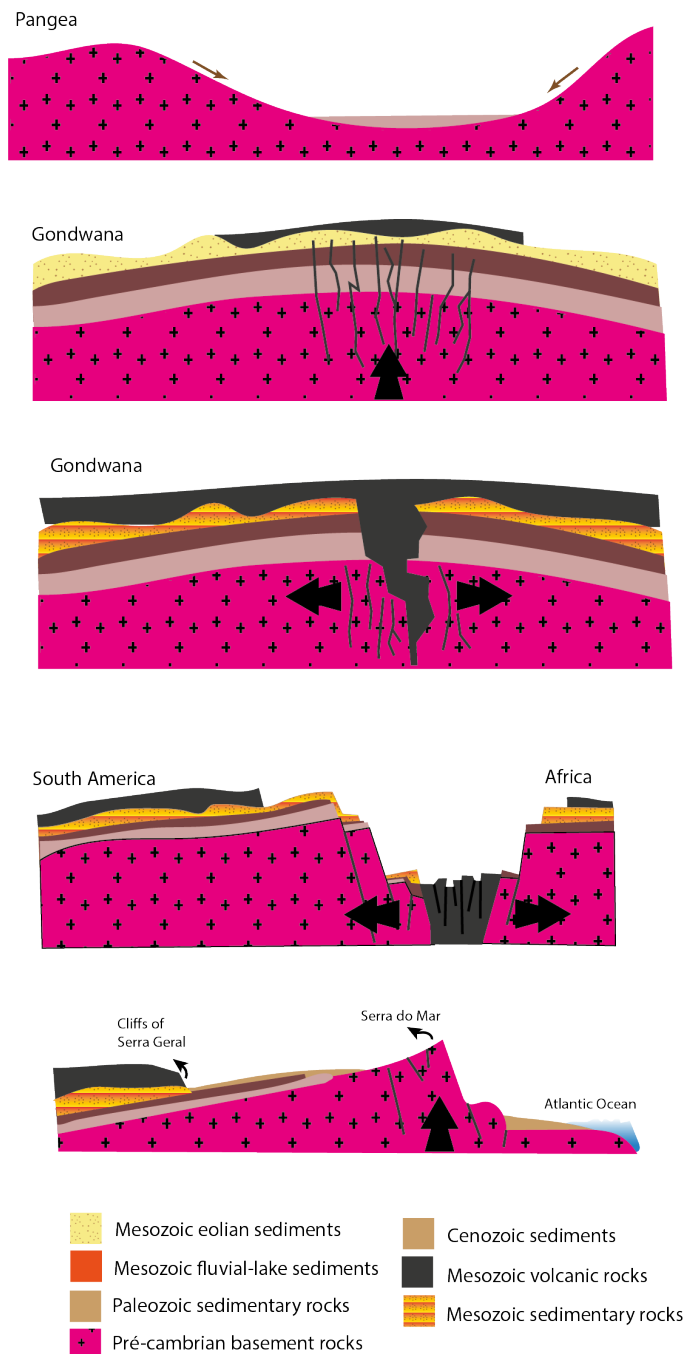


Fig 14- Schematic representation of the grand-scale geological events of formation of the QCAG territory.

Candelaria Seq. outcrops. Important records of dinosaurs, pseudosuchians, basal pterosauroforms, among others, are also attributed to these levels. The presence of the rhynchosaur *Hyperodapedon* characterizes the *Hyperodapedon* AZ, for it was a taxon which had a cosmopolitan distribution during the Triassic, allowing a correlation between the base layers of the

Candelaria Seq. and sites in Europe and Asia, but mainly the strata of the Ischigualasto Formation, in Argentina, which shares broad paleofaunal similarities with the Brazilian strata. Both locations yielded the world's oldest unequivocal dinosaur records (Langer, 2010; Novas et al., 2021), with the Brazilian layers being slightly older, dated at ~233 Ma (Langer et al., 2018). Such

a datum places the Candelaria seq. and the *Hyperodapedon* AZ in the Mid-Carnian, which matches proposed biostratigraphic assignments (e.g. Abdala et al., 2001; Langer et al., 2007b; Schultz et al., 2020). Overlying the reddish pelites where the *Hyperodapedon* AZ is preserved, a pinkish sandstone accumulates, mostly massive and without sedimentary structures, but occasionally preserving deltaic structures and incorporating dispersed intraclasts. The deposition of these packages is related to mass flows caused by seasonal torrential rains, whose abrupt deceleration would prevent the formation of sedimentary structures. Sections of sandstones with planar cross-stratifications or centimeter layers of pelites are rarely found. This environment of ephemeral, hyperconcentrated fluvial systems, regulated by a monsoonal rainfall regime, lithostratigraphically characterizes the base of the Caturrita Formation (Zerfass et al., 2003). Microtetrapod faunas are attributed to these levels, notably extremely small-sized prozostrodontian cynodonts (e.g. *Riograndia*, *Brasilodon*), associated with lepidosaurs, procolophonids or other very small taxa that characterize the Riograndia AZ. The dinosaurs present in this unit, in turn, are represented by large animals such as *Macrocollum* and *Guaibasaurus*, precursors of an ecological period dominated by this group. Absolute dating for this unit based on detrital zircons indicates an age of ~225 Ma (Langer et al., 2018), corresponding to the early Norian. Biostratigraphically, this fossil assemblage is closely related to the Los Colorados and the Quebrada del Barro Formations, both in Argentina. Finally, a sedimentary unit of sandstones of larger grain size discontinuously overlies the deposits with tetrapod fossils, whose fossil record is restricted to the presence of silicified gymnosperm trunks. This unit is contained wi-



thin the Caturrita Formation as a facies corresponding to the Mata Formation, or Mata Sequence (Zerfass, 2003; Horn et al., 2014), and is biostratigraphically distinct from both the *Riograndia* AZ and *Hyperodapedon* AZ (see Schultz et al., 2020 for a detailed overview). Precise dating is not known, with its age tentatively assigned to Late Triassic (Rhaetian). Southwestern Gondwana underwent a transitional phase in the Jurassic period, with virtually no deposition during this period on the Paraná Basin, suggesting that this portion of the South American platform was relatively stable and uplifted, which is reflected as the most conspicuous gap in its stratigraphic record (Milani et al., 2007). The first records of the Jurassic period found in the territory refer to the Guar formation, which belongs to the Late Jurassic, between 163.5 and 145 Ma. The Guar formation presents several traces of fossils such as gastropods, reptiles and fish, suggestive of its stipulated age (Pires, 2019). The thickness of the Guar Formation ranges from 70 to 100 m. The unit is interpreted as a deposit of a humid aeolian system, with dunes and sand sheets. Aeolian paleocurrents indicate dune migration predominantly to the northeast. The facies succession shows an increase in moisture from the base to the middle of the Formation, evidenced by the presence of adhesion structures and paleosols, and becoming dry once more at the top (Soares et al., 2008). The upper contact between the sandstones of the Guar and Botucatu Formations is abrupt, with the occurrence of large local polygonal fractures, in which the upper, aeolian sandstone fills the space

generated by the contraction of the lower sandstone (Soares et al., 2008). The Botucatu Formation corresponds to the immense desert environment of the Early Cretaceous period of the Mesozoic Era (145 to 100.5 million years ago). This formation consists mainly of large and very large sandstone sedimentary rocks with cross stratification, associated with aeolian dunes (Zerfass, 2007), and fine to medium grain size (Pires, 2019). In those portions where the sandstone is more silicified, there is greater resistance to erosion, ensuring the structural maintenance of the top of the residual hills that are distributed throughout the territory as a product of the erosive retreat of the plateau cliff, and which represent a significant part of the local geomorphological heritage. The Cretaceous in the Paran Basin was marked by the end of a first order tectonic cycle, with the fragmentation of Gondwana and the opening of the South Atlantic (fig. 9). In the QCAG, the records of this event are marked by the occurrence of aeolian sandstones of the Botucatu Formation and volcanic outcrops of the Serra Geral Formation (Botucatu-Serra Geral Sequence), with intercalations of wide lenses of intertrap aeolian sandstones between successive spills. The Serra Geral Formation dates back to the Early Cretaceous, which is evidenced by radiometric dating performed on the volcanic rocks (Zerfass, 2007). In the QCAG territory, the Serra Geral Formation is divided between the Gramado facies (characterized by a volcanic sequence of basic rocks - basalts and andesites - of dark gray color and spheroidal disjunctions, with pilotaxitic texture and vesicular zones); inter-

traps sandstone facies (composed of fine to medium quartzose pink sandstones with large and very large fluted cross-lamination, associated with aeolian dunes) and the Caxias facies (characterized by a volcanic acidic sequence of light gray vitrophyres, rhyolites and rhyodacites) (Godoy, 2011). Especially in the Gramado facies, this unit shows intense cracking, predominantly vertical in the middle of the sill (columnar structure) and horizontal at the top and bottom. After the Atlantic Ocean opening, the South American Platform kept the generalized ascending character - which began at the time of the Botucatu sedimentation - until the inversion of this behavior as a result of the accumulation of almost 2,000 m thick basaltic lavas, searching for a new isostatic adjustment of the lithospheric portion where the Serra Geral spills were now accumulated (Milani et al., 2007). In the Quarta Colnia region, an informal unit was defined to encompass a set of rocks, called So Joo do Polsine Intrusives, with a suggested age equal to or slightly older than the Botucatu-Serra Geral Sequence, but still from the Early Cretaceous (Zerfass, 2007). These rocks correspond to intrusive igneous bodies in triassic rocks, which may be associated to the alkaline magmatism phase, although the hypothesis that they represent conduits of lavas from effusions of the Botucatu-Serra Geral sequence should not be discarded. Finally, the Cenozoic at the QCAG territory is marked by lateritic exposures, colluvial deposits and by large alluvial plains. The pleistocene laterites correspond to the Formigueiro Laterite, generated by the surface concentration of iron under alternating climatic condi-





SCIENTIFIC NAME		AGE	COMPLETUDE	FEEDING	SIZE	TIME OF PUBLICATION
<b>DINOSAURS</b>						
<i>Pampadromaeus barberenai</i>		-230 Ma	an incomplete skeleton	omnivore	small (roughly 1.5m long)	2011
<i>Bagualosaurus agudoensis</i>		-230 Ma	an incomplete skeleton	herbivore/omnivore	medium (2.5 to 3m long)	2018
<i>Macrocollum itaquii</i>		-225 Ma	at least three almost complete skeletons	herbivore/omnivore	large (more than 3.5m long)	2019
<i>Erythrovenator jacuiensis</i>		? 230/225 Ma	a single femur fragment	carnivore/insectivore	medium (2m long)	2020
<i>Guaibasaurus candelariensis</i>		-225 Ma	two incomplete skeletons	?	medium (about 3m long)	1999
<i>Buriolestes schultzi</i>		-233 Ma	two incomplete skeletons	carnivore	small (less than 1.5m long)	2016
<i>Gnathovorax cabreirai</i>		-233 Ma	an almost complete skeleton	carnivore	medium (more than 2m long)	2019
<b>CYNODONTS</b>						
<i>Exaeretodon riograndensis</i>		-230 Ma	dozens of skulls and postcranial bones	herbivore/omnivore	medium/large (the size of a pig)	2003
<i>Trucidocynodon riograndensis</i>		-230 Ma	an almost complete skeleton, plus isolated elements	carnivore	medium (about 1.5m long)	2010
<i>Siriusgathus niemeyerorum</i>		? 230/225 Ma	dozens of skulls and postcranial bones	herbivore	medium/large (the size of a pig)	2018
<i>Agudotherium gassenaee</i>		? 230/225 Ma	an incomplete mandible with teeth	insectivore	small (the size of a small possum)	2020
<i>Luangwa sudamericana</i>		237 Ma +	fragmentary skulls and jaws	herbivore	the size of a dog	2004
<i>Massetognathus ochagaviae</i>		237 Ma +	dozens of skulls and postcranial bones	herbivore	the size of a cat	1981
<i>Protheriodon estudianti</i>		237 Ma +	a skull	carnivore/insectivore	the size of a possum	2006
<i>Riograndia guaibensis</i>		-225 Ma	several skulls and isolated bones	herbivore/insectivore	tiny (the size of a mouse)	2003
<i>Brasilodon quadrangularis</i>		-225 Ma	fragmentary skulls and jaws	carnivore/insectivore	tiny (the size of a rat)	2005
<i>Irajatherium hernandezii</i>		-225 Ma	skull and jaw	carnivore/insectivore	tiny (the size of a rat)	2005
<i>Prozostrodon brasiliensis</i>		-233 Ma	skull and jaw	carnivore/insectivore	small (the size of a small possum)	1987
<i>Scalenodon ribeiroae</i>		237 Ma +	skull	herbivore/omnivore	medium (about 1.5m long)	2017
<i>Protuberum cabralense</i>		237 Ma +	skull, incomplete postcranium	herbivore/omnivore	medium (about 1.5m long)	2009
<i>Chiniquodon sp.</i>		237 Ma +	partial skeletons	carnivore	medium (about 1.5m long)	1936
<b>DICYNODONTS</b>						
<i>Dinodontosaurus sp.</i>		237 Ma +	dozens of skulls and postcranial bones	herbivore	large (the size of a calf)	1943
<i>Jachaleria candelariensis</i>		-225 Ma	two skulls and several postcranial elements	herbivore	large (the size of a calf)	1980
<i>Stahleckeria potens</i>		237 Ma +	incomplete skulls	herbivore	large (the size of a cow)	1935
<b>PSEUDOSUCHIANS</b>						
<i>Dynamosuchus collisensis</i>		-230 Ma	an incomplete skeleton	carnivore	medium (the size of a large iguana)	2020
<i>Decuriasuchus quartacolonia</i>		237 Ma +	several complete skeletons	carnivore	medium (the size of a small alligator)	2011
<i>Prestosuchus chiniquensis</i>		237 Ma +	several incomplete skeletons	carnivore	large (4 to 8m long)	1938
<i>Aetosauroides scagliai</i>		-233 Ma	several incomplete skeletons	herbivore/omnivore	medium (the size of a small alligator)	1960
<i>Polesinesuchus aurelioi</i>		-233 Ma	an incomplete skeleton	herbivore/omnivore	small (the size of a lizard)	2014
<b>RHYNCHOSAURS</b>						
<i>Hyperodapedon sp.</i>		-233 Ma	dozens of skulls and postcranial bones	herbivore	medium (2 to 3m long)	1859
<b>SQUAMATES</b>						
<i>Carginia enigmatica</i>		-225 Ma	a jaw fragment	insectivore	tiny (the size of a gecko)	2006
<i>Clevosaurus riograndensis</i>		-225 Ma	several incomplete skeletons	insectivore	tiny (the size of a gecko)	2010
<i>Lanceirosphenodon ferigoloi</i>		-225 Ma	skull fragments	insectivore	tiny (the size of a gecko)	2020
<b>OTHERS</b>						
Amphibian	<i>Compsoceros sp.</i>	-233 Ma	skull fragments	carnivore	small (less than 1m long)	1995
Pterosauroomorpha	<i>Ixalerpeton polesinensis</i>	-233 Ma	skull fragments	insectivore	tiny (the size of a parrot)	2016
Silesauridae	<i>Sacisaurus agudoensis</i>	-225 Ma	dozens of femora, plus isolated elements	herbivore/insectivore	small (less than 1.5m long)	2006
Procolophonidae	<i>Soturnia caliodon</i>	-225 Ma	some skulls and postcranial elements	herbivore/insectivore	tiny (the size of a gecko)	2003
Owenettidae	<i>Candelaria barboursi</i>	237 Ma +	some skulls	insectivore	tiny (the size of a gecko)	1974
Archosaur	<i>Faxinalipterus minima</i>	-225 Ma	incomplete skeleton	?	tiny (the size of a gecko)	2010

Fig 16- List of fossil vertebrates found in the territory of UNESCO Aspiring Geopark Quarta Colônia.

*Gnathovorax* corresponds to a carnivore over 2.5m long, closely related to the Brazilian dinosaur *Staurikosaurus pricei* and the Argentinian forms comprised in the Herrerasauridae family. It is known from a single virtually complete skeleton in an exceptional state of preservation, consisting of the best dinosaur fossil record of the group. *Buriolestes*, on the other hand, is a small dinosaur, about 1.2m long, known from at least five specimens in varying degrees of completeness. It represents a bipedal faunivorous/insectivorous form, with close phylogenetic relationships with the Sauropodomorpha, and is most hypothetically considered as the most primitive form of the group. Sauropodomorphs are the best sampled dinosaur group in the QCAG territory and include, besides *Buriolestes*, the taxa *Pampadromaeus barberenai*, *Bagualosaurus agudoensis*, (both from geosite GF1- Janner) and *Macrocollum itaquii* (GF4- Wachholz). These three forms show, broadly speaking, successively more derived stages of Sauropodomorpha, “progressively” accumulating traits, such as an increase in the robustness of the teeth (indicative of a transition to omnivorous diet, as seen in *Pampadromaeus* and *Bagualosaurus*), an increase in body size and a reduction in the relative size of the skull (as seen in *Bagualosaurus* and *Macrocollum*), and finally a remarkable elongation in the cervical region and dentition completely adapted to the consumption of vegetation (as seen in *Macrocollum*). These features, evolutionarily accumulated over an interval between 233-225 Ma., consist of the first morphofunctional adaptations that gave the Sauropodomorpha great adaptive success. Other dinosaurs from the QCAG include *Erythroventor jacuiensis*, represented only by a fragment of femur collected at geosite GF16 (Niemyer), and *Guaibasaurus cande-*

*lariensis* (GF8- Linha São Luiz), a dinosaur of controversial taxonomic affinities, recognized in Quarta Colônia by a very complete skeleton, but without the skull. Nevertheless, the vertebrate fossil record in the QCAG is not limited to dinosaurs. In fact, one of the most striking aspects of the Triassic records is precisely the fact that they collectively and globally bring together the root of current major vertebrate lineages. For example, the Loricata group (França et al., 2013; Desojo et al., 2020; Roberto-Da-Silva et al., 2020), represented by *Prestosuchus chiniquensis* and *Decuriasuchus quartacolonía* in Quarta Colônia, eventually spawned present-day crocodiles. Circa 237 million years ago (even before the dinosaurs emerged), some of the members of this lineage embodied the top of the food chains. *P. chiniquensis*, for example, could exceed 8 meters in length and is virtually one of the largest (if not the largest) predators of its time on the whole planet. This group coexisted extensively with dicynodonts such as *Dinodontosaurus* (Kammerer and Ordoñez, 2021), herd herbivores of an extinct lineage, depicting a surviving branch of the Permian-Triassic extinction, a phenomenon that nearly obliterated life on Earth 252 million years ago. This is perhaps one of the best sampled Triassic taxa in Rio Grande do Sul, with hundreds of specimens known, from hatchlings through juvenile stages, to adults that could reach the size of a modern bovine. Contemporary to the first dinosaurs, 233 million years ago, a booming fauna flourished, dominated by rhynchosaurs. The rhynchosaur group is represented by the genus *Hyperodapedon* in Quarta Colônia (Langer and Schultz, 2000; Schultz et al., 2020), and consists of quadrupeds, which represented most of the herbivores of that time. In fact, the genus is so abundant that 233 million years ago it expanded into territories which today com-

prise Argentina in South America, Europe (e.g. Scotland) and Asia (e.g. India), suggesting that they were in fact able to span the entire globe (at that time made up of a single continental mass, the Pangaea). At the same time as the aforementioned taxonomic groups, the cynodonts prospered as a more diverse group in Triassic outcroppings in the QCAG region. Cynodonts, collectively, were quadrupeds, spanning from the ecological role of large herbivores to small insectivores, but also included medium-sized predators, detritivores/necrophages and other forms. Cynodonts are present in all fossil assemblages recorded in QC to date. Thus, their record in the region extends from ~237 Ma. to ~225 Ma. Globally, however, the group exceeds these temporal limits. Indeed, the cynodont lineage persists to the present day through the mammalian lineage, which evolutionarily lies very close to a lineage of cynodonts extensively recorded in QC, in geosite GF8 (Linha São Luiz). From fossil records found in QC, the cynodontids are temporally concentrated in two groups: Traversodontidae (herbivorous/omnivorous forms that ranged from 4 to over 40kg) and probainognathids, mostly carnivorous/insectivorous forms that ranged from about 20kg to tiny animals of a few grams of mass. Traversodontidae (Abdala et al., 2002; Pavanatto et al., 2016; 2018) include instances such as *Massetognathus ochagaviae*, *Exaeretodon riograndensis* and *Siriusgnathus niemyerorum*. They were characterized by their post-canine teeth (from the posterior portion of the dental arches) which were remarkably enlarged and robust, suitable for macerating fibrous matter, suggesting that they were herbivores. The probainognathid lineage, in turn, included ecteniniids such as *Trucidocynodon riograndensis*, a true carnivore with piercing/cut-

ting dentition (Oliveira et al., 2010; Stefanello et al., 2018), *Prozostrodon brasiliensis*, a small carnivore, and a micro-cynodont fauna that included tritheledontids such as *Riograndia guaibensis* and brasilodontids such as *Brasilodon quadrangularis* and *Brasilitherium riograndensis* (Bonaparte et al., 2005, 2010; Soares et al., 2011). These cynodonts were remarkable for their miniature size (with skulls from one to three centimeters long) and the latter two genera (*Brasilodon* and *Brasilitherium*) are closely related to the lineage of Mammaliaformes, which beget the evolution of today's mammals. The QC fossil record also presents specimens that are less conspicuous, yet no less important. Ae-

tosaurus like *Aetosauroides scagliai* were armored figures related to the pseudosuchians; Silesauridae like *Sacisaurus agudoensis*, herbivorous forms with a controversial classification (sometimes grouped as a lineage of dinosaurs, sometimes as a group basal to dinosaurs); lagerpetids such as *Ixalerpeton polesinensis*, which for decades were nested among Dinosauroomorpha, but were recently regrouped among pterosaur ancestors (Ezcurra et al., 2020); as well as small lizard-like forms, such as procolophonids (*Soturnia caliodon*); rhychocephalians (*Clevo-saurus brasiliensis*, *Lanceirosphenodon ferigoloi*) and lepidosaurs, such as *Cargninia enigmatica*. The Geopark area also has pa-

leobotanical records (Barboni and Dutra, 2013; Crisafulli et al., 2018), ranging from fossilized wood, such as the Taxaceae *Sommerxylon spiralosus* and the conifers *Kaokoxydon zalesskyi*, *Agathoxydon africanum* and *Chapmanoxydon jamuriense*, to a wealth of branches and strobili, including reproductive structures of Bennettitales such as *Williamsonia potyporanae* and *Pterophyllum sp.*, as well as Equisetaceae and Araucariaceae such as *Pagiophyllum*. Interestingly, many of these botanical taxa could indicate a Jurassic age for the layers in which they occur, although radiometric dating indicates an age of ~225 Ma (Triassic, Norian) for some of the localities.

### B.2.3- Juro-Cretaceous Geological Heritage

The main juro-cretaceous geological heritage of the territory refers to morphological structures formed from the lithologies produced in two distinct systems: an

arid system formed from the Late Jurassic, composed of the Guará and Botucatú formations, and a system of Cretaceous volcanic eruptions, of the Serra Geral formation, interspersed by layers of sandstones aeolian intertraps. In the first case, these formations are composed of essentially quartz sandstones containing altered feldspars cemented by silica (predominantly) or iron oxide, with large cross stratification. From a structural point of view, these formations are especially responsible for the maintenance of important geomonuments of the territory thanks to the presence

of very lithified layers, semi-permeable or impermeable, capable of stopping the erosion processes produced by cliff retreat movement, isolating residual hills that stand out in the landscape, as in the case of the Morro Agudo geosite (GG1) - Figure 17, a feature that served as a reference and territorial identity for the first immigrants, giving rise to the name of the municipality (Agudo, which means acute or sharp). These geomonuments currently assume a heritage value not only from the scientific-geomorphologic point of view, but also ecological (for supporting current xerophyte relics, as in the case of Morro Agudo - GG1, or for guaranteeing the conservation of expressive fragments of the Atlantic Forest, as in the case of Monte Grappa - GG5, in Ivorá) as well as from a cultural standpoint (with religious pilgrimages, as in Monte Grappa - GG5 or in Morro Santo Antônio - GG19, in Dona Francisca). In these sandstone formations it is also worth mentioning an important heritage value associated with the hydrogeological behavior,

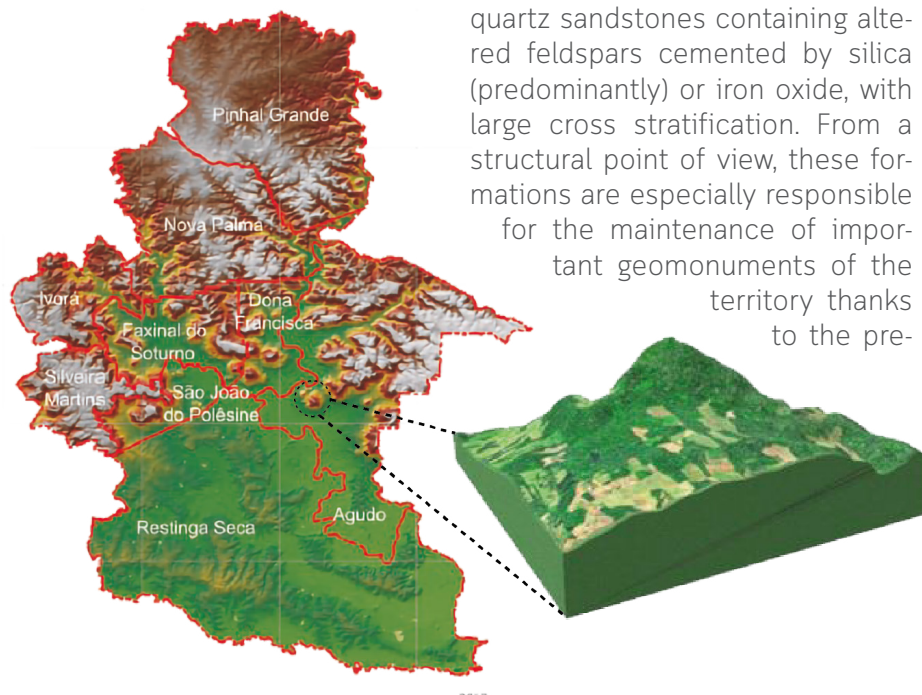


Fig 17- Topographic representation of the territory, highlighting the Morro Agudo geosite, one of the geomonuments of Morro do Testemunho produced by the retreat of the Plateau Cliffs.



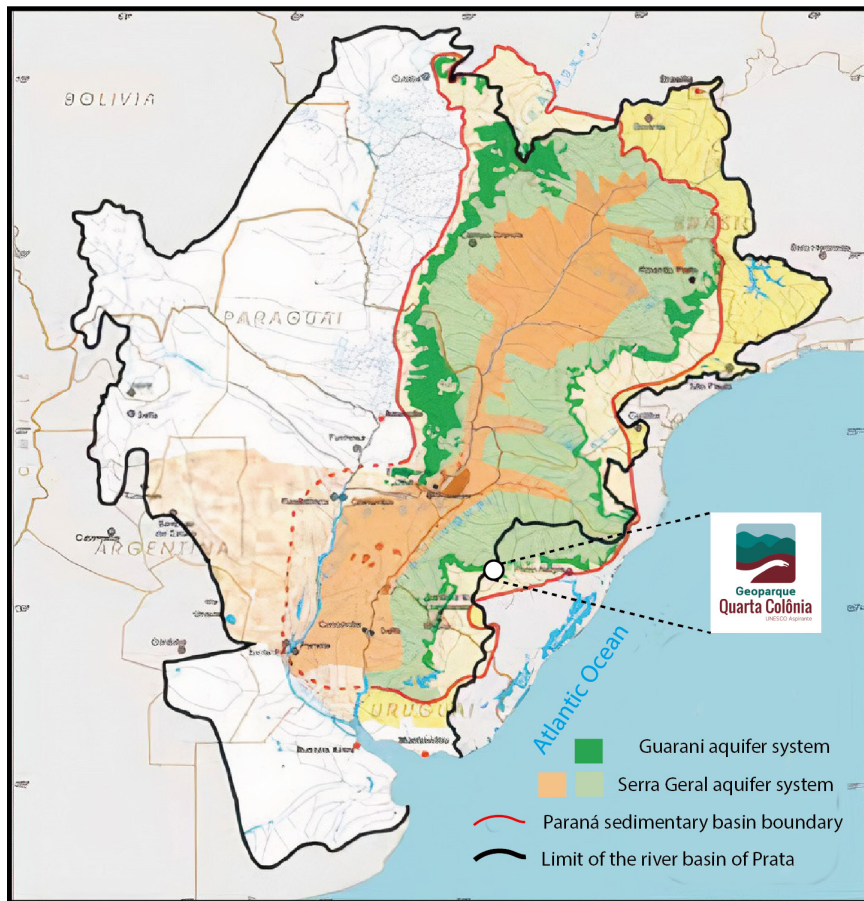


Fig 18- Map of the Guarani-Serra Geral Aquifer System, highlighting the location of the QCAG, on the southern slope of the Brazilian Meridional Plateau. Source: Adapted from Stallbaum (2018).

especially in the case of Botucatu sandstone. Due to its great permeability, it receives indirect recharge from downward drainage from the overlying volcanic flows and the formation of the Paraná Basin is thus responsible for sus-

taining one of the largest aquifers on the planet, the Guarani-Serra Geral Aquifer system, with an area of 1,200,000 Km<sup>2</sup> (fig. 18), distributed among Brazil, Argentina, Paraguay and Uruguay, with an exploitable water volume of approxi-

mately 40 km<sup>3</sup> (STALLBAUM, 2018). As the general slope of the layers is northward, there is an overall flow in this direction. However, close to the declivity that delimits the southern slope of the Paraná Basin, there is a flow downstream of the slope due to the lowering of the piezometric level from the discharge of water sources that exfiltrate this geomorphological compartment and feed the enormous diversity of rivers, streams and waterfalls that exist in the territory due to topographic conditions. The Paraná Basin Cretaceous was marked by the end of a first-order tectonic cycle, with the fragmentation of Gondwana and the opening of the South Atlantic. The main event preceding this opening is the volcanism of the Paraná-Etendeka Province (GODOY et al., 2012). In Namibia as well as in southern Brazil, the lava flow covered aeolian dune fields at the contact point between the current Botucatu and Serra Geral formations. These rocks occur in a decreasing age pattern towards the top. This reflects a stacking behavior of lavas, in different eruptions, which is determined by observing the rocks' texture and structure. The basic sequence is composed predominantly of effusive rocks, which are arranged in three major groups:



Fig 19- A volcanic rock extraction site at Pinhal Grande (left) and a colonial house in Dona Francisca (right) built with rocks of the Serra Geral Formation, showing a construction standard typical of the immigrant culture, quite common within the territory.





Fig 20- Panoramic view of the Jacuí river dam at Nova Palma municipality, viewed from the Dona Francisca Dam Overlook (GH3).

basalts, andesites and basalts with volcanic glass. The commonly found effusive rocks are grouped into four major petrographic types: felsic dacites and rhyodacites, felsic rhyolites and glassy phenobasalts. There are mining sites of these rocks in various parts of the Geopark territory and, due to the ease of access and extraction, this material has been incorporated into the construction standard of the local architecture (which also occurs with sandstone extraction), often taking advantage of the rock's thermal insulation to build cellars, where wine and other products of the family agro-industry could be stored (fig. 19). All these buildings, in different states of conservation, were identified and mapped in the work of Sechin (2018) and became study subjects for the creation of geotourism routes associated with the architectural heritage of German and Italian immigration. The great heritage value of the Serra Geral Formation, however, is associated with the formation of a geomorphological cliff structure (fig. 21 and 22) which

crosses the territory from east to west, demarcating the transition between the Brazilian Meridional Plateau (covered by the Atlantic Forest biome) and the central accumulation plains, to the south, covered by the Pampa biome. The formation of this zone of higher cliffs led to a lowering of the base level, with intensified hydric discharge and processes of erosion and transport during the Cenozoic, which resulted not only in a slow and continuous retreat of the slope line, maintaining the geomorphons of residual hills, but also a perfect carving of large valleys originally fitted into fault lines. Today, these valleys can be observed from some panoramic geosites, such as Cerro Comprido Overlook - GG4, CAPPÁ Overlook - GG8 and Cerro da Figueira - GG15, they also provide an essential ecological service for the entire region, which is the storage of water in artificial lakes with multiple uses, including two power plants: the Itaúba Plant and the Dona Francisca Plant (fig. 20), both on the

Jacuí River. The former, located in Pinhal Grande, was inaugurated in 1978, has an installed capacity of four 125 MW turbines, with a level difference of almost ninety meters and a dam length of 385m. The Dona Francisca Hydroelectric Power Plant, inaugurated in 2001, is located downstream from the Itaúba plant, between the municipalities of Pinhal Grande, Nova Palma and Agudo. It has a level difference of little more than 38 meters and a dam length of 610m, installed with the potential of 125MW of generated power, distributed in two turbines. It is important to note that the hydroelectric use of the valleys embedded in the volcanic relief of the plateau represents a more modern version of a technology already used by immigrants in this territory since the nineteenth century: the water wheel, used especially to power flour mills and to crush sugar cane to produce aguardente (alcoholic beverage). Relics of this technology can still be found in the territory, some still in operation.



Fig 21- Images of the central opening on the sandstone cavity located at the Gruta do Índio geosite (GG9), in Agudo.

## B.2.4- Cenozoic Geomorphological Heritage

Holocene deposits on one side correspond to areas of recent accumulation of sandy-clay floodplain material, with flat topography dominated by slopes with declivities lower than 5% and elongated slope lengths; on the other side, there are colluvial deposits located below the rocky cliffs, covering the concave parts of the slopes all the way to the valleys' thalweg, as elongated and irregular interfluvial spurs, normally covered by seasonal forest (fig. 22). The valleys of the rivers Soturno (affluent of the right bank of the Jacuí River) and Jacuí (main hydrographic system of the Atlantic basin of Rio Grande do Sul) are of special note. The Jacuí floodplain dominates most of the floodplains within the geopark and the low slope of these areas ensures the formation of a meandering drainage pattern for the main river and its tributaries (fig. 23), allowing very plain observation of features linked to the river's fluvial dynamics, such as sandy bars, river islands and the meandering formation. This low slope of the channel, from the municipalities of Agudo, Dona Francisca and Restinga Seca, extending to the river mouth in the Guaíba lake (Metro-



Fig 22- Picture of the Cerro da Igreja geosite (GG3), in Agudo, where colluvial deposits can be clearly seen below the fault cliff, descending in a slope until they meet the alluvial deposits of the Jacuí river plain.

politan Region of Porto Alegre), and the Jacuí river's great volume of water, guaranteed the navigability between this territory and the capital of the province during the 19th century, allowing arrival of supplies to the colony and a portion of the newly arrived immigrants in Porto Alegre to be transported by river to the center of the province. Throughout the floodplain areas, it is also possible to identify a large amount of paleodeposits associated with paleochannels, horseshoe lakes and flood basins, which de-

monstrate the migration of the channel within its evolutionary system over the past millennia, producing a mosaic of wetlands with distinct morphogeneses. The floodplain areas have been strategic for the agricultural economy of the municipalities located in the central-southern portion of the Geopark territory, such as São João do Polêsine, Faxinal do Soturno, Agudo and Restinga Seca, especially for rice production.



## B.3- Geosites and their Heritage Value



Fig 23- Aerial image of the Jacuí river plain in Agudo, highlighting the meandering pattern of the main channel.

The QCAG has 31 geosites with regional and international geoheritage value (distributed among categories of fossil, lithological/sedimentological, fluvial/hydro-

geological and geomorphological value) and 23 sites linked to other forms of heritage (ecological, scenic, historical-cultural and/or archaeological value), as shown in

figures 24 and 25. Another twenty geosites and twenty-two sites of heritage value have been inventoried in the territory, but are not ready for immediate use, ei-

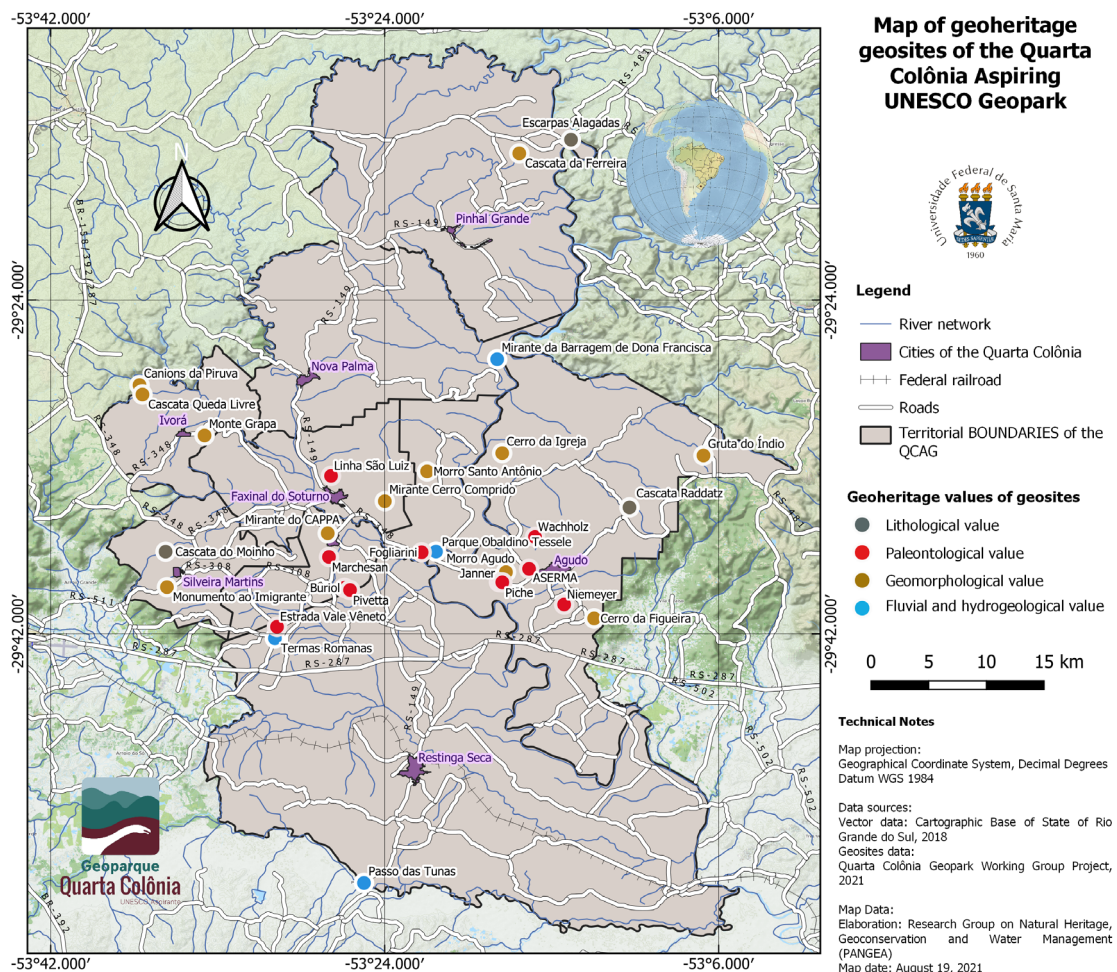


Fig 24- Location map of the 31 geosites within QCAG, distributed in the four geoheritage value categories.

ther because of challenges related to access or because of the need for infrastructure and safety installations in order to be able to receive visitors in the future. These 54 places (sites and geosites) are distributed across the nine municipalities of the Geopark and include the best existing examples of the territory's geological, ecological and cultural heritage. Many of these sites are already incorporated into the culture of the territory's communities, providing a reference of

territorial identity for its residents. Specifically in the case of geosites, they represent an effort to systematize areas of the territory that have already been investigated by UFSM researchers for decades and originating dozens of scientific publications, including published articles, monographs, dissertations and theses. The systematization of these sites in the context of geoconservation began with the preliminary inventory conducted by the Geological Service of Brazil (Godoy et al., 2012), which was sub-

sequently improved and expanded by the research of Ziemann (2015 and 2020) and Cechin (2018). Although most of the geosites and sites of heritage value have geotourism uses (fig. 26), not all geosites are open to self-guided visitation, especially in the case of fossil geosites, where the vulnerability of the collected material requires greater access control. In these cases, visitation, when possible, only occurs for educational purposes and with the presence of specialized guides.

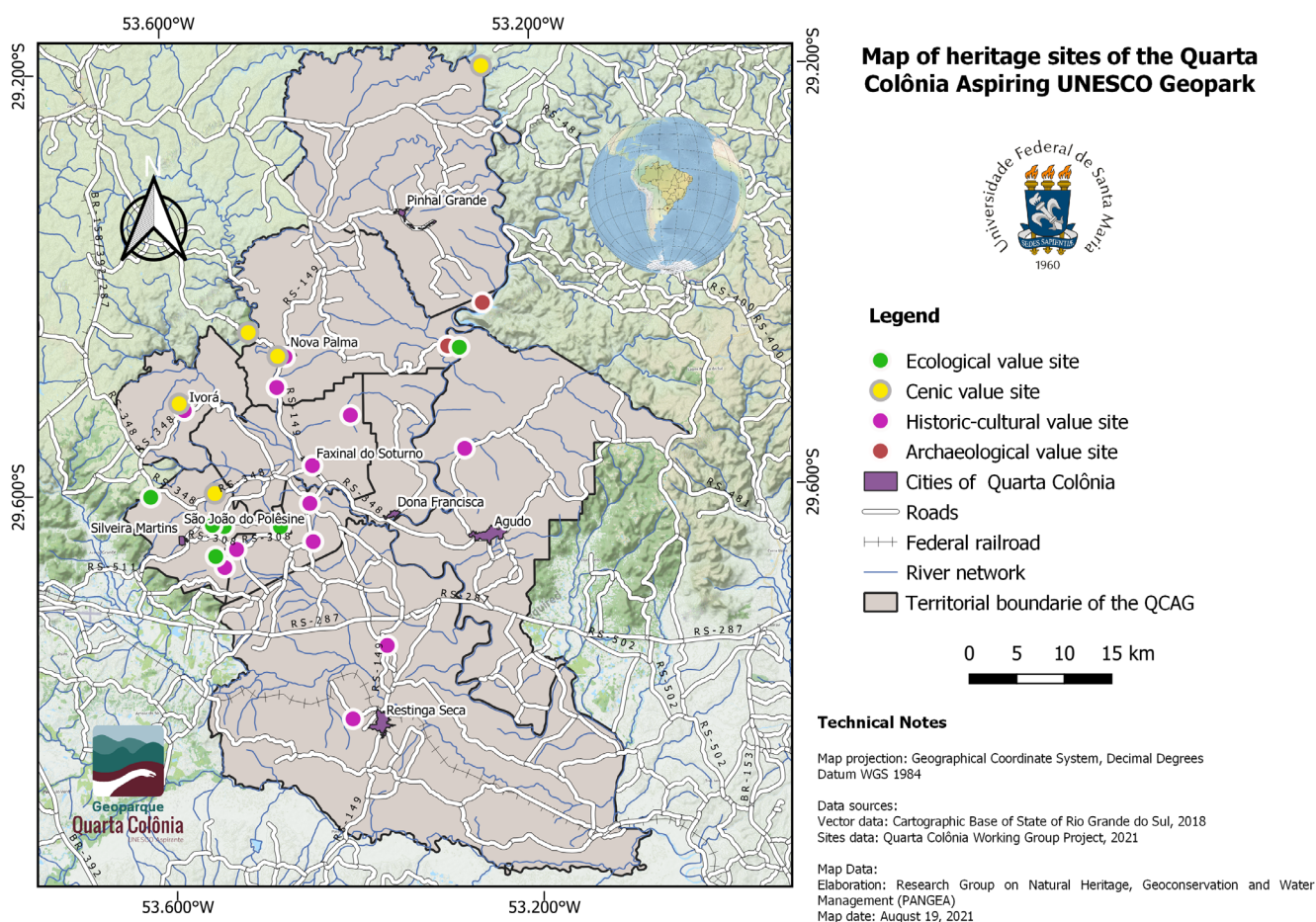


Fig 25- Map of the 23 sites of heritage value in QCAG, distributed in the four categories of heritage value.

### B.3.1- Geosites of fossil value

The relevant fossiliferous geosites (fig. 27) at the QCG area are roughly concentrated at the southern half of the territory, where sedimentary layers of Triassic age are

exposed. These deposits area characterized as reddish mudstone and siltstone layers (red beds) and sandstones of lighter coloration, which represent fluviolacustrine sedimentary successions, typical of floodplain environments. The red ravines and hillsides which

characterize these outcrops are distributed along urban and rural areas likewise, including roadcuts, artificially excavated water reservoirs employed in agriculture, and hillsides, in sedimentary exposures that range from 2 meters to more than 15 meters



in height. The fossil content in these localities varies according to the exposed depositional units. Therefore, the areas surrounding the Dona Francisca municipality concentrate deposits representative of the Dinodontosaurus AZ including iconic loricatan top predators such as *Prestosuchus*. In the areas surrounding the municipalities of São João do Polêsine, Restinga Seca and Agudo, *Hyperodapedon* AZ outcrops are dominant, including a rich fossil record of rhychosaurus, early dinosaurs, and cynodonts. The *Riograndia* AZ

outcrops are particularly concentrated in the area of Faxinal do Soturno, though occur sparsely in the urban area of Agudo. These sites yield a rich and diverse microcynodont fauna, altogether with small-sized reptiles and medium-sized to large dinosaurs, such as *Guaibasaurus* and *Macrocollum*.

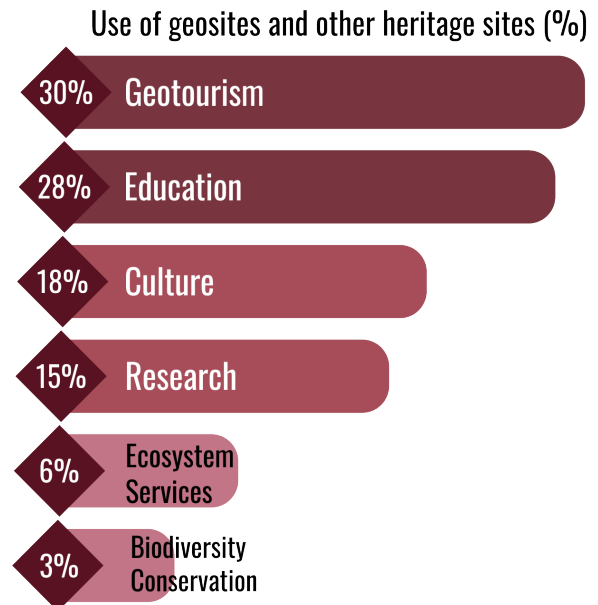


Fig 26- Graph showing the distribution of use defined for geosites and heritage value sites of the QCAG.

CODE	NAME	MUNICIPALITY	USE*	HERITAGE VALUE	VULNERABILITY
GF 1	Janner	Agudo	P, E		
GF 3	ASERMA	Agudo	P, E, G		
GF 4	Wachholz	Agudo	P		
GF 5	Fogliarini	Dona Francisca	P, E, G		
GF 8	Linha São Luiz	Faxinal do Soturno	P, E, G		
GF 11	Buriol	São João do Polêsine	P, E		
GF 12	Piche	São João do Polêsine	P, E		
GF 15	Estrada Vale Vêneto	Restinga Seca	G		
GF 16	Niemeyer	Agudo	P		
GF 17	Pivetta	São João do Polêsine	P, E		
GF 18	Marchesan	São João do Polêsine	P		

\*USE: E-educational, P - Research, C - Cultural, G - Geotourism, SE - Ecosystem Service, CB- Biological Conservation

HERITAGE VALUE	LOW	MIDDLE	HIGH	VERY HIGH
VULNERABILITY	LOW	MIDDLE	HIGH	VERY HIGH

Fig 27- Heritage and vulnerability evaluation of the fossiliferous geosites employed at the Geopark.



### B.3.2- Geosites of fluvial/hydro-geological value

The QCAG has three geosites of fluvial value and one of hydrogeological value (figures 28 and 29). The Obaldino Tessele Park is a geosite located in the urban area of Dona Francisca, in the floodplain area on the banks of the Jacuí

River, allowing visitors to have a privileged view of different aspects of the dynamics of a meandering river. Moreover, because it is an urban park, visitors will find architectural references to the immigrants' culture at this geosite. In the Passo das Tunas geosite, a traditional riverside resort on the banks of the Vacacai River, it

is possible to observe the entire formation dynamics of sandbanks and river islands. At the Dona Francisca Dam Overlook geosite, visitors have the opportunity to understand the formation of embedded valleys and the processes of damming and hydroelectric utilization of the Jacuí River.

CODE	NAME	MUNICIPALITY	USE*	HERITAGE VALUE	VULNERABILITY
GH 1	Parque Obaldino Tessele	Dona Francisca	E, C, G		
GH 2	Passo das Tunas	Restinga Seca	E, G		
GH 3	Mirante da Barragem de Dona Francisca	Nova Palma	E, G, SE		
GH 4	Termas Romanas	Restinga Sêca	E, C, G		

\*USE: E-educational, P - Research, C - Cultural, G - Geotourism, SE - Ecosystem Service, CB- Biological Conservation

HERITAGE VALUE	LOW	MIDDLE	HIGH	VERY HIGH
VULNERABILITY	LOW	MIDDLE	HIGH	VERY HIGH

Fig 28- Heritage and vulnerability evaluation of the fluvial and hydrogeologic geosites employed at the Geopark.

The Termas Romanas geosite is a spa with four pools of hyperthermal salty water, with two extraction wells with temperatures between 38° and 42°C, directly from the Rio Bonito Formation (Permian, therefore older than the Triassic formations that outcrop

in the territory), at a depth of 1,124m, with the presence of Lithium, Silicon and Strontium in addition to carbonates. According to the National Mining Agency, the water from this hydrosite is classified as alkaline-earth mineral water, sulfated, chlorinated,

fluorinated, lithinated, sulfurous and hyperthermal at the source. The main pool has 417,000m<sup>3</sup> of water, within a 43-hectare area, with 25,000m<sup>2</sup> of built area where visitors also have lodging alternatives: 358 apartments distributed in six towers that hold up to 1,432 guests.

### B.3.3 - Geosites of geomorphological value

The QCAG has 13 geosites of geomorphological value (fig. 24). Seven of them (GG3, GG4, GG5, GG8, GG15, GG18 and GG19) are

linked to structural and/or sculpturing processes in the dynamics of formation of the Meridional Plateau and the retreat of cliffs from erosion, which have left residual hills that are used as very didactic overlooks for learning about the formation of the

territory's fertile valleys and the role of tectonic processes in the current landscape. In three of the geosites (GG9, GG13 and GG17) it is possible to observe the result of the differential resistance of volcanic rocks to weathering, as well as the role of

fracture lines in the fitting and direction of drainage along the cliff zone. The Cascata Cara de Índio and the Cascata Ferreira are two instances, among the dozens of waterfalls in the territory, with a great didactic potential for interpretation of these processes. The geosites Gruta do Índio (GG10) and Gruta do Sítio Alto (GG20) are also worth mentioning as examples of the dynamics of wear and fluvial excavation in sandstones, demonstrating the



Fig 29- Geosites of fluvial/hydrogeological value of the Geopark: Passo das Tunas (a), Obaldino Tessele Park (b) and Termas Romanas (c). Fig. 20 also shows a panoramic image of the Dona Francisca Dam Overlook geosite.

CODE	NAME	MUNICIPALITY	USE*	HERITAGE VALUE	VULNERABILITY
GG 3	Cerro da Igreja	Agudo	E, G, CB		
GG 4	Mirante Cerro Comprido	Faxinal do Soturno	E, C, G		
GG 5	Parque Municipal Natural Monte Grappa	Ivorá	E, C, G, P, CB		
GG 7	Monumento do Imigrante	Silveira Martins	E, C, G		
GG 8	Mirante do CAPPÁ	São João do Polêsine	E, G, P		
GG 9	Cascata Cara de Índio	Ivorá	G, SE		
GG 10	Gruta do Índio	Agudo	E, C, G, P		
GF 13	Cascata da Ferreira	Pinhal Grande	E, G		
GF 15	Cerro da Figueira	Agudo	L, G, C		
GF 17	Cânions da Piruva	Ivorá	E, G		
GF 18	Morro Agudo	Agudo	G, CB		
GF 19	Morro Santo Antônio	Dona Francisca	E, C, G		
GF 20	Gruta do Sítio Alto	Faxinal do Soturno	E, C, G		

\*USE: E-educational, P - Research, C - Cultural, G - Geotourism, SE - Ecosystem Service, CB- Biological Conservation

HERITAGE VALUE	LOW	MIDDLE	HIGH	VERY HIGH
VULNERABILITY	LOW	MIDDLE	HIGH	VERY HIGH

Fig 30- Table depicting the assessment of heritage and vulnerability of with geomorphological value geosites used by the Geopark.





Fig 31- Examples of geosites of geomorphological value in the QCAG: Monte Grappa Mountain (a), Monumento do Imigrante Monument (b), Canions da Piruva Canyons (c), Queda Livre Waterfall (d) and Cerro Comprido Overlook (e). Figs. 21 and 22 show images of two other geosites also included in this thematic group.

use and cultural appropriation of these geoforms. Finally, the Monumento ao Imigrante geosite (GG7) not only marks the place of arrival of the

first wave of Italian immigrants into the territory, but also presents a privileged infrastructure for observing the dynamics of erosive processes on the slope,

with the formation of colluvia, block fields and soil creep. In Figure 31 you can see images of some of these geosites of geomorphological value in the QCAG.

### B.3.4- Geosites of lithological / sedimentological value

The QCAG has three geosites (GL1, GL5 and GL8) where the lithological composition is the heritage highlight, largely linked to the comprehension of Cretaceous volcanism processes and their role in structuring the current landscape (fig. 32). At Radatz Waterfall (GL1), visitors have the opportunity to glimpse the sequence of structures, from the desertic Jurassic environment (with a very didactic view of the outcrop of eolic sandstones of the Botucatú Formation) through the Cretaceous volcanic structure

of the Serra Geral Formation (at the basalts of the Gramado facies that create a knickpoint over which the Radatz Waterfall falls). Integration between the hiking trail and the infrastructure built at this geosite allows for greater accessibility for visitors at different levels of difficulty. At the Escarpas Alagadas geosite, located in Pinhal Grande, visitors have the opportunity to interpret the different Serra Geral Formation outcrops, since the geosite is located within the flooded area of the Itaúba power plant, on the Jacuí River. The area is characterized by a beautiful set of rocky walls, 10 to 40 meters high, where

the columnar disjunction of the outcrops can be clearly seen (fig. 33) interspersed by layers of inter-trap sandstones. At the Cascata do Moinho waterfall, visitors have the opportunity to see a very significant structural step within the Caxias facies of the Serra Geral Formation, going down a path inside a large colluvial deposit of blocks to reach the waterfall, which is located in a private area covered by the Atlantic Forest. The site features an old mill, which was one of the most important in the region and used hydraulic power to grind grains.



CODE	NAME	MUNICIPALITY	USE*	HERITAGE VALUE	VULNERABILITY
GH 1	Cascata Raddatz	Agudo	G, E, SE		
GH 2	Escarpas Alagadas	Pinhal Grande	G		
GH 3	Cascata do Moinho	Silveira Martins	E, P, C, G, SE		

\*USE: E-educational, P - Research, C - Cultural, G - Geotourism, SE - Ecosystem Service, CB- Biological Conservation



Fig 32- Table with the assessment of heritage and vulnerability of geosites with lithological value used by the Geopark.

## B.4- Sites with other Heritage Interests (ecological, scenic, historical-cultural and archaeological value)

Besides the geosites, the QCAG also has 23 sites of heritage interest (fig. 34), identified for their tourism potential, sought for their value linked to identity, memory and ecological heritage (Holoce-

ne), as well as their socio-historical heritage for the communities (CERETTA et al, 2020).area covered by the Atlantic Forest. The site features an old mill, which was one of the most important in the

region and used hydraulic power to grind grains. Five sites of ecological value are recognized, two of them with legal protection (SE3 and SE8) and the other three (SE2, SE6 and SE7)



Fig 33- Geosites of lithological value in the Geopark: block deposits at Cascata do Moinho (a), basalt fracturing at Raddatz Waterfall (b), columnar disjunctions at Escarpas Alagadas Cliffs (c).

being private properties that carry out ecotourism activities in important conserved Atlantic Forest fragments.

There are four scenic value sites, with privileged points of observation of the territory's landscape. At site SC2, there is a panoramic view of volcanic sequences that can be observed more closely at geosite GL5, depicted in Figure 27. Site SC5, on the other hand, is a linear site of approximately 8

km, along which, one can enjoy a beautiful view of embedded valleys and colonial landscapes, observing a sequence of large sculptures, produced in sandstone by a local artist, these sculptures depict aspects of everyday rural life in the territory.

Twelve sites of historical and cultural value were selected to show visitors the mixture of multi-ethnic cultural wealth developing amidst a context of hardships and

historical isolation, which also led to the preservation of heritage and traditions. Within this scope, there are a number of buildings that exemplify the spirituality of the inhabitants, as well as relevant tourist attractions. They are places of heritage interest, both for residents and visitors, demonstrating the faith and religiosity of the inhabitants. These include churches, chapels and capitéis, unique local religious monuments. The great diversity in architecture showcases the close religious relationships of the inhabitants (Dotto and Hahn, 2021; Dotto et al, 2019). Other heritage elements include colonial houses; memorials, museums, cultural centers, monuments, in addition to a rich cultural ways of knowing and being, handcrafts, traditional local food, religious and traditional festivals, traditional dances, festivities and other forms of expression (Coradini et al., 2021). It is worth mentioning that this thematic category also includes a quilombola community (SH16), which portrays the slavery of colonial society in Rio Grande do Sul, an international reference site for genealogical research on Italian immigration (SH9) and a site that portrays aspects of the economy and life in the South American pampas.

Finally, there are sites of archaeological value, including two significant interpretation sites: the Indigenous Caemborá Shelter (SA2), which exhibits heritage from a period when the territory was occupied by native populations, and the archaeological sites of the Dona Francisca dam (SA5), currently flooded, but which provides visitors with tools to understand the entire process of archaeological rescue that was carried out. Figure 35 presents an overview of some of the heritage value sites open to Geopark visitors.

CODE	NAME	MUNICIPALITY	USE*	HERITAGE VALUE	VULNERABILITY
<b>ECOLOGICAL VALUE</b>					
SE 2	Quinta Dom Inácio	Silveira Martins	E, P, SE, G		
SE 3	Parque Estadual da Quarta Colônia	Agudo	CB, E, P, SE, G		
SE 6	Rincão da Encantada	São João do Polêsine	E, P, SE, G		
SE 7	Quinta Marco 50	Silveira Martins	E, P, SE, G		
SE 8	Figueira Centenária	Silveira Martins	E, G, CB		
<b>SCENIC VALUE</b>					
SC 2	Mirante Paga Peão	Pinhal Grande	G		
SC 5	Rota das Esculturas	Nova Palma	C, G, E		
SC 6	Cruz Luminosa	Ivorá	C, G		
SC 8	Praia do Rio Soturno	Nova Palma	G, C		
<b>HISTORIC-CULTURAL VALUE</b>					
SH 6	Conjunto Histórico da Pompéia	Silveira Martins	E, P, C, G		
SH 7	Casa Museu João Luiz Pozzobom	São João do Polêsine	E, C		
SH 8	Centro Histórico de Ivorá	Ivorá	E, C, G		
SH 9	Centro de Pesquisas Genealógicas	Nova Palma	E, C, P		
SH 10	Fazenda dos Borges	Restinga Seca	G, C		
SH 11	Vale Vêneto	São João do Polêsine	G, C		
SH 14	Museu Fotográfico Irmão Ademar da Rocha	Faxinal do Soturno	E, C		
SH 15	Novo Treviso	Faxinal do Soturno	E, C, G, P		
SH 16	Comunidade Quilombola São Miguel dos Pretos	Restinga Seca	C, E		
SH 18	Roteiro dos Capitéis	Nova Palma	G, C		
SH 23	Centro Histórico de Silveira Martins	Silveira Martins	E, C, G		
SH 24	Mirante Nossa Senhora da Salete	São João do Polêsine	G, C		
<b>ARCHAEOLOGICAL VALUE</b>					
SA 2	Abrigo indígena Caemborá	Nova Palma	G, E, C, P		
SA 5	Sítios arqueológicos da barragem	Nova Palma	G, E		

\*USE: E-educational, P - Research, C - Cultural, G - Geotourism, SE - Ecosystem Service, CB- Biological Conservation

Fig 34- Table with the heritage and vulnerability assessment of sites with other heritage values used by the Geopark.





# GEOCONSERVATION AND GEOEDUCATION

## C.1- Anthropropic pressure and protection status of the geosites

The geosites of greater vulnerability within the Geopark are those of fossil value, either because of the risk of destruction of outcrops due to urban or agricultural expansion, or invasion of exotic species, such as *Pinus sp.* which, if not managed, tends to cover the outcrops and obstruct collection operations for research. A study by Ziemann and Figueiró (2017) evaluated the set of fossil geosites as to their degree of vulnerability, based on eleven criteria, following the indications of Siqueira et al. (2011). This provided a calculation of the risk of degradation of geosites of paleontological interest, where each criterion was evaluated using Fuzzy logic, where it is possible to define quantifiable para-

meters for qualitative variations that are established within each criterion. Based on the results, monitoring priorities were established at these geosites, which are inspected every six months. Erosive processes are not a problem for the fossil geosites. On the contrary, the collection of fossils always requires the removal of surface sediments.

As a result, the UFSM Paleontological Research Center, which operates within the Geopark, has a partnership with rural producers to keep a permanent surveillance process regarding for newly visible fossils. This not only expands the possibilities of collection and research, but also creates a sense of pride and belonging on the part of the landowners who collaborate in the discovery of new fossils. Likewise, heritage education is carried out continually at the schools in the region, including lectures at schools, reception of classes at the interpretive center, and the PaleoDay scientific dissemination event for the community, held annually since 2017 (fig. 36 and 37).



Fig 35 - Examples of sites with other heritage values in the Geopark: Cross in Ivorá (a), Paga Peão Overlook in Pinhal Grande(b), Vale Vêneto in São João do Polêsine (c), Route of sculptures in Nova Palma (d), Novo Treviso in Faxinal do Soturno (e), Soturno River Beach in Nova Palma (f).





Fig 36- PaleoDay has been a very successful scientific popularization activity carried out at the Geopark since 2018. Thousands of people attend, interacting through a large number of activities proposed for different types of audiences, seeking to connect the local community with its heritage.

Geosites with sandstone outcroppings are also at risk of degradation, since many of these rocks have been the target of vandalism throughout history. A graduate study is being carried out at the Gruta do Índio cave, to propose a risk management plan for this geosite. Based on the results, a protection model can be established

and used by the other sites. Finally, the geosites and sites that involve self-guided hiking and swimming without the presence of conductors and interpreters present not only a risk of damage to the natural heritage, but also a safety risk. The Geopark seeks to address this issue through an information campaign

about safety on trails, especially through materials widely distributed in the region and through partnerships, as well as through quarterly monitoring of these geosites, checking safety conditions and working in cooperation with the owners, in the case of geosites located on private properties. A training course for geotourism



Fig 37 - PaleoDay has been a very successful scientific popularization activity carried out at the Geopark since 2018. Thousands of people attend, interacting through a large number of activities proposed for different types of audiences, seeking to connect the local community with its heritage.

guides is being planned for 2022, in order to train the first group of certified Geopark guides, aiming to improve safety conditions and broaden the knowledge about geo-heritage interpretation. In the cases of greatest risk, such as the Morro Agudo geosite, where the flow of visitors increased has greatly in recent years and cattle ranching has also interfered with

the natural recovery of the habitat, a dialogue is underway with the municipality and the Municipal Environmental Council of Agudo, to create a conservation unit. This will allow for a better management of the area, by controlling visitation and protecting the *Dyckia agudensis* Irgan., an endemic and critically endangered species (CR), because it is the only place

where it occurs, a requirement for a priority protection area. The same has occurred in the Monte Grappa geosite, in Ivorá, which became a protected area in the category of Municipal Nature Park by law n. 1425 of 2020. Currently, a management plan is being prepared for this geosite.

## C.2- Management and conservation plan for geosites

For planning purposes, the geosites in the QCAG are divided into two categories (fig. 38), namely public heritage sites and private heritage sites, each with different management and conservation instruments in effect. Initially, it is important to point out that the management and conservation of geosites for geotourism within the QCAG follow some principles clearly established by its management committee and endorsed by the commissions of tourism and environment and education, communication, and culture:

- Visitation is an essential instrument to bring society

closer to its natural and cultural heritage, raising awareness of the importance of conservation;

- Visitation must be promoted in the most democratic way possible, allowing access from all social segments to the geosites and heritage sites and their interpretation;
- Visitation is an alternative for the sustainable use of the territory and its heritage;
- Visitation must contribute to the promotion of economic and social development of the community that receives the visitors;
- Visitation activities must respect the rules established in the plans for

each geosite or heritage site;

- The development of visitation activities requires the existence of a minimum infrastructure to ensure visitor safety and quality of the geotourism experience;
- Maintenance of the integrity of geosites and heritage sites is essential to sustain the environmental services derived from them, including economic benefits from visitation;
- Visitation should seek to meet the expectations of visitors with respect to the quality and diversity of experiences, safety and education.

In the case of the geosites and he-

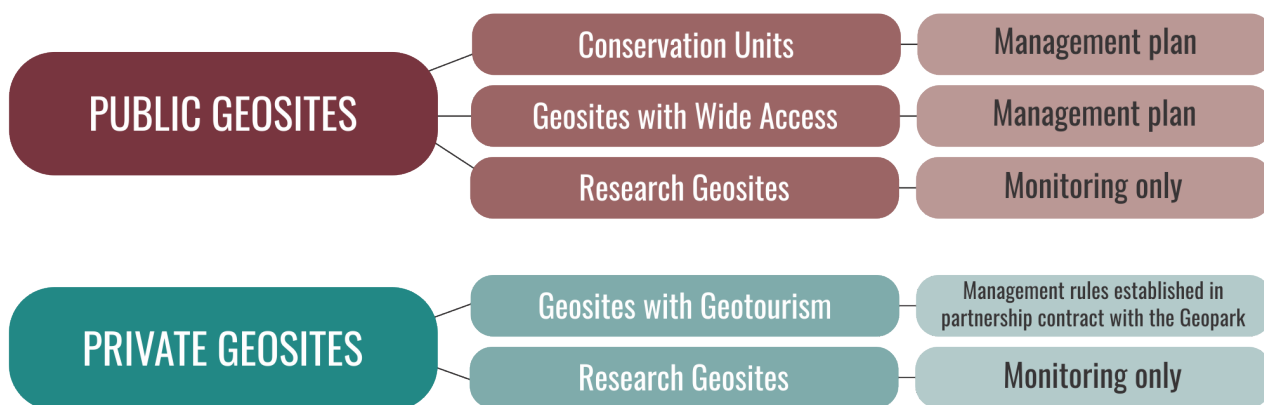


Fig 38- Classification of QCAG geosites and management and conservation instruments.



ritage sites that are Conservation Units (GG5, SE3 and, in the future, GG18), the management and conservation instruments are already defined by the Management Plan of these Conservation Units, according to the guidelines established by law. Law 9.985/2000, which establishes the National System of Conservation Units, defines the Management Plan as a technical document establishing zoning and rules for the use of the area and the management of its heritage, based on the general objectives of a Conservation Unit. In addition, compliance with the “Guidelines for Visitation in Conservation Units”, published by the Ministry of the Environment in 2006, contributes to the quality of visitor experiences. In the case of geosites and public heritage sites with wide access,

the management instruments are much more simplified, due to the difficulty in controlling self-guided access. In these cases, the Geopark defines only some guidelines for visitation (and interpretation) and conservation of these sites (configuring a Management Program). The Geopark also carries out quarterly monitoring of these sites. A joint seminar of the advisory committees, planned for early 2022, has been scheduled to review and finalize all of the Management Programs for each of the geosites and heritage sites of the QCAG. When the geosites and heritage sites are located on private properties, the management and conservation of the heritage is carried out by the owners, who receive the benefits of visitation. However, even this private control must be in accordance with the rules esta-

blished in the partnership contract that the owners establish with the Geopark. By the end of 2021, the Business and Income Commission, together with the Tourism and Environment Commission, is expected to conclude a document laying out criteria for the different types of private entrepreneurs seeking partnership with the Geopark, establishing a partnership seal, which will be renewable every two years. Finally, in the case of geosites intended for research, whether in public or private areas, considering the absence of visitation (since the geoheritage there is only disclosed ex-situ, to ensure the integrity of the geosite), the control is carried out through semi-annual monitoring of these sites, to detect possible threats, such as the occupation by invasive species or the presence of enterprises on the site.

### C.2.1- Potential for scientific research in the territory

The expressive role played by Higher Education Institutions (HEI) is one of the great highlights of the territory. Currently there are four higher education institutions operating in the territory, including four public poles of the Universidade Aberta do Brasil (UAB), located in the cities of Agudo, Faxinal do Soturno, São João do Polêsine and Restinga Seca; two extension units of the Universidade Federal de Santa Maria: Silveira Martins Multidisciplinary Space (two buildings with more than two thousand square meters, for multidis-

ciplinary research and extension projects and activities, providing scientific, social, cultural, linguistic, technological, economic, and tourism development) and the Center

for Paleontological Research in the Quarta Colônia (CAPPa - UFSM) in São João do Polêsine (fig. 39). It also has two private institutions, the Universidade Anhanguera, lo-



Fig 39- A participação institucional da UFSM no território se dá por meio do Centro de Apoio à Pesquisa Paleontológica (figura superior) e do Espaço Multidisciplinar de Pesquisa e Extensão (fotos inferiores)

cated in Faxinal do Soturno and the Antonio Meneghetti College, located in Restinga Seca. In addition to providing higher education in the region, these institutions have a great impact due to their extension and research actions. The involvement of the institutions

with the reality of the communities, the stimulus for innovation, research and autonomy of the populations, significantly increases the quality of life in the region. Establishment of a state technical school linked to tourism is also underway in the municipality of

Nova Palma. The training of local tourism guides will greatly add to activities that are already being developed in the Quarta Colônia, increasing the understanding of the local potential, the recognition of its heritage, and stimulating the local and regional economy.

## C.3- Heritage Interpretation

### C.3.1- Interpretation and signaling plan for geosites

The QCAG espouses a holistic concept of protection, education and sustainable development. The landscape spaces are valued with emphasis on geological, geomorphological and cultural landscapes, providing local tourist attractions linked to scientific and educational activities. Geotourism in the territory has brought local economic benefits and educated people about the evolution of their territory and landscape. Therefore, the management of the Geopark has sought to adjust to its different socio-economic contexts, incorporating them into the sphere of planning and development of the territory. The interpretive plan contributes to the creation and promotion of educational possibilities, both formal and informal, for its community and visitors. “Interpretive Trails” and “Educational Programs”, aimed at all ages, have reached a large number of visitors, promoting the integration of the geological heritage with the natural and cultural heritage. The interpretive strategies focus on three work fronts: educational projects in the community, the reception of visitors at the

Geopark’s interpretative center and the organization of events.

As far as community projects are concerned, there are currently 15 projects in progress, funded by UFSM, involving different aspects of the interpretive process of the territory, focused on different social groups in the community; from projects aimed at schools (working with students and teacher training), to projects focused on the interpretation of biodiversity involving farmers and women’s groups. Specifically for teachers, the Geopark is planning the fourth edition of the “Interdisciplinary Conference for Teachers Training in Heritage Education”, for November 2021. More than 400 registered teachers who work in the territory participated in the 2020 edition. As a result of this engagement, all the municipalities that make up the Geopark approved the inclusion of a pedagogical component related to heritage education in the school curricula. In this regard, one of its most strategic tasks of the commission on education, culture and communication is to foster the production of educational materials and tools that can support and qualify this pedagogical component in schools (fig. 40). The second interpretive strategy is related to the reception of



Fig 40- Examples of publications of the Geopark focused on formal and informal heritage education within the territory



visitors at the Geopark's interpretative center, where people can have access to information about the territory and its heritage. After suspending its services during the pandemic, the interpretative center has been working with UFSM scholarship recipients and employees,

in addition to volunteer researchers who serve the general public. At the moment, the Geopark has only one interpretative center, in the city of São João do Polésine, but two other thematic interpretative centers are already being

planned, in the cities of Silveira Martins and Agudo. The table below lists the main objectives and goals established for the period 2022-2027, with regard to interpretation, signaling and geotourism development of the territory.

PLAN FOR THE EXPANSION OF GEOPARK INTERPRETIVE PROCESSES (2022-2027)		
Area	Objectives	Goals
<b>Geosites, Landscape and landscape protection</b>	<ol style="list-style-type: none"> <li>1. To preserve and conserve the geosites, overlooks, natural and semi-natural landscapes of the territory;</li> <li>2. To monitor the natural erosion processes at geosites of paleontological interest, to rescue naturally exposed fossil material;</li> <li>3. To map new areas of rock exposure to evaluate their fossil potential;</li> <li>4. To expand the research on the heritage value of the selected geosites of the Geopark;</li> <li>5. To maintain a permanent group of scientific consultants from the different areas of interest, with emphasis on geosciences.</li> </ol>	<ol style="list-style-type: none"> <li>1.1 To install educational signs with instructions related to the preservation of geosites and overlooks in at least one geosite per municipality by 2023;</li> <li>1.2 To produce, by the end of 2022, an interpretation guide of the geosites and install interpretative panels on at least 50% of the geosites and at 100% of the geosites by the end of 2024;</li> <li>1.3 To carry out, once every three months, an inspection of all geosites of geotourism and educational value, in order to identify the needs of intervention in terms of infrastructure, to guarantee access and visitation;</li> <li>2.1 To contain and reverse, with the support of the local government, processes of plant succession by invasive species (e.g. Pinus sp.) at paleontological sites of high heritage value;</li> <li>3.1 To work with companies and the population to raise awareness of the importance of paleontological monitoring in mining areas, construction sites and the like;</li> <li>4.1 To create an integrated multi-user research center, by 2023, aiming to expand the current research infrastructure, in order to increase the number of research projects in different areas of knowledge involved in the promotion and conservation of geoheritage;</li> <li>5.1 To maintain a permanent, high-level scientific committee, renewable every four years, which is responsible for evaluating, proposing and issuing opinions about the actions proposed by the Geopark, within their respective areas of knowledge.</li> </ol>
<b>Natural and Cultural Heritage</b>	<ol style="list-style-type: none"> <li>1. To preserve and conserve the biodiversity of the territory of the Quarta Colônia;</li> <li>2. To preserve aquatic ecosystems in the territory;</li> <li>3. To preserve the surroundings of river sources within the territory;</li> <li>4. Preserve, invest in and publicize the Historic-Cultural Heritage of the territory of the Quarta Colônia;</li> </ol>	<ol style="list-style-type: none"> <li>1.1 To install panels with instructions/warnings about the conservation of biological diversity in Geopark conservation units and geosites by 2023;</li> <li>1.2 To permanently promote the creation of municipal conservation units in accordance with the different characteristics of the biota, landscape and socio-environment in the Geopark;</li> <li>1.3 To support the creation of Municipal Plans for the Atlantic Forest that gather and regulate the necessary elements for the protection, conservation, recovery and sustainable use of the biome by 2027;</li> <li>1.4 To encourage the implementation of agroforestry and organic systems prioritizing native species on family farms by 2027;</li> <li>1.5 To awaken the appreciation of and belonging to the Atlantic Forest biome through the processing of native fruits in food products by 2027;</li> <li>2.1 Articulations with regional entities and farmers' representatives for the definition of areas of restricted use of agrotocics, to decrease their use by 20% by 2025;</li> <li>2.2 Install educational signaling at 100% of the hydrosites by 2024;</li> <li>3.1 To create and institute a "Water Planting Program", with incentives for planting native species and fencing riverhead areas by 2025;</li> <li>4.1 To create and institute the program "My history, my culture, my Geopark" by 2023;</li> <li>4.2 To create a contest for Geopark audiovisual material by 2022;</li> <li>4.3 To create Audiovisual Programs to be broadcasted on TV and Internet about Ways of Knowing and Being in the Quarta Colônia, (with the dissemination of knowledge in gastronomy, craftsmanship, and dialects);</li> </ol>

Fig 41- Plan for the expansion of geopark interpretive processes (2022-2027)

## PLAN FOR THE EXPANSION OF GEOPARK INTERPRETIVE PROCESSES (2022-2027)

Area	Objectives	Goals
<b>Natural and Cultural Heritage</b>	<p>5. To register and disseminate studies about the Quarta Colônia from the most diverse areas;</p> <p>6. To collaborate with and promote the preservation of public and private collections;</p> <p>7. To further the knowledge and stimulate the appreciation of cultural diversity in the territory.</p>	<p>5.1 To create, promote and maintain an updated database of studies from different areas, which work with themes that involve the Quarta Colônia;</p> <p>5.2 To maintain updated the database on the "Publications" tab of the Geopark site and publish a link to this tab on the sites of Condesus, the municipalities and UFSM;</p> <p>5.3 To create a biannual event for the presentation of research from the undergraduate to the Post-Doctorate level, in addition to results from extension, teaching and management programs with themes directly related to the Geopark;</p> <p>5.4 Offer awards annually to the most complete and relevant undergraduate monograph, Master's thesis and Doctoral Dissertation whose theme is the natural and cultural heritage of the Quarta Colônia;</p> <p>5.5 Offer awards for the most innovative tourism-cultural-conservationist project or program proposed by the community of the Quarta Colônia, whether private, governmental or entrepreneurial;</p> <p>6.1 To continue advising the Municipalities for the creation of Municipal Archives and the regulation and functioning of Museums;</p> <p>6.2 To create a tourism route for the museums of the Quarta Colônia, making such routes available on publicity media of the municipalities, UFSM and Condesus (in more than one language);</p> <p>7.1 To create, by 2024, an interpretive center for indigenous culture in the territory;</p> <p>7.2 To build, by 2023, a "slavery route", that allows visitors to learn about the inheritances of the Brazilian slavery regime and the resistance of the black community.</p>
<b>Tourism development (infrastructure and activities)</b>	<p>1. To stimulate tourism through the recognition of the Quarta Colônia region as a tourist destination in different governmental spheres;</p> <p>2. To encourage public-private partnerships and ones with the third sector in the area of tourism in the Quarta Colônia, striving for involvement and commitment of stakeholders in the process of sustainable development of the territory;</p> <p>3. To act strategically in the marketing of events and tourist routes in the Quarta Colônia, with the support of local and regional tourism governance, entrepreneurs in the tourism trade, partner educational institutions and the community.</p> <p>4. To encourage the training and qualification of tourism products and services in the territory, considering the need to convene, stimulate, recognize and endorse tourism as a strategic development activity, based on the use and safeguarding of the land and natural and cultural heritage.</p> <p>5. To provide tourism accessibility for the elderly and people with disabilities (PCD);</p> <p>6. To allow and facilitate greater access to geosites of scenic beauty.</p> <p>7. To inform tourists about the Geopark's heritage and "offers".</p>	<p>1.1 To establish by 2022 the "Regional Governance of Tourism", according to the guidelines of national and state tourism policy, to effectively contemplate prospects for developing sustainable tourism in the medium and long term in the territory;</p> <p>1.2 The recognition of the territory of Quarta Colônia, by 2025, as a tourist destination by the State of Rio Grande do Sul;</p> <p>1.3 To hire a professional trained in tourism, to work in the tourism sector of the Geopark, by 2024, with the goal of establishing the link between the tourism teams of the municipalities and the demands of the Geopark;</p> <p>2.1 To provide semiannual advising to the public, private and third sector actors connected with tourism in the Quarta Colônia, holding periodical meetings in order to map actions and jointly seek solutions to problems and increase marketing competitiveness of the region;</p> <p>3.1 To undertake a campaign to register the Geopark on the federal government's CADASTUR, so that all entrepreneurs in the tourism sector in the Quarta Colônia can operate legally in the sector and in accordance with the Tourism Law No. 11771/2008 by December 2022;</p> <p>3.2 To adopt integrated marketing and promotion strategies for events and tourist routes of the Quarta Colônia;</p> <p>4.1 To promote an annual training workshop for local stakeholders interested in developing tourism in the Quarta Colônia, based on a proposal for awareness, marketing and sustainable actions for the development strategies of the Geopark;</p> <p>4.2 To create, by the end of 2022, a training course for local environmental guides, in partnership with the teaching institutions that work in the territory. The 300-hour course will include knowledge about the natural and cultural heritage of the territory and its sites;</p> <p>5.1 The installation of infrastructure such as handrails and access ramps on at least 50% of the Geopark's partner tourist establishments by 2024;</p> <p>5.2 Production of marketing materials about the Geopark;</p> <p>5.3 To install, by 2024, at least 5 Braille interpretative panels at selected geosites;</p> <p>6.1 To articulate with municipalities or private owners of the geosites where there are overlooks to be built and/or infrastructure renovation or improvements, including bathrooms and access ways at 50% of the geosites with scenic value by 2023 and at 80% of the geosites by 2025;</p> <p>7.1 To expand the Interpretive Centers of the Geopark by 2026, which will receive tourists and provide information regarding tourist routes, geosites, accommodations and restaurants, in addition to showcasing replicas and original fossils found in the Quarta Colônia;</p> <p>7.2 To maintain the Geopark tourism website updated;arta Colônia;</p> <p>7.2. Manter atualizado o site turístico do Geoparque Quarta Colônia;</p>

Fig 41- Plan for the expansion of geopark interpretive processes (2022-2027)



### C.3.2- Educational programs: “Heritage Education Program for the Quarta Colônia Aspirant Geopark: identities, heritage and belonging”

The natural and cultural heritage contribute to the formation of a collective identity, valuing and preserving diversity. Through them, the feeling of belonging to the ter-

ritory is strengthened and reinforced. The educational program of the QCAG is composed of an expressive set of actions that aim to value the heritage (natural and cultural) in order to strengthen identities and belonging to the territory. The program originates from previous actions related to Condesus, the municipalities of the region, museums and schools and their links with the Higher Education Institutions that operate in the territory, especially UFSM. The program

originated in 2018 with a series of activities focused on the training of Teachers in Heritage Education; this program is shaped mainly by raising awareness among teachers of the basic education network of the Quarta Colônia region about concepts such as geopark, heritage education, cultural and natural heritage. The following table presents the main objectives and goals established for the period 2022-2027, regarding the geoeducation activities in the Geopark.

PLAN FOR GEOEDUCATION IN THE GEOPARK (2022-2027)		
Area	Objectives	Goals
Education activities	1. To continue heritage education projects in local schools;	<p>1.1 To keep a permanent offer of lectures about the educational activities carried out throughout the Geopark at schools and carry out new training through UFSM extension projects;</p> <p>1.2 To create, by the beginning of 2022, in partnership with the municipalities, a program to encourage field work with the schools;</p> <p>1.3 To set up, by 2023, a multipurpose laboratory for the development of didactic instruments connected to the territory's geoeducation, in order to provide the schools with the necessary materials for a qualified heritage education;</p> <p>1.4 To provide advisory services to the schools in the territory that have not yet implemented the heritage education pedagogical unit</p> <p>1.5 To plan and implement a Geopark Earth Science Fair by 2023, aimed at the territory's schools</p>
	2. To promote the continued qualification of the professionals who work in the educational network;	<p>2.1 To maintain and expand the offer of special student spots in the Master's Degree in Cultural Heritage of UFSM for teachers from the territory of the Quarta Colônia;</p> <p>2.2 To continue holding the annual Interdisciplinary Seminar on Teacher Training in Heritage Education;</p>
	3. To encourage the creation of events with themes that involve the Geopark and knowledge of the territory.	<p>3.1 To prepare and publish, by March of each year, a calendar of events in the Geopark that involve formal and informal heritage education.</p>
	4. To prepare an Educational Program for the Geopark, reviewed and improved every two years	<p>4.1 To prepare the Educational Program of the Geopark by 2022, defining the objectives, goals and geo-educational instruments to be used.</p>

Fig 42- Plan for geoeducation in the geopark (2022-2027)



# D

## A ECONOMIC ACTIVITIES AND SUSTAINABLE DEVELOPMENT

### D.1. Economic activities in the territory and partnerships

While the rural population in the state of Rio Grande do Sul is under 15%, in the nine municipalities of the Quarta Colônia, this population is over 30% (fig. 43), which demonstrates the strategic importance of the rural sector and the agricultural economy for this territory, especially considering the trend of population reduction that has been evident in recent decades. Even in the case of municipalities with a more expressive industrial sector, this sector is mainly linked to family-based agricultural industries. If this high percentage of the rural population has at times presented difficulties in terms of sustaining

solid economic growth and maintaining or attracting youth to the territory, on the other hand, it has been responsible for a greater degree of heritage conservation. This has been a great differential for geotourism in the Quarta Colônia: the biodiversity, geodiversity, land use, unique relationships with

the environment, the buildings, the symbols and artifacts used, all the materiality but also the values, the gastronomy, the language, the crafts and clothing, which give this territory a unique identity. The recognition and work being developed in the scope of the QCAG can contribute signifi-

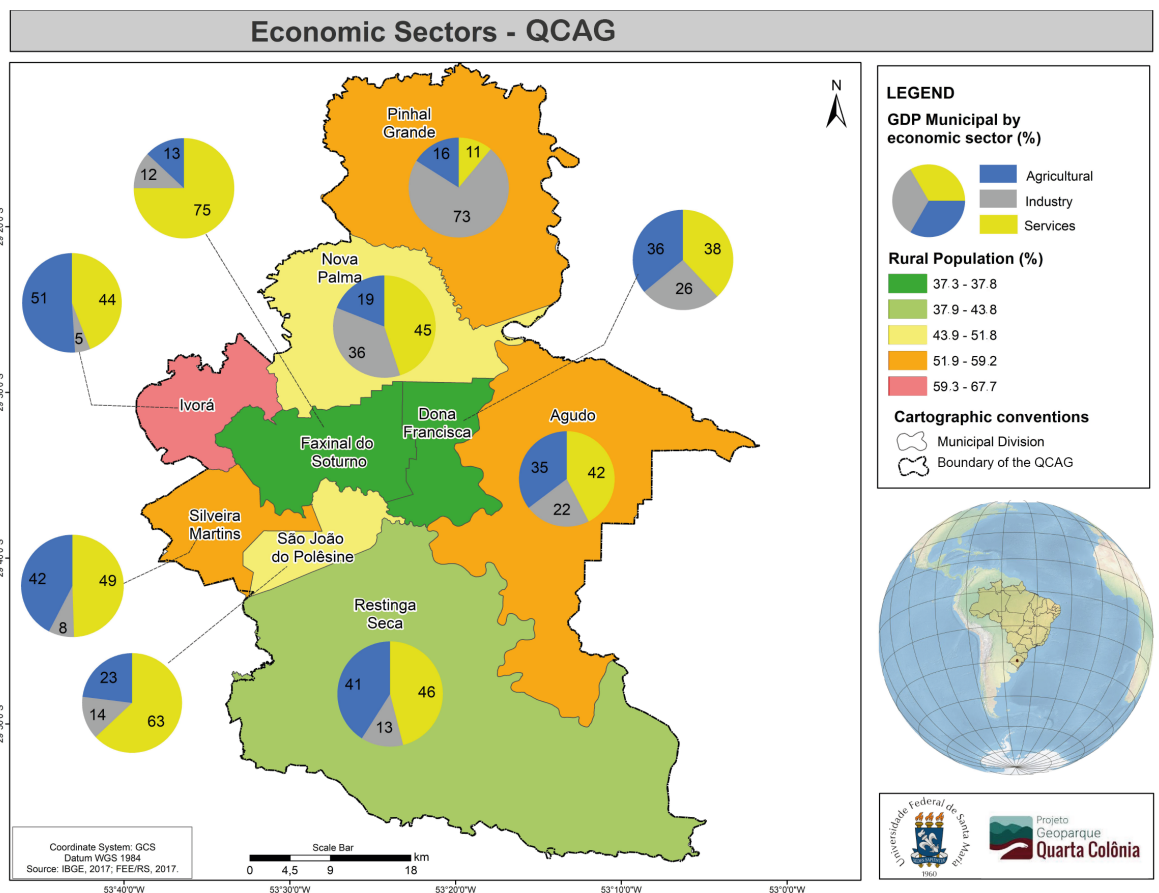


Fig 43- Map of the distribution of urban and rural population in the territory and participation of the economic sectors in each municipality.



cantly to improvements in the local community-based tourism sector and, consequently, to the generation of income and improvements in the quality of life of the inhabitants of the region. From the perspective of public authorities, the region has sought to strengthen its identity, local tourism and environmental conservation since 1995, through the QC Sustainable Development Program (PRODESUS-QC), which has resulted in numerous integrated tourism projects, the strengthening of social capital, the rescue of memory and research in the fields of paleontology, archeology, and cultural heritage. With the possibility of UNESCO certification, the population has regained a sense of belonging and appreciation of its rich natural, cultural and historical heritage. The region is one of the most authentic tourist areas in RS, mainly due to the trails amidst a great diversity of landscapes, waterfalls, biodiversity, the rich cultural heritage and the well preserved rural and colonial characteristics. The landscapes are scenarios that inspire artists, writers, festivals and lovers of good food. In recent years, with the more concrete possibility of articulating numerous initiatives

in the development of the Geopark, young enterprises have been bringing a new life to the regional economy. New businesses (fig. 44) such as Sabores da Cabana, Trattoria da Cabana, Quinta do Marco 50, Cutelaria Menegassi, Caminhos de Ivorá, Agudo Ecoturismo, Rincão da Encantada, Dear Santa and different craft companies are focused on tourism and local products. In addition, enterprises with more experience in the territory have undertaken new directions. The Giacomini sausage agro-industry and the Foletto agro-industry have both expanded their area of action to embrace the tourism sector, creating spaces for marketing and

tasting of products. The Jardim das Esculturas, sculpture exposition and park, now has a restaurant and an inn. The entire tourist complex of the Recanto Maestro, which currently is endowed with an inn, hotels, restaurants, a winery, and a thermal springs park - Termas Romanas, and also a receptive tourist operator, Viaggio Tur, which markets and invests in the territory, integrating partner services, such as gastronomy, accommodations, trails and historical tours. In the QCAG, there is an enormous potential for business owners to learn about the benefits of acting in a global network and being partners of a certified UNESCO initia-



Fig 44- Examples of entrepreneurs who have stood out in the territory since the revitalization resulting from the QCAG: Trattoria da Cabana and Sabores da Cabana ice cream parlor (a), Cutelaria Menegassi, with the manufacture of thematic knives (b), Elson Mta Arte Sacra, with the production of mountable dinosaurs (c), Caminhos de Ivorá company, with rides on tractor-drawn vehicles (d), Viaggio tur company, with the marketing of specialized tourism packages (e).

tive. The QCAG has been working with several initiatives, mainly through projects such as: a) Geoparks: Business Laboratories; b) Business Consultancy; c) Business Plan for Entrepreneurs; d) Cost Management and Pricing; e) Management and Infrastructure in Geoparks - all of the former with the participation of professors from the Administration area; f) Brand Observatory and Laboratory and g) Comunicare-RP from the communication area, and also specific projects for the gastronomy area, aiming at creating new products and qualifying the services already

offered: h) Forum of the Food Sector of the Quarta Colônia; i) Non-Conventional Food Plants: Cultivation, Identification and Food and Medicinal Uses and j) The taste of native Atlantic Forest fruit trees. For all these actions and initiatives, community empowerment and engagement are core values. In this sense, UFSM and CONDESUS constantly work to develop strong partnerships and meaningful engagement with key stakeholders, including the municipalities, the private sector, the community in general and the academic and educational institutions as

well as other tourism stakeholders (governance spheres). In the year 2021, the Business and Income Thematic Commission of the QCAG Management Committee held more than 10 online meetings and has mobilized a group of about 100 entrepreneurs from the territory, seeking to define criteria for the creation of the Geopark's partner initiative seal. As soon as the criteria are finalized, a public call for proposals will be organized by CONDESUS and the terms of commitment of both parties will be signed, selecting the official partners of the QCAG.

## D.2- Adherence to the Sustainable Development Goals - Agenda 2030/UN

The proposal of the Quarta Colônia Geopark is in line with the UN Agenda 2030. We exemplify in Figure 45 the nine goals which are supported by actions carried out in the territory. Objective 2 (Zero Hunger and Sustainable Agriculture) is represented by activities related to food handling, native fruit trees of the Atlantic Forest, non-conventional food plants and the realization of a Regional Food Sector Forum. Objective 4 (Quality Education) is supported by the promotion of heritage and geoscience education for schools, immersion and interactivity in paleontology, ethnobiology and environmental edu-



Fig 45- Adherence to the Sustainable Development Goals - Agenda 2030/UN



cation, achieved by the current involvement of three Higher Education Institutions (Universidade Federal de Santa Maria, Faculdade Antonio Meneghetti and Instituto Federal Farroupilha) in the territory. Objective 5 (Gender equality) has been strongly supported by the encouragement and qualification of groups of women artisans and entrepreneurs, in partnership with EMATER-RS. Objective 6 (Drinking water and sanitation) has been addressed through the “Water Planting” program, with incentives for the planting of native species and fencing of riverhead areas within the territory (planned by 2025). Objective 8 (Decent Work and Economic Growth) is represented by the planned management and production of flowers, beekeeping, branding, business laboratories, cost management and pricing project, among others, all conducted

from a geotourism perspective. Objective 11 (Sustainable Cities and Communities) is represented by road mobility actions for rural communities, georeferencing, environmental planning, and territorial planning. Emphasis on goal 11.4 (Strengthen efforts to protect and safeguard the world’s cultural and natural heritage), is fulfilled to a good extent through the actions promoted in the educational program: “Heritage Education Program for the Quarta Colônia Aspirant Geopark: identities, heritage, and belonging”, which, among other achievements, excels at protecting and valuing the fossil heritage. Objective 12 (Responsible Consumption and Production) is represented by the pilot proposal for selective waste collection. Objective 13 (Action regarding global climate change) is represented by actions in the area of meteorology which are

open to the community. Finally, objective 15 (Terrestrial Life) is being addressed through support for the preparation of Municipal Plans for the Atlantic Forest that gather and regulate the elements necessary for the protection, conservation, recovery, and sustainable use of the biome by 2027, as well as incentives and advising for the creation of Conservation Units and the implementation of agroforestry and organic systems, prioritizing native species on family farms. The set of efforts undertaken in the territory in favor of an articulated strategy for sustainable regional development, which preserves, conserves and values its natural and cultural heritage, clearly support the 2030 Agenda, ratified by the plurality of actions promoted in the territory, in partnership with Higher Education Institutions and in line with the wishes of the population.

### D.3- Visibility and Geotourism the territory

The Quarta Colônia territory has high geotourism potential because of its aesthetic relevance, geological and geomorphological significance, which is easily comprehended by visitors, the low risk of desecration from tourists and the presence of a reasonably good tourism infrastructure (Ziemann, 2020). Regarding economic activities, some geosites of the Quarta Colônia may receive small numbers of visitors, along with the indigenous population, which is estimated at 60,697 inhabitants (IBGE, 2010), although poorly distributed throughout the territory (fig. 46). The cultural attractions of the Quarta Colônia are an expression and memory of the culture of Italian, German and Portuguese immigrants and Afro-descendants who settled the territory that to-

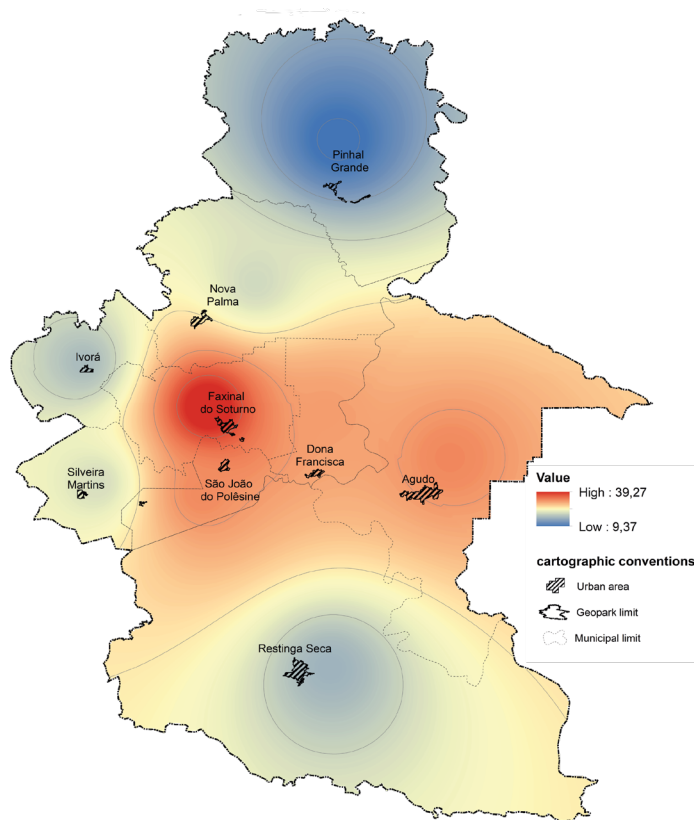


Fig 46- Population distribution map in the territory

day make up the Quarta Colônia. These cultural attractions are impressive because of the intrinsic relationship of the heritage with everyday practices and the typical nature surroundings. The sites are visibly identified by cultural manifestations of the Apostolic Roman Catholic heritage, materialized in capiteis, chapels, churches, halls, parish houses, cemeteries and manors, which are still preserved and maintained by the communities of origin (Ceretta, 2007; Vendruscolo, 2009). These heritage sites, which are used locally on a daily basis, are open for visitation and many are already part of religious tourist attractions because they are often sought out as places for religious devotion. Complementarily, there are many events, which contribu-

te to the economic gains of the region. For example, there are a number of events with emphasis on the preservation of gaucho culture, the most significant being the Crioulo Rodeos (which include artistic competitions, shows, dances and the main attraction, which are championship competitions, such as the gineteada, a wild-horseriding event, and the lasso event, as well as dances at the Centers of Gaucho Tradition - CTGs), dinners with typical gaucho cuisine and shows with traditional gaucho music (Dotto et al, 2017). There is also a large number of festivals, church festivities and other meetings, with religious themes that take place in all the Quarta Colônia communities. These events attract many visitors, representing a

significant financial benefit to the region. In general terms, the tourism offer of the territory is part of a systemic set formed by elements of the production chain that involve many economic sectors, such as equipment, goods and services for accommodation, food, entertainment and cultural and artistic attractions, which sustain the movement of tourists (Beni, 2003). Specifically, the unique tourism offer in the Quarta Colônia consists of a number of complementary services and the specific natural and cultural assets that constitute the raw material of tourism, resulting in the influx of tourists year-round, respecting the principles of intangibility, seasonality and complexity, characteristic of the tourism product (Beni, 2003).

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### D.3.1- natural heritage and nature tourism in Quarta Colônia

Considering the richness of the existing natural heritage, the region offers many itineraries whose main attraction is related to nature (hiking, trekking and ecological trails, with options of short and long distance walks in natural environments, obstacles or climbing, including climbing rocky walls with special equipment) (Dotto et al, 2018). Nature tourism, as part of

ecotourism, proposes to socialize nature and naturalize humanity so that the existing relationship is not fragmented, but interwoven into a systemic evolutionary process and understood as a whole (Santos, 1997; Capra, 2006). Tourism, especially ecotourism, has shifted the relationship between society and nature due to the growing need to overcome the discontent connected to the modern paradigm; to turn to the cult of nature and search for awareness and sensitivity regarding environmental issues and the

sustainability of the ecosystem. (Eichenberg; Silva, 2012). Therefore, the Geopark has been working based on the existence of an intertwined, inseparable, continuous and systemic relationship between humans and nature. In the Quarta Colônia, nature tourism is understood from this perspective, where tourism activities are holistically conditioned to respectful, fair and educational uses and interactions.

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### D.3.2- Cultural tourism and intangible heritage in Quarta Colônia

The emergence of a redefined tourism, with multiple perspec-

tives and initiatives aimed at an economy of value has been fulfilling its mission of environmental responsibility, recognizing that the existing resources in the municipalities also represent a spa-

tially and culturally constructed territory. These resources attract tourism, as a strategy to add value to local economies and, mainly, enhance the value of cultural and natural resources, while producing



a territorial perspective of development (PECQUEUR, 2005). In this way, the territory of the Quarta Colônia has taken advantage of its cultural resources as part of the territorial strategy to publicize and market its specific local resources, whose cultural dimensions are strongly linked to the cultural manifestations of the first immigrants (Froehlich; Vendruscolo, 2012), found in an Italian/German reminiscence, in the religiosity present at religious services and festivals and in typical local cuisine (Vendruscolo, 2009). The institutionalization of festivals, schools, small trades, craft industries, colonization policies and the orientation for growth and development, since the early years of colonization in the 19th century, are all part of the religious cultural construction of the territory (Zanini, 2006). Religious festivals that take place

in the territory express the region's cultural identity, even if they have been transformed by temporal and natural dynamics of daily life and new cultural elements. Human interrelations arise from cultural identity and feelings of belonging, which renew feelings of community and strengthen the commitment to religiosity, the representative institution and the cultural identity built over time (Ceretta, 2021). Regarding cultural tourism, which is related to the intangible heritage of the region, there are a number of social movements geared toward preserving traditions and typical customs of Rio Grande do Sul, called gaucho traditions, which are represented, most prominently, by thematic parades, gastronomy and the use of typical garments, symbolizing the experience of the gauchos, especially in rural areas (Dotto et al, 2017). When it comes

to these aspects of cultural heritage, be they the traditional movements or religiosity and sacred rituals, tourists may often find that the commercial side of tourism events does not always prevail at local activities, where cultural, social and religious dynamics are also valuable in the intersubjective relationships in the Quarta Colônia. Cultural tourism, linked to the tangible and intangible heritage, takes place through identity dynamics, built under conditions of reciprocity and elements of solidarity, mutual aid, volunteer work, mutual work practices and donation of products and services, all of them linked to the belief in the sacred and legitimized around a hybrid identity matrix in the territory, stimulating social bonds and strengthening cultural identity (Ceretta, 2017)..

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### D.3.3- Impacts of the Geopark on the territory's sustainable development

The municipalities that make up the territory of the Quarta Colônia have a history of development policies similar to other municipalities on the margins of central economies. The search for an exogenous development in the last three decades, based on traditional sectors and technologies of global circuits of production has been followed by a loss of competitiveness, impoverishment, rural flight, a decline in social indicators in the region, as well as an extreme reduction in the population in most municipalities in the last ten years. However, in recent years, with a changing developmental focus, investment in the conservation, dissemination

and sustainable exploitation of its natural and cultural heritage, there is a clear reversal of the trends of impoverishment and cultural erosion. For this development to continue, the Geopark seeks an interconnection between a local-based economy, equitable conservation and an integration between the economy and the environment, which essentially contemplates the balanced promotion of environmental preservation (biodiversity, rational use and conservation of natural resources), economic efficiency (of the territory, businesses and tourists) and benefits for the local community (employment, income, and respect for socio-cultural values) (Fons and Fierro, 2011). In a holistic and systemic way, the impacts produced by the Quarta Colônia Geopark affect different areas and actors,

mainly through the application of knowledge toward geoconservation as part of sustainable development. In a valuable and unique way, the presence of the Geopark has allowed the protection of geological heritage assets, the articulation and involvement of social actors in the safeguarding process and, at the same time, the encouragement of social interaction and educational practices for tourism activities throughout the territory. New entrepreneurs are constantly coming forward, with geoproductions planned and tested by the entrepreneurs themselves. Schools are experiencing a unique moment of "discovery" of their territory and the community in general is progressively more proud of its heritage and roots, which has been aiding the real estate market and attracting new investments

### D.3- Visibility and Geotourism the territory

One of the central points for the Geopark's endogenous development strategy involves networking, which entails processes of circulation, articulation, participation, association and communication among the social actors involved. Collaboration has increasingly provided potential for organizing initiatives in territorial networks, where joint actions, arising from various causes, perform significant social transformations, since they occur through the exchange of information and institutional and political articulation. In the case of the Quarta Colônia, associative processes are linked to the very history of construction of the territory. Poor immigrants, "abandoned" by the State in the midst of an adverse environment and filled with a strong sense of religiosity ended

up developing strategies of cooperation and mutual help, which were bolstered amidst the great number of festivities and social events that endure until today. The numerous festivals in the religious calendar of the Quarta Colônia always rely on a great deal of voluntary and collaborative work, which expresses a deep social interaction, also portrayed in the artisan groups, folkloric dance groups, cooperatives, and organized rural communities. In this sense, the Geopark's implementation strategy has benefited from this characteristic of the region, which recognizes the central role of the institutional actors involved and assigns the necessary level of trust to these actors and the projects they coordinate. In the graph of Figure 47, produced by Ziemann (2020) from

interviews with the main leaders and entrepreneurs of the territory, centrality is defined by the number of times a given actor is referred to by the interviewees, and the more central the position of these subjects or institutions, the more strategic they are in the process of community articulation. Thus, the position occupied by the actors directly involved in the implementation project of the Quarta Colônia Geopark (especially CONDESUS and UFSM), demonstrates, with a high degree of reliability, that the project is today a reference for this region and this community, even though much has to be advanced in terms of social cohesion, trust in public institutions and collaborative entrepreneurship.

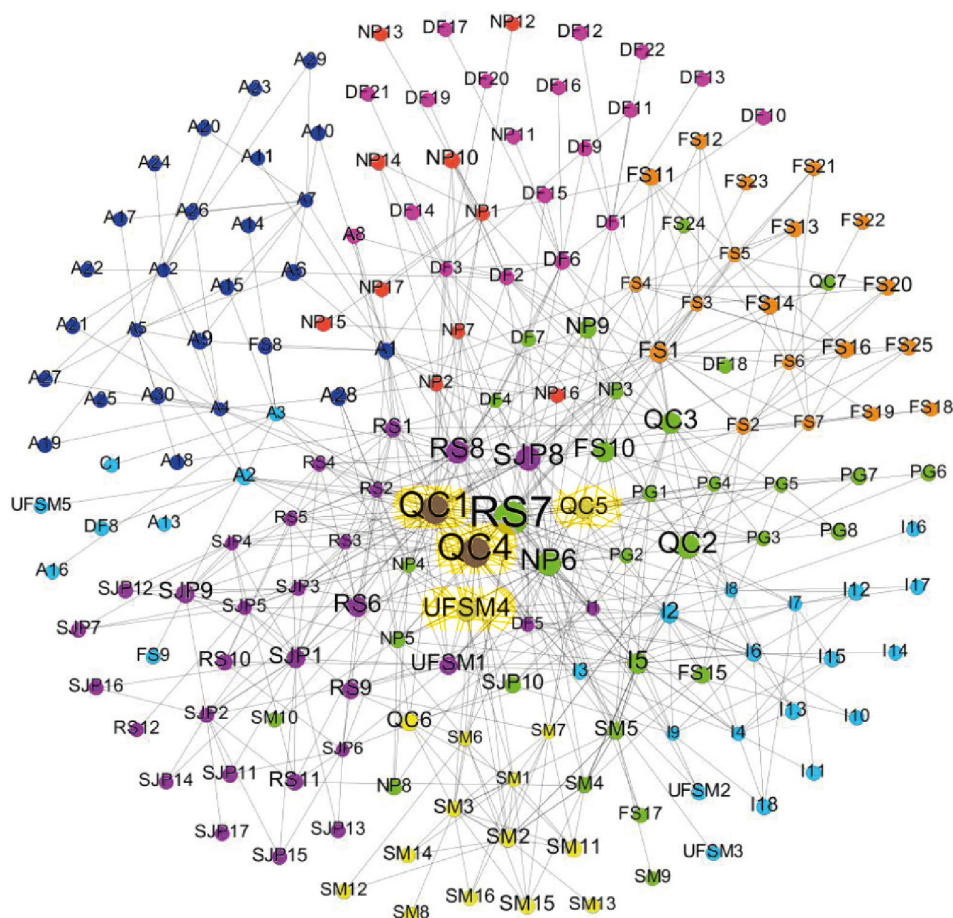


Fig 47- Organization of the network of social interactions in the territory of the Quarta Colônia, according to the perception of entrepreneurs and community leaders. The central strategic position occupied by the actors most directly involved in the implementation of the QCAG is clearly highlighted: CONDESUS (QC4), UFSM (UFSM4) the municipalities (QC5) and the Consortium's executive secretary (QC1)





# E

## SELLING OF GEOLOGICAL MATERIAL

The QCAG is not involved in the sale of geological material, such as fossils, minerals or polished

rocks. The governing authority of the proposed Geopark agrees to uphold the Operational Gui-

delines for UNESCO global Geoparks, in particular Section 3. (vii).



# F

## INTERESTS AND ARGUMENTS FOR BECOMING A UNESCO GLOBAL GEOPARK

The territory of the Quarta Colônia is the source of a unique paleontological heritage, comparable to few regions on the planet, where you can find evidence of the rise of one of the most famous animal groups in paleontology: the dinosaurs. The sedimentary rocks that support the landscape of this territory, deposited between 233

and 225 million years ago, in the Triassic Period, are well-preserved records of a key moment in the history of life on planet Earth. High impact discoveries for world science, such as those of the species *Buriolestes schultzi*, *Bagualosaurus agudoensis* and *Macrocollum itaquii*, are so far unique to the territory of the Quarta Colônia, de-

monstrating its importance for our understanding of the evolutionary history of the Earth. Similarly, the carnivore *Gnathovorax cabreirai*, described in late 2019 and widely reported by the international media, attests to one of the first moments when dinosaurs became top-of-the-chain predators, a fact that would be sustained throu-

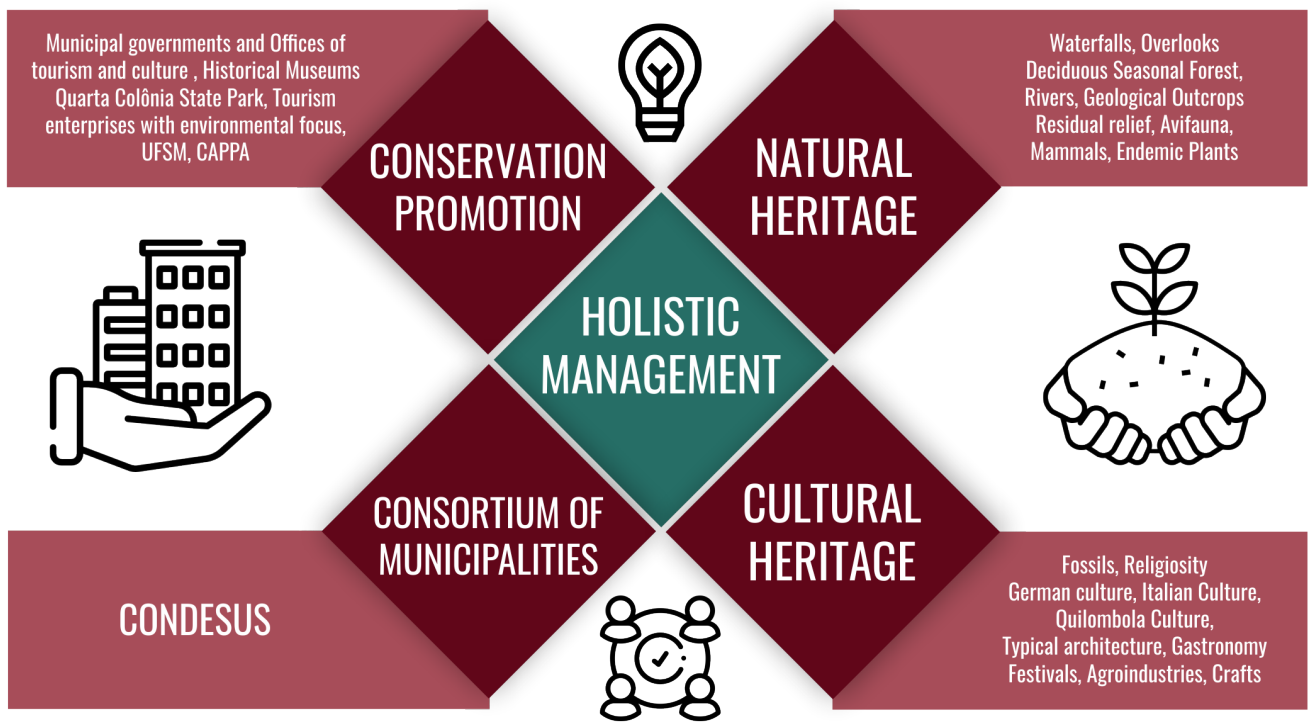


Fig 48- Diagram of the potential of the Quarta Colônia as a UNESCO Global Geopark. Source: Zieman, 2020.

Throughout the more than 100 million years in which these animals dominated the planet. The fossil record from the region provides us with a kind of “window into the past” that allows us to understand what the environment was like some 230 million years ago, and how events that occurred at that time shaped life on Earth as we know it today. This evolutionary history is also reflected in the current nature of the territory, giving it a unique landscape heritage, which expresses the transition between the dry Mesozoic environment and the humid Holocene environment, with a mountain range delimited by cliffs covered by large and well-preserved fragments of Atlantic Forest. In the midst of this exuberant landscape, a large number of deep valleys sculpted over thousands of years by the energy of a large hydrographic network stand out, providing

the Quarta Colônia with waterfalls, river beaches and navigable rivers. This territory has served for over a decade as a reference for ecotourism activities in central Rio Grande do Sul, attracting the attention of tourists, researchers and environmental managers. Additionally, there is an exceptional cultural heritage, which has been sustained especially through European immigrants and their descendants. Whether in the dialects spoken, the gastronomy, the festivals, the religiosity, the music or the preserved architecture, the territory of the Quarta Colônia represents today a living symbol of immigration in southern Brazil. The scheme above (fig. 48) synthesizes the prominent features of the territory that make it a strong Geopark candidate. Aiming to conserve the natural and cultural heritage of this terri-

tory, enhancing local development based on geotourism, CONDESUS Quarta Colônia has partnered with UFSM to develop a set of strategies we hope will lead the territory to become a UNESCO Global Geopark. Thus, actions to promote entrepreneurship, heritage education, inventories of natural and cultural heritage, among others, have been vigorously developed in the Quarta Colônia, seeking to expand in the community an awareness of development based on conservation and sustainable use of local heritage. In the wake of this process, and after a large number of debates and public hearings, the Management Committee of the Quarta Colônia Geopark Project was established in the first semester of 2020 and now submits the application to the International Geosciences and Geoparks Program (IGGP).





UNESCO Aspiring

**Geopark**

**Quarta Colônia**

**ANNEX 1**  
**Self-evaluation document**





United Nations  
Educational, Scientific and  
Cultural Organization



UNESCO  
Global  
Geoparks

## Evaluation Document - A

### Self Evaluation

Updated: 11 February 2016

### Identity

#### 1. Name and country of the territory

Quarta Colônia UNESCO Aspiring Geopark - Rio Grande do Sul, Brazil

#### 2. Name of the management body

Region	Latin America & the Caribbean
Country	Brazil
Telephone	+55 55 3269-1022
Fax	
E-mail	<a href="mailto:geoparquequartacolonia.pre@ufsm.br">geoparquequartacolonia.pre@ufsm.br</a>

#### 3. Address of the management body

Rua Maximiliano Vizzotto, nº 598, São João do Polêsine/RS – Brasil

#### 4. Size of territory and geographical coordinates

Size in km <sup>2</sup>	2.923 km <sup>2</sup>
Geographical coordinates	-29°10'19" to -29°58'55" S and -53°39'18" to -53°1'30"W

#### 5. Contact persons

Management body director	Jaciele Carine Vidor Sell
Geoscientist	Flávio Pretto
Specialist on regional development	Adriano Severo Figueiró

#### Submitted by:

Name	Position	Date
Jaciele Carine Vidor Sell	Geopark manager	November 5th, 2021
Signature		



## Overview

	Category	Weighting	Self Assessment	Evaluators' Estimate
		(%)		
<b>I</b>	Geology and Landscape			
<b>1.1</b>	Territory	5	42	0
<b>1.2</b>	Geoconservation	20	148	0
<b>1.3</b>	Natural and Cultural Heritage	10	92,5	0
<b>II.</b>	Management Structure	25	180,75	0
<b>III</b>	Interpretation and Environmental Education	15	90,75	0
<b>IV</b>	Geotourism	15	121,8	0
<b>V</b>	Sustainable Regional Economic Development	10	88	0
<b>Total</b>		100	763,8	0

## EVALUATORS VERIFICATION

Name	Position	Date
Signature		
Name	Position	Date
Signature		

I. Geology and Landscape 1.1 Territory		Points Available	Self Assessment
1.	<b>Territory</b>		
1.1	<b>Geosite list</b>		
	List of "Geosites" located within the territory identified for use (Please provide a geosite list)		
		20 "Geosites" or more	100
		40 "Geosites" or more	200
		<b>Maximum Total</b>	<b>200</b>
			<b>100</b>
2	<b>Geodiversity</b>		
2.1	How many geological periods are represented in your area? (10 points each, maximum 100 points) (Please provide a list)	100	40
2.2	How many clearly defined rock types are represented in your area? (10 points each, maximum 100 points) (Please provide a list)	100	100
2.3	How many distinct geological or geomorphological features are present within your area? (Please provide a list) (10 points each, maximum 100 points).	100	100
		<b>Maximum Total</b>	<b>300</b>
			<b>240</b>
3	<b>Public interpretation of the Geopark's sites of interest</b>		
3.1	Number of sites with public interpretation (trails, interpretation panels or leaflets) (Please provide a list)		
		5-10	40
		10-20	80
		20 or more	120
3.2	Geosites of scientific importance (Please provide a list)	> 25 %	40
3.3	Geosites used for education (Please provide a list)	> 25 %	40
3.4	Geosites used for geotourism (Please provide a list)	> 25 %	40
3.5	Non-geological sites used by the Geopark (intergraded in Geoparks' activities) (Please provide a list)		40
		<b>Maximum Total</b>	<b>200</b>
			<b>200</b>
4	<b>Comparison to UNESCO Global Geoparks (select one from the following options)</b>		
4.1	There is no comparison with any other UNESCO Global Geopark.	300	300
4.2	There is another UNESCO Global Geopark with comparable geology.	200	
4.3	There is another UNESCO Global Geopark with comparable geology or infrastructure in the same country.	100	
4.4	There is another UNESCO Global Geopark with comparable geology or infrastructure in the same country's geographical region (Clarification in time and distance)	50	
		<b>Maximum Total</b>	<b>300</b>
			<b>300</b>

Please provide lists and details as a separate annex referring to the corresponding item numbers

Territory Subtotal	Maximum Points	Self Assessment
	<b>1000</b>	<b>840</b>



I. Geology and Landscape 1.2 Geological Conservation		Points Available	Self Assessment	Evaluators' Estimate
1	Inventory and significance of the geosites that can be found in your area (SELF AWARDED total cannot exceed 300).			
1.1	At least one geosite of international geological significance (100 for each) (Give a list and justification)	160	160	
1.2	At least five geosites of national significance (Give a list and justification)	100	100	
1.3	At least 20 geosites of educational interest and used by schools and universities. (Give a list and justification)	100	100	
1.4	Do you have a geosites' database for the Geopark? (Please give details)	50	50	
1.5	Do you have a geosites' map for the Geopark? (Please give details)	50	50	
<b>Maximum Total</b>		<b>300</b>	<b>300</b>	<b>0</b>
2	Strategy and legislation to protect against damage of geological sites and features (one answer only)			
2.1	The entire territory has legal protection because of its geological values.	300		
2.2	Part of the area is protected by law for its geological interest. (Please refer to which part and why)	150	150	
2.3	Prohibition of destroying and removing parts of the geological heritage.	150	150	
<b>Maximum Total</b>		<b>300</b>	<b>300</b>	<b>0</b>
3	How are the geosites protected against misuse and damage?			
3.1	General announcement of regulations to prevent misuse and damage in the entire Geopark area	100	0	
3.2	Announcement of regulations to prevent misuse and damage at individual sites of the Geopark	50	0	
3.3	Use of observation posts, guarding and patrolling by wardens	60	0	
3.4	Provision for enforcement of regulations (no digging and collecting) on the website, in flyers, etc.	40	40	
3.5	Offering collecting of geological specimens under supervision at selected sites (clarification)	40	40	
<b>Maximum Total</b>		<b>200</b>	<b>80</b>	<b>0</b>
4	What measures are taken to protect geosites and infrastructure from damage and natural degradation?			
4.1	Regular maintenance and cleaning (Please give details. How often are they checked?)	60	30	
4.2	Conservation measures (Please give details)	70	30	
4.3	Protective measures (preparation, sealing to avoid natural degradation) (Please give details)	70	0	
<b>Maximum Total</b>		<b>200</b>	<b>60</b>	<b>0</b>
<b>Geoconservation Subtotal</b>		<b>1000</b>	<b>740</b>	<b>0</b>

I. Geology and Landscape 1.3 Natural and Cultural Heritage		Points Available	Self Assessment	Evaluators' Estimate
<b>1 Natural Rank (SELF AWARDED total cannot exceed 300)</b>				
1.1	International designation in part of the Geopark territory (except World Heritage Sites and Biosphere Reserves) (Please give a list and justification)	250		
1.2	National designation in part of the Geopark territory (Please give a list and justification)	150	150	
1.3	Regional designation in part of the Geopark territory (Please give a list and justification)	75	75	
1.4	Local designation in part of the Geopark territory (Please give a list and justification)	50	50	
<b>Maximum Total</b>		<b>300</b>	<b>275</b>	<b>0</b>
<b>2 Cultural Rank (SELF AWARDED total cannot exceed 300)</b>				
2.1	International designation in part of the Geopark territory (except World Heritage Sites) (Please give a list and justification)	250	250	
2.2	National designation in part of the Geopark territory (Please give a list and justification)	150	150	
2.3	Regional designation in part of the Geopark territory (Please give a list and justification)	75	75	
2.4	Local designation in part of the Geopark territory (Please give a list and justification)	50	50	
<b>Maximum Total</b>		<b>300</b>	<b>300</b>	<b>0</b>
<b>3 Promotion and maintenance of Natural and Cultural Heritage</b>				
3.1	Promotion of the links between Geological Heritage sites and the existing Natural and Cultural sites within the Geopark (Prove with examples) (Please give details)	100	100	
3.2	Interpretation (Please give details)	100	50	
3.3	Communication (Please give details)	100	100	
3.4	Education programmes (Please give details)	100	100	
<b>Maximum Total</b>		<b>400</b>	<b>350</b>	<b>0</b>
<b>4 Overlapping UNESCO designations</b>				
4	Your Geopark overlaps partly or totally with a World Heritage Site and/or Biosphere Reserve (If yes, please provide justification and evidence on how UNESCO Global Geopark status will add value by being both independently branded and in synergy with the other designations)	Yes/No	Sim	

Natural and Cultural Heritage Subtotal	Maximum Points	Self Assessment	Evaluators' Estimate
	<b>1000</b>	<b>925</b>	<b>0</b>

**Please provide requested lists and details, but do not send entire publications, brochures, etc. (these should be provided only to field evaluators)**

Total Points Awarded For Section I: Geology and Landscape	Maximum Points	Self Assessment	Evaluators' Estimate
	<b>3000</b>	<b>2505</b>	<b>0</b>



II. Management Structure		Points Available	Self Assessment	Evaluators' Estimate
<b>1</b>	<b>How is the Geopark's management structure organised?</b>			
1.1	Does the Geopark have a clear and well-defined boundary? (Please give details)	50	50	
1.2	Does the Geopark have a well-defined and effective management structure able to take and implement decisions to enhance protection of Geological Heritage and promote sustainable regional development for the Geopark area? (Please give details)	50	40	
1.3	Is the Geopark staff employed directly, or indirectly by Geopark partners? (Please elaborate)	50	50	
1.4	Does the Geopark have an independently administered budget? (Please give details)	50	50	
		<b>Maximum Total</b>	<b>200</b>	<b>190</b>
<b>2</b>	<b>Does a management or Master Plan exist?</b>			
2.1	Management or Master Plan exists (not older than 10 years) (You should refer to the main components in accompanying documentation)	40	20	
		<b>Maximum Total</b>	<b>40</b>	<b>20</b>
<b>3</b>	<b>The Master Plan - What components does it include?</b>			
3.1	Earth Heritage (Geosite and Landscape)	10	5	
3.2	Other Natural and Cultural Heritage	10	5	
3.3	Links between Natural and Cultural Heritage	10	5	
3.4	Tourism development (infrastructure and activities)	10	5	
3.5	Education activities	10	5	
3.6	Local development	10	5	
3.7	Regional products (agrotourism)	10	5	
3.8	Community links	10	5	
3.9	Funding	10	5	
3.10	Marketing strategy	10	0	
3.11	Strengths and weaknesses analysis of management and administration	20	10	
3.12	An audit of the geological and other resources	20	0	
3.13	Do you have specific targets for goals in the following areas? (Identify specific goals)			
		Geology	5	2
		Landscape protection	5	2
		Tourism "geotourism"	5	2
		Agriculture and forestry	5	2
3.14	Analysis of opportunities for local and/or regional development	10	5	
		<b>Maximum Total</b>	<b>160</b>	<b>68</b>
<b>4</b>	<b>Does your Geopark have a Marketing Strategy?</b>			
4.1	Strategy exists (not older than 10 years) (You should refer to the main components in accompanying documentation)	50	0	
		<b>Maximum Total</b>	<b>50</b>	<b>0</b>
<b>5</b>	<b>A Geopark should protect its geological heritage and create sustainable geotourism. What has been done to fulfil this duty?</b>			
5.1	Defined areas which will be the focus of tourism development	25	10	
5.2	Defined areas where no tourism is allowed (with focus on protection and research)	20	20	
5.3	Measures taken to regulate and reduce traffic (restricted access, central parking lots, traffic guiding system, signposting etc.)	15	5	
5.4	Environmental friendly hiking path system	10	10	
5.5	Clearly defined cycle or other trails such as bridleways or river trails	10	10	
		<b>Maximum Total</b>	<b>80</b>	<b>55</b>
<b>6</b>	<b>Are there any initiatives or working groups that discuss promotion of natural and cultural heritage? (SELF AWARDED total cannot exceed 20)</b>			
6.1	Regular "Working Group" meetings on specific topics	20	20	
6.2	Individual cooperation and contracts between the Geopark, tourism organisations and other interest groups	10	0	
6.3	Other regular activities, not described by the answers above	10	10	
		<b>Maximum Total</b>	<b>20</b>	<b>20</b>
<b>7</b>	<b>Has your Geopark area received any awards or other formal recognition for its activities in the field of geodiversity, conservation or sustainable geo-tourism during the last five years? (SELF AWARDED total cannot exceed 100)</b>			
7.1	International awards (name and date of award)	100	100	
7.2	National awards (name and date of award)	50		
7.3	Other (e.g. from industry) (name and date of award)	20	20	
		<b>Maximum Total</b>	<b>100</b>	<b>100</b>
<b>8</b>	<b>Are competent geological and scientific experts available to promote further scientific research?</b>			
8.1	At least one person with a degree in geosciences or other related discipline in the permanent staff (employed directly) (Add 10 points for each geoscientist)	40	0	

8.2	At least five people with a degree in geosciences or other related discipline on the staff of the Geopark (employed by partner)	25	25	
8.3	Additional experts exist in the permanent staff (e.g. biologists)	10	0	
8.4	Regular and formal joint activity with at least one scientific institution (University, National Geological Survey)	20	20	
8.5	Regular consulting is maintained by:			
	Persons with a scientific background in geosciences	15	15	
	Persons with experience in geosciences	10	10	
	Amateurs available from local community	5	5	
8.6	How many different scientific disciplines are represented in the expert network?			
	< 5	5		
	> 5	10	10	
8.7	Does a marketing expert exist? If not, who does the work?	5	0	
8.8	Does a press office exist? If not, who does the work?	5	2	
8.9	Are staff members available to run field trips/guided walks?	5	3	
<b>Maximum Total</b>		<b>150</b>	<b>90</b>	<b>0</b>

<b>9</b>	<b>Does your Geopark area have the following infrastructure?</b>			
9.1	Museum within the area of the Geopark managed by yourself or a partner in your organization	100	100	
9.2	Information centre within the area of the Geopark	80	40	
9.3	'Info-kiosks' or other 'local information points' within the area that provide information about the Geopark, its aims and work	40	0	
9.4	Information panels within the area	40	20	
9.5	Geological trails within the area of the Geopark (which have been developed by the Geopark, or the Geopark has been involved in developing)	40	20	
<b>Maximum Total</b>		<b>200</b>	<b>180</b>	<b>0</b>

Total Points Awarded For Section II: Management Structure	Maximum Points	Self Assessment	Evaluators' Estimate
	<b>1000</b>	<b>723</b>	<b>0</b>

III. Information and Environmental Education		Points Available	Self Assessment	Evaluators' Estimate
<b>1</b>	<b>Research, information and education scientific activity in Earth sciences within the territory</b>			
1.1	At least one scientific/academic institution working in the Geopark's area	50	50	
1.2	At least one student final report (mapping etc.) on the Geopark's area per year	40	40	
1.3	At least one PhD thesis on the Geopark's area within the past three years	50	<b>50</b>	
1.4	At least five scientific or tourism focused academic papers from work within the Geopark's area during the last 5 years	40	<b>40</b>	
		<b>Maximum Total</b>	<b>180</b>	<b>180</b>
<b>2</b>	<b>Do you operate programmes of environmental education in your Geopark area?</b>			
2.1	Does your permanent staff include specialists in environmental education, who undertake such work as part of their main role within your team?	50	0	
2.2	Do you operate at least one formal education programme? (Please outline the nature of the programme(s))	30	0	
2.3	Do you contribute to at least one formal education programme developed by other organisations? (Museums, etc.)	20	20	
2.4	Do you offer personal and individual programmes for children visiting the Geopark's area?	20	20	
2.5	Do you operate a special programme for primary/elementary school classes?	20	20	
2.6	Do you operate a special programme for secondary/high school classes?	20	20	
2.7	Do you operate a special programme for university students?	20	20	
2.8	Are there any university camps/education centres in the Geopark's area?	20	20	
		<b>Maximum Total</b>	<b>200</b>	<b>120</b>
<b>3</b>	<b>What kind of educational materials exist? (to be checked by field evaluators on site)</b>			
3.1	Have you developed new educational material for school classes?	20	20	
3.2	Films, video, slideshow etc.	20	20	
3.3	Interactive (online) elements	20	20	
3.4	Different special exhibitions changing on a regular basis	20	0	
3.5	Special education equipment (puzzles, special constructions, etc)	20	20	
3.6	Do you produce other material for children below the age of 8?	20	20	
		<b>Maximum Total</b>	<b>120</b>	<b>100</b>
<b>4</b>	<b>What kind of published information is available in your Geopark area? (to be checked by field evaluators on site)</b>			
4.1	Protection of geological heritage	20	20	
4.2	Geology of the area	15	15	
4.3	Publication linking geology, nature and culture of the area	20	20	
4.4	Environmentally friendly behaviour in the area	15	15	
4.5	Other aspects of natural history which can be found within the area	15	15	
4.6	Historical elements	15	15	
		<b>Maximum Total</b>	<b>100</b>	<b>100</b>
<b>5</b>	<b>Geology provision for school groups (for example, organized visits, etc.) (The SELF AWARDED total cannot exceed 100)</b>			
5.1	Guided tours by Geopark's staff (explain and justify)	30	0	
5.2	Guided tours through a member organisation (explain and justify)	15	15	
5.3	Standard programmes, regularly offered for all park visitors (explain and justify)	10	0	
5.4	Limited group size (max. 30 persons per guide) (explain and justify)	10	0	
5.5	Are alternatives available if tours are not possible due to bad weather conditions? (explain and justify)	10	10	
5.6	Do programmes exist aimed at different age groups? (explain and justify)	20	20	
5.7	Do special scientific programmes exist? (explain and justify)	20	0	
5.8	Is teacher training offered in matters relating to the Geopark? (explain and justify)	20	20	
		<b>Maximum Total</b>	<b>100</b>	<b>65</b>
<b>6</b>	<b>Education – Guides (The SELF AWARDED total cannot exceed 100)</b>			
6.1	Do you have at least one qualified expert in the Geopark's permanent staff providing guided visits that your organization has a role in developing? (explain and justify)	20	0	
6.2	Do you have at least one qualified expert in a partner organization providing guided visits that your organization has a role in developing? (explain and justify)	15	15	
6.3	Personal guides as part of the Geopark's permanent staff (explain and justify)	20	0	
6.4	Personal guides by partner organisation (explain and justify)	15	15	
6.5	Freelance guides whose training and/or programme your organization supports (explain and justify)	20	0	
6.6	Training courses for guides (explain and justify)	20	0	
		<b>Maximum Total</b>	<b>100</b>	<b>30</b>
<b>7</b>	<b>What kind of information do you provide to educational groups to encourage them to visit your area?</b>			
7.1	Letters to schools and universities	20	10	



7.2	Brochure	20	0	
7.3	Press announcements (Newspapers, Radio, TV)	20	0	
7.4	Newspaper or newsletter	20	0	
<b>Maximum Total</b>		<b>80</b>	<b>10</b>	<b>0</b>
<b>8 Do you use the internet for school programmes? What kind of service do you provide?</b>				
8.1	Own website with general information about environmental education within the area	50	0	
8.2	Those responsible for the education programme may be reached by e-mail	30	0	
8.3	Regular electronic newsletter	20	0	
8.4	Up-to-date calendar of activities	20	0	
<b>Maximum Total</b>		<b>120</b>	<b>0</b>	<b>0</b>

**Please do not send information material, brochures, etc. (these should be provided only to field evaluators)**

Total Points Awarded For Section III: Education	Maximum Points	Self Assessment	Evaluators' Estimate
	<b>1000</b>	<b>605</b>	<b>0</b>

IV. Geotourism		Points Available	Self Assessment	Evaluators' Estimate
<b>1</b>	<b>What kind of promotional material of the area is available?</b>			
1.1	Printed material (e.g. leaflets, magazines)	25	25	
1.2	Popular literature for public (e.g. books, guide books)	15	15	
1.3	CD or video material	15	<b>15</b>	
1.4	Other promotional material or merchandise	15	<b>15</b>	
		<b>Maximum Total</b>	<b>70</b>	<b>0</b>
<b>2</b>	<b>In how many languages is the marketing material produced? (The SELF AWARDED total cannot exceed 80)</b>			
2.1	English	10	10	
2.2	French	10	10	
2.3	Spanish	10	10	
2.4	Russian	10		
2.5	Chinese	10		
2.6	Arabic	10		
2.7	Add 10 points for each other language (explain and justify)		10	
2.8	Multiple languages in one publication	10		
		<b>Maximum Total</b>	<b>40</b>	<b>0</b>
<b>3</b>	<b>Are the information centres or exhibitions regarding the area in the Geopark's area?</b>			
3.1	At least one information centre, managed directly by the Geopark or one of the partner organizations	30	30	
3.2	Info points' or similar facilities throughout the area managed directly by the Geopark or one of the partner organizations	20	20	
3.3	Information centre "meeting and starting" point for excursions	10	10	
3.4	Is the Information centre accessible for wheelchair users and does it cater for individuals with other disabilities?	10	10	
3.5	Personal and individual information offered to visitors about possible activities in the area	10	10	
3.6	Centre open to the public at least 6 days a week, all year round (if the weather permits it)	20	20	
		<b>Maximum Total</b>	<b>100</b>	<b>0</b>
<b>4</b>	<b>How is information and interpretation about the area presented at info centres, information points, etc.?</b>			
4.1	Static display material	10	10	
4.2	Films, video, slideshow, etc.	10	10	
4.3	Interactive displays	10	10	
4.4	Different special exhibitions changing on a regular basis	40	40	
		<b>Maximum Total</b>	<b>70</b>	<b>0</b>
<b>5</b>	<b>Public access and facilities (SELF AWARDED total cannot exceed 100)</b>			
5.1	Is it possible to reach the Geopark area by public transport?	50	50	
5.2	Do you provide your own tourist transport?	20	0	
5.3	Is public transport integrated with walking, cycling trails?	20	20	
5.4	Do you have car park facilities connected to the trails which your organization has developed?	20	20	
5.5	Are there toilets available in the parking areas?	20	10	
		<b>Maximum Total</b>	<b>100</b>	<b>0</b>
<b>6</b>	<b>Are visitors informed about public transport in the area and encouraged to use it before their arrival?</b>			
6.1	Promotional material about the area (leaflets, brochures, internet) contains information about public transport	20	20	
6.2	The website(s) of the Geopark and/or local tourism organizations are linked to web-based timetables and transport information held by others	20	20	
6.3	Special offers for tourists using public transport, bicycle or other forms of sustainable transport	10	10	
		<b>Maximum Total</b>	<b>50</b>	<b>0</b>
<b>7</b>	<b>What kind of guided tours have been developed by your management body and/or partners?</b>			
7.1	Tours for groups with special a interest in geology and geomorphology	10	10	
7.2	Tours take place regularly during the season	10	10	
7.3	Tours for a broad audience	20	20	
7.4	Tours for disabled visitors	10	2	
7.5	Available alternatives if tours are not possible due to bad weather conditions	10	10	
7.6	Flexible registration system (day to day basis) for participants or no registration required	10	10	
		<b>Maximum Total</b>	<b>62</b>	<b>0</b>
<b>8</b>	<b>What else do you use to inform visitors about your area?</b>			
8.1	Easy to read interpretation panels at entrance areas and/or tourist locations	20	0	
8.2	There is at least one promoted trail dealing with geological subjects, developed by your team, alongside any developed by partners.	20	20	
		<b>Maximum Total</b>	<b>20</b>	<b>0</b>

<b>9</b>	<b>How is the information and are activities of different organisations co-ordinated?</b>				
9.1	Joint information and/or promotional material		20	10	
			<b>Maximum Total</b>	<b>20</b>	<b>10</b>
<b>10</b>	<b>Do you use the internet and what kind of online service do you provide? (SELF AWARDED total cannot exceed 80)</b>				
10.1	Own website with general information about the area		40	40	
10.2	Links to other websites of tourist board, communities, local government, which provide a broad range of information on the Geopark's area.		10	10	
10.3	Geopark's management body may be reached by email		5	5	
10.4	Regular electronic newsletter		10	0	
10.5	Facility to order publications online		10	10	
10.6	Up-to-date calendar of activities		15	0	
10.7	Guidance for visitors on potential excursions		10	10	
			<b>Maximum Total</b>	<b>80</b>	<b>75</b>
<b>11</b>	<b>What kind of infrastructure is available for activities such as horse riding, canoeing and cycling ?</b>				
11.1	Network of footpaths, which include the main touristic and scientific points of interest		10	5	
11.2	Uniform/standard signposting of paths		10	0	
11.3	Regular checks of infrastructure and immediate repair guaranteed		10	0	
11.4	Special maps and information sheets for hikers, cyclists, etc.		10	0	
11.5	At least one path concerning a special subject (mining, archaeology, architecture - not previously counted in your score under another heading)		10	10	
11.6	Guided cycling -, walking tours, etc. provided or actively supported by a partner organization		10	10	
11.7	All inclusive offers (e.g. hotel, half or full board) of several days for tours (for example, hiking - and/or cycling tours) offered or actively supported by a partner organization		10	10	
11.8	All inclusive tour package with luggage transport of several days provided or actively supported by a partner organization		10	10	
11.9	There is a network of hiking/biking friendly hotels/pensions, defined by a catalogue of criteria who work in partnership with your organisation.		20	0	
			<b>Maximum Total</b>	<b>100</b>	<b>45</b>
<b>12</b>	<b>How do you communicate the goals of geotourism, especially to those responsible for tourism?</b>				
12.1	Direct personal meetings and/or through their involvement in your organization		10	10	
12.2	A regular award scheme to promote good practice		20	0	
12.3	The selection and nomination of official partners/mentors/sponsors		20	20	
			<b>Maximum Total</b>	<b>50</b>	<b>30</b>
<b>13</b>	<b>Do you have the following sustainable (e.g. non car based) trails?</b>				
13.1	Geo-trails		20	20	
13.2	Cultural trails		10	10	
13.3	Forest trails		10	10	
13.4	Other trails		10	10	
13.5	Other out-door activities not mentioned elsewhere		10	10	
			<b>Maximum Total</b>	<b>60</b>	<b>60</b>
<b>14</b>	<b>Visitor evaluation</b>				
14.1	Do you count visitors?		20		
		By entrance tickets / trail counters		yes	
		By field trip participants		yes	
		By estimation			
		By visitor survey			20
14.2	Do you evaluate where your visitors come from?		20		
		By booking addresses			10
		By market analysis			5
		By university study			5
14.3	Do you use visitor evaluation for your forward planning?		20	20	
14.4	Do you analyse the socio-economic profile of your visitors (families, school classes, pension groups, tourist groups, etc.)?		10	10	
14.5	Do you use questionnaires to assess visitors' satisfaction levels?		10	10	
			<b>Maximum Total</b>	<b>80</b>	<b>80</b>

**Please do not send information material, brochures, etc. (these should be provided only to field evaluators)**

Total Points Awarded For Section IV: Geotourism	Maximum Points	Self Assessment	Evaluators' Estimate
	<b>1000</b>	<b>812</b>	<b>0</b>



V. Sustainable Regional Economy		Points Available	Self Assessment	Evaluators' Estimate
<b>1</b>	<b>What efforts are undertaken to promote regional food and craft products, and to integrate the catering trade?</b>			
1.1	Initiatives promoting food from regional and/or ecological production, which your organisation develops or actively supports	50	50	
1.2	Meals from regional and/or ecological production are available in restaurants	30	30	
1.3	The Geopark organizes markets, where mainly regional agricultural products are sold	50	0	
1.4	A label for regional food products or local gastronomy exists	30	30	
1.5	Direct marketing of regional agricultural products	40	20	
<b>Maximum Total</b>		<b>200</b>	<b>130</b>	<b>0</b>
<b>2</b>	<b>What efforts are undertaken to create and promote regional geotourism products?</b>			
2.1	Initiatives to promote the production of geological replicas	50	50	
2.2	Casts and souvenirs from local production are available	100	100	
2.3	The organization or its active partners has (a) retail outlet(s) where mainly regional products are sold.	50	40	
<b>Maximum Total</b>		<b>200</b>	<b>190</b>	<b>0</b>
<b>3</b>	<b>How are regional crafts promoted?</b>			
3.1	The marketing of local craft products is actively supported	50	40	
3.2	Local craft products are showcased	100	80	
<b>Maximum Total</b>		<b>150</b>	<b>120</b>	<b>0</b>
<b>4</b>	<b>What efforts are undertaken to promote links between the Geopark and local businesses? (SELF AWARDED total cannot exceed 100)</b>			
4.1	A label for regional services/products has been developed by the Geopark or in partnership with others	50	50	
4.2	Direct marketing of regional products is undertaken by your organization	50	20	
4.3	Tourism offers include tours in collaboration with local businesses	20	20	
<b>Maximum Total</b>		<b>100</b>	<b>90</b>	<b>0</b>
<b>5</b>	<b>What kind of contracts are regularly offered to businesses in your area? (SELF AWARDED total cannot exceed 150)</b>			
5.1	Services (repair, management)	50	50	
5.2	Design, Print	50	50	
5.3	Other equipment and/or services to support geotourism and interpretation, e.g. transport, display cabinets etc. (give details)	80	80	
<b>Maximum Total</b>		<b>150</b>	<b>150</b>	<b>0</b>
<b>6</b>	<b>Networking (SELF AWARDED total cannot exceed 200)</b>			
6.1	A network of co-operating enterprises exists, fostered by the Geopark.	100	100	
6.2	There is a formal contract between the Geopark and its partners	100	100	
6.3	There are jointly financed projects between the Geopark, private businesses and local authorities.	50		
<b>Maximum Total</b>		<b>200</b>	<b>200</b>	<b>0</b>

<b>Total Points Awarded For Section V: Sustainable Regional Economy</b>	<b>Maximum Points</b>	<b>Self Assessment</b>	<b>Evaluators' Estimate</b>
	<b>1000</b>	<b>880</b>	<b>0</b>



## I. Geology and landscape | 1.1 Territory

### 1. Territory

#### 1.1 Geosite list

List of "Geosites" located within the territory identified for use

No.	Geosite	Latitude	Longitude
1	Vale Vêneto Road	29°41'37,2"S	53°29'48,3"W
2	Linha São Luiz	29°33'28,8"S	53°26'53,6"W
3	Fogliarini	29°37'36,1"S	53°22'0,7"W
4	ASERMA	29°64'15,24"S	53°27'03,77"W
5	Janner	29°39'12,5"S	53°17'50,7"W
6	Wachholz	29°36'46,42"S	53°15'54,06"W
7	Buriol	29°39'30,99"S	53°26'10,13G"W
8	Piche	29°39'13,2"S	53°17'39,9"W
9	Niemeyer	29°40'25"S	53°14'20"W
10	Pivetta	29°39'38,11"S	53°25'52,22"W
11	Marchesan	29°63'11,42"S	53°45'01,35"W
12	Raddatz Waterfall	29°35'10.72"S	53°10'48.69"O
13	Alagadas Cliffs	29°15'21.01"S	53°13'57.72"O
14	Cascata do Moinho Waterfall	29°37'34.23"S	53°35'48.50W
15	Obaldino Tessele Park	29°37'33.87"S	53°21'14.22"O
16	Passo das Tunas	29°55'25.95"S	53°25'7.13"O
17	Termas Romanas Hot Springs	29°42'14.44"S	53°29'55.07"O
18	Dona Francisca Dam Overlook	29°27'11.40"S	53°17'56.45"O
19	Monument to the Immigrant	29°39'28.87"S	53°35'44.20"O
20	Monte Grapa Mountain	29°31'18.11"S	53°33'42.55"O

21	Piruva Canyons	29°28'34.99"S	53°37'12.89"O
22	Cara de Índio Waterfall	29°29'45.71"S	53°35'24.95"O
23	CAPPA Overlook	29°36'34.51"S	53°27'4.25"O
24	Cerro Comprido Overlook	29°34'50.87"S	53°23'59.76"O
25	Morro Agudo Mountain	29°38'40.22"S	53°17'28.04"O
26	Cerro da Igreja Hill	29°32'15.24"S	53°17'40.21"O
27	Gruta do Índio Cave	29°32'22.82"S	53° 6'49.40"O
28	Cerro da Figueira Hill	29°41'10.00"S	53°12'43.00"O
29	Cascata da Ferreira Waterfall	29°16'5.36"S	53°16'44.96"O
30	Gruta do Sítio Alto Cave	29°31'26.27"S	53°32'38.38"O
31	Morro Santo Antônio Mountain	29°33'14.36"S	53°21'43.76"O



## 2. Geodiversity

### 2.1 How many geological periods are represented in your area?

No.	Geological period
1	Triassic
2	Jurassic
3	Cretaceous
4	Quaternary

## 2. Geodiversity

### 2.2 How many clearly defined rock types are represented in your area?

No.	Depositional types
1	Laterite in Formigueiro
2	Intrusive in São João do Polêsine
3	Volcanic from the Serra Geral Formation - Caxias Facies
4	Volcanic from the Serra Geral Formation - Gramado Facies
5	Intertrap Sandstone from the Serra Geral Formation
6	Sandstone from the Botucatu Formation
7	Sandstone from the Guará Formation
8	Sandstone from the Caturrita Formation
9	Argillite from the Santa Maria Formation
10	Lutite from the Santa Maria Formation
11	Conglomerates from the Santa Maria Formation
12	Sandstone from the Sanga do Cabral Formation
13	Sandstone from the Pirambóia Formation

## 2. Geodiversity

### 2.3 How many distinct geological or geomorphological features are present within your area?

No.	Geological or geomorphological features
1	Valleys
2	Residual hills (inselbergs)
3	Caverns
4	Cliffs
5	Meander cutoffs (or oxbow lakes)
6	Lakes and Floodplains
7	Colluvia
8	Fluvial terraces
9	Fossil sites
10	Waterfalls

### 3. Public interpretation of the Geopark's sites of interest

#### 3.1 Number of sites with public interpretation (trails, interpretation panels or leaflets)

Approximately 25 sites in the QC Geopark territory have some type of signage, hiking trails, interpretation panels or brochures, including:

No.	Sites with public interpretation
1	Cascata do Moinho Waterfall
2	Monument to the Immigrant
3	Hiking trail at the Quinta Marco 50 property
4	Silveira Martins Urban Historic Center
5	Monte Grappa Municipal Nature Park
6	Cara de Índio Waterfall
7	Piruva Canyons
8	Shining Cross Monument
9	Ivorá Urban Historic Center
10	CAPPA Overlook
11	Nossa Senhora da Salete Overlook
12	João Luiz Pozzobon Historic House Museum
13	Vale Vêneto
14	Cerro Comprido Overlook
15	Gruta do Sítio Alto Cave
16	Irmão Ademar da Rocha Museum of Photography
17	Obaldino Tessele Park
18	Morro Santo Antônio Mountain
19	Termas Romanas Hot Springs
20	Raddatz Waterfall
21	Route of Sculptures
22	Balneário Municipal Atílio Alessio Waterfront Park
23	Centro de Pesquisas Genealógicas - CPG (Center for Genealogical Research)



24	Roteiro dos Capitéis Route (Religious Monuments)
25	Caemborá Indigenous Site

### 3. Public interpretation of the Geopark's sites of interest

#### 3.2 Geosites of scientific importance

No.	Geosite
1	Janner
2	ASERMA
3	Wachholz
4	Fogliarini
5	Linha São Luiz
6	Buriol
7	Piche
8	Niemeyer
9	Pivetta
10	Marchesan
11	Monte Grappa Mountain
12	CAPPA Overlook
13	Gruta do Índio Cave

### 3. Public interpretation of the Geopark's sites of interest

#### 3.3 Geosites used for education

Nº	Geosite:
1	Janner
2	ASERMA
3	Fogliarini
4	Linha São Luiz

5	Buriol
6	Piche
7	Pivetta
8	Raddatz Waterfall
9	Obaldino Tessele Park
10	Passo das Tunas
11	Dona Francisca Dam Overlook
12	Termas Romanas Hot Springs
13	Cerro da Igreja Hill
14	Cerro Comprido Overlook
15	Monte Grapa Mountain
16	Immigrant to the Monument
17	CAPPA Overlook
18	Gruta do Índio Cave
19	Cascata da Ferreira Waterfall
20	Pedras Pretas Waterfall
21	Piruva Canyons

### 3. Public interpretation of the Geopark's sites of interest

#### 3.4 Geosites used for geotourism

1	Monument to the Immigrant
2	Monte Grappa Mountain
3	Cara de Índio Waterfall
4	Piruva Canyons
5	Linha São Luiz
6	Fogliarini

7	ASERMA
8	CAPPA Overlook
9	Cerro Comprido Overlook
10	Gruta do Sítio Alto Cave
11	Obaldino Tessele Park
12	Morro Santo Antônio Mountain
13	Vale Vêneto Road
14	Passo das Tunas
15	Termas Romanas Hot Springs
16	Cerro da Igreja Hill
17	Gruta do Índio Cave
18	Cerro da Figueira Hill
19	Raddatz Waterfall
20	Morro Agudo Mountain
21	Dona Francisca Dam Overlook
22	Alagadas Cliffs
23	Cascata da Ferreira Waterfall

### 3. Public interpretation of the Geopark's sites of interest

#### 3.5 Non-geological sites used by the Geopark (intergraded in Geoparks' activities)

1	Center for Paleontological Research in the Quarta Colônia - CAPPA/UFSM
2	Rincão da Encantada
3	Quinta Marco 50
4	Quarta Colônia State Park
5	Quinta Dom Inácio
6	Figueira Centenária
7	Shining Cross Monument



8	Route of Sculptures
9	Paga Peão Overlook
10	Soturno River Beach
11	Pompéia Historical Site
12	Silveira Martins Urban Historic Center
13	Irmão Ademar da Rocha Museum of Photography
14	Novo Treviso
15	Ivorá Urban Historic Center
16	Centro de Pesquisas Genealógicas (Center for Genealogical Research)
17	Fazenda dos Borges
18	Vale Vêneto
19	João Luiz Pozzobom Historic House Museum
20	Route of the Capitéis (Religious Monuments)
21	São Miguel dos Pretos Quilombola Community
22	Nossa Senhora da Salete Overlook
23	Caemborá Indigenous Site
24	Dona Francisca Dam



## 1. Geology and landscape | 1.2 Geological Conservation

### 1. Inventory and significance of the geosites that can be found in your area

#### 1.1 At least one geosite of international geological significance

Several paleontological geosites in the QCAG area are internationally relevant, primarily because of their fossil content. The Fogliarini Site, for example, houses records of *Prestosuchus*, the largest predator on the planet at its time, more than 237 Ma (Mastrantonio 2010; Mastrantonio et al. 2019; Roberto-Da-Silva et al. 2020; Desojo, von Baczko and Rauhut 2020), associated with a diverse fauna (Schultz et al. 2020). The Marchesan Site (233 M.y.) is the site of discovery of the only complete skeleton of a herrerasaurid dinosaur (*Gnathovorax*), the world's oldest predatory dinosaur to date (Pacheco et al. 2019; Langer, Ramezani, and Da Rosa 2018). The Buriol site (233 Ma) harbors a rich fauna that is yet to be fully described. Among the fossils already recognized at the site are *Buriolestes* (linked to the ancestry of the giant sauropods) and *Ixalerpeton* (a basal member of the lineage that originated the Pterosauria). The Janner site, (?230Ma), is one of the sites with the highest faunal diversity for the South American Triassic (Liparini et al. 2013; Pretto et al. 2018; Pretto et al. 2015; Oliveira et al. 2010; Müller et al. 2020; Stefanello et al. 2018; Schultz et al. 2020). Finally, the Linha São Luís geosite (225 Ma) is the only area in Brazil from which we have radiometric dating for the Norian (Langer et al. 2018). It splendidly preserves a rich fauna of cynodonts that represent the last evolutionary stage of the group before the origin of the Mammaliamorpha clade, which concentrates the entire diversity of mammals on the planet (Bonaparte et al. 2010; Bonaparte et al. 2005; Soares et al. 2011; Schultz et al. 2020). Most of the geosites mentioned above have already been visited and explored in international research agreements (see references), which attest to their global scientific importance. Below is a list of bibliographic productions that confirm the international relevance of the mentioned geosites:

Bonaparte, Jose Fernando, Agustín G Martinelli, and Cesar Leandro Schultz. 2005. "New Information on *Brasilodon* and *Brasilitherium* (Cynodontia, Probainognathia) from the Late Triassic of Southern Brazil." *Revista Brasileira de Paleontologia* 8 (1): 25-46.

Bonaparte, Jose Fernando, Cesar Leandro Schultz, Marina Bento Soares, and Agustín G Martinelli. 2010. "La Fauna Local de Faxinal Do Soturno, Triásico Tardío de Rio Grande Do Sul, Brasil." *Revista Brasileira de Paleontologia* 13 (3): 233-46. <https://doi.org/10.4072/rbp.2010.3.07>.

Desojo, Julia, María von Baczko, and Oliver Rauhut. 2020. "Anatomy, Taxonomy and Phylogenetic Relationships of *Prestosuchus chiniquensis* (Archosauria: Pseudosuchia) from the Original Collection of von Huene, Middle-Late Triassic of Southern Brazil." *Palaeontologia Electronica*. <https://doi.org/10.26879/1026>.

Langer, Max Cardoso, Jahandar Ramezani, and Átila Augusto Stock Da Rosa. 2018. "U-Pb Age Constraints on Dinosaur Rise from South Brazil." *Gondwana Research* 57: 133-40. <https://doi.org/https://doi.org/10.1016/j.gr.2018.01.005>.

Liparini, A., T.O.V. Oliveira, F.A. Pretto, M.B. Soares, and C.L. Schultz. 2013. "The Lower Jaw and Dentition of the Traversodontid Exaeretodon Riograndensis Abdala, Barberena & Dornelles, from the Brazilian Triassic (Santa Maria 2 Sequence, Hyperodapedon Assemblage Zone)." *Alcheringa* 37 (3): 331-37. <https://doi.org/10.1080/03115518.2013.752607>.

Mastrantonio, Bianca Martins. 2010. "DESCRIÇÃO OSTEOLÓGICA DE MATERIAIS CRANIANOS E PÓS-CRANIANOS DE PRESTOSUCHUS CHINIQUENSIS (ARCHOSAURIA, RAUISUCHIA ) DO MESOTRIÁSSICO DO RS ( BIOZONA DE DINODONTOSAURUS , FORMAÇÃO SANTA MARIA ) E CONSIDERAÇÕES FILOGENÉTICAS SOBRE OS RAUISSÚQUIOS." Universidade Federal do Rio Grande do Sul.

Mastrantonio, Bianca Martins, Maria Belén Von Baczko, Julia Brenda Desojo, and Cesar L. Schultz. 2019. "The Skull Anatomy and Cranial Endocast of the Pseudosuchid Archosaur Prestosuchus Chiniquensis from the Triassic of Brazil." *Acta Palaeontologica Polonica* 64 (1): 171-98. <https://doi.org/10.4202/app.00527.2018>.

Müller, Rodrigo, M. Belén von Baczko, Julia Desojo, and Sterling Nesbitt. 2020. "The First Ornithosuchid from Brazil and Its Macroevolutionary and Phylogenetic Implications for Late Triassic Faunas in Gondwana." *Acta Palaeontologica Polonica* 65. <https://doi.org/10.4202/app.00652.2019>.

Oliveira, Téo Veiga de, Marina Bento Soares, and Cesar Leandro Schultz. 2010. "Trucidocynodon Riograndensis Gen. Nov. et Sp. Nov. (Eucynodontia), a New Cynodont from the Brazilian Upper Triassic (Santa Maria Formation)." *Zootaxa* 2382: 1-71.

Pacheco, C., R.T. Müller, M. Langer, F.A. Pretto, L. Kerber, and S.D. Da Silva. 2019. "Gnathovorax Cabreirai: A New Early Dinosaur and the Origin and Initial Radiation of Predatory Dinosaurs." *PeerJ* 2019 (11). <https://doi.org/10.7717/peerj.7963>.

Pretto, Flávio A., Cesar L. Schultz, and Max C. Langer. 2015. "New Dinosaur Remains from the Late Triassic of Southern Brazil (Candelária Sequence, Hyperodapedon Assemblage Zone)." *Alcheringa: An Australasian Journal of Palaeontology* 39 (2): 264-73. <https://doi.org/10.1080/03115518.2015.994114>.

Pretto, Flávio Augusto, Max Cardoso Langer, and Cesar Leandro Schultz. 2018. "A New Dinosaur (Saurischia: Sauropodomorpha) from the Late Triassic of Brazil Provides Insights on the Evolution of Sauropodomorph Body Plan." *Zoological Journal of the Linnean Society* 185 (2): 388-416. <https://doi.org/10.1093/zoolinnean/zly028/5003418>.

Roberto-Da-Silva, Lúcio, Rodrigo Temp Müller, Marco Aurélio Gallo de França, Sérgio Furtado Cabreira, and Sérgio Dias-Da-Silva. 2020. "An Impressive Skeleton of the Giant Top Predator Prestosuchus Chiniquensis (Pseudosuchia: Loricata) from the Triassic of Southern Brazil, with Phylogenetic Remarks." *Historical Biology* 32 (7): 976-95. <https://doi.org/10.1080/08912963.2018.1559841>.



Schultz, Cesar L., Agustín G. Martinelli, Marina B. Soares, Felipe L. Pinheiro, Leonardo Kerber, Bruno L.D. Horn, Flávio A. Pretto, Rodrigo T. Müller, and Tomaz P. Melo. 2020. "Triassic Faunal Successions of the Paraná Basin, Southern Brazil." *Journal of South American Earth Sciences* 104 (December): 102846. <https://doi.org/10.1016/j.jsames.2020.102846>.

Soares, Marina B, Cesar L Schultz, and Bruno L D Horn. 2011. "New Information on Riograndia Guaibensis Bonaparte, Ferigolo & Ribeiro, 2001 (Eucynodontia, Tritheledontidae) from the Late Triassic of Southern Brazil: Anatomical and Biostratigraphic Implications." *Anais Da Academia Brasileira de Ciências* 83 (1): 329-54. <http://www.ncbi.nlm.nih.gov/pubmed/21437390>.

Stefanello, Micheli, Rodrigo Temp Müller, Leonardo Kerber, Ricardo N. Martínez, and Sérgio Dias-Da-Silva. 2018. "Skull Anatomy and Phylogenetic Assessment of a Large Specimen of Ecteniniidae (Eucynodontia: Probainognathia) from the Upper Triassic of Southern Brazil." *Zootaxa* 4457 (3): 351. <https://doi.org/10.11646/zootaxa.4457.3.1>.

## **1. Inventory and significance of the geosites that can be found in your area**

### **1.2 At least five geosites of national significance**

Several paleontological geosites from the QCG area possess national relevance, given their iconic fossil record, or by their educational relevance, employed mainly by universities. The Piche Site is continuously visited in fieldtrips of Geoscience and Bioscience university courses, being chosen as a place where geological sedimentary successions can be easily observed. It also yields a rich fossil record, including dinosaurs, rhynchosaurs and aetosaurs (Schultz et al. 2020). The same applies to the Pivetta Site, with a notable succession of fluvio-lacustrine facies that yield archosaur, rhynchosaur, cynodont, fish and invertebrate fossils. The Wacholz site is nationally relevant for its iconic fossil record, mostly by the articulated exquisite specimens of the dinosaur *Macrocollum*. These localities, apart from being explored by Brazilian researchers, are heritage sites important in educational activities, as aforementioned, mainly in under-graduation and graduation courses.

Schultz, Cesar L., Agustín G. Martinelli, Marina B. Soares, Felipe L. Pinheiro, Leonardo Kerber, Bruno L.D. Horn, Flávio A. Pretto, Rodrigo T. Müller, and Tomaz P. Melo. 2020. "Triassic Faunal Successions of the Paraná Basin, Southern Brazil." *Journal of South American Earth Sciences* 104 (December): 102846. <https://doi.org/10.1016/j.jsames.2020.102846>.

## **1. Inventory and significance of the geosites that can be found in your area**

### **1.3 At least 20 geosites of educational interest and used by schools and universities**

Of the 54 total geosites and heritage sites that make up QCAG's inventory, 42 (78%) are indicated for educational use within six different themes, according to the following distribution:



In QCAG's strategic planning, these geosites and sites with educational use have priority in the development of interpretive materials. It is expected that by 2023 at least 80% of these locations will have interpretive strategies created and in use.

## **1. Inventory and significance of the geosites that can be found in your area**

### **1.4 Do you have a geosites' database for the Geopark?**

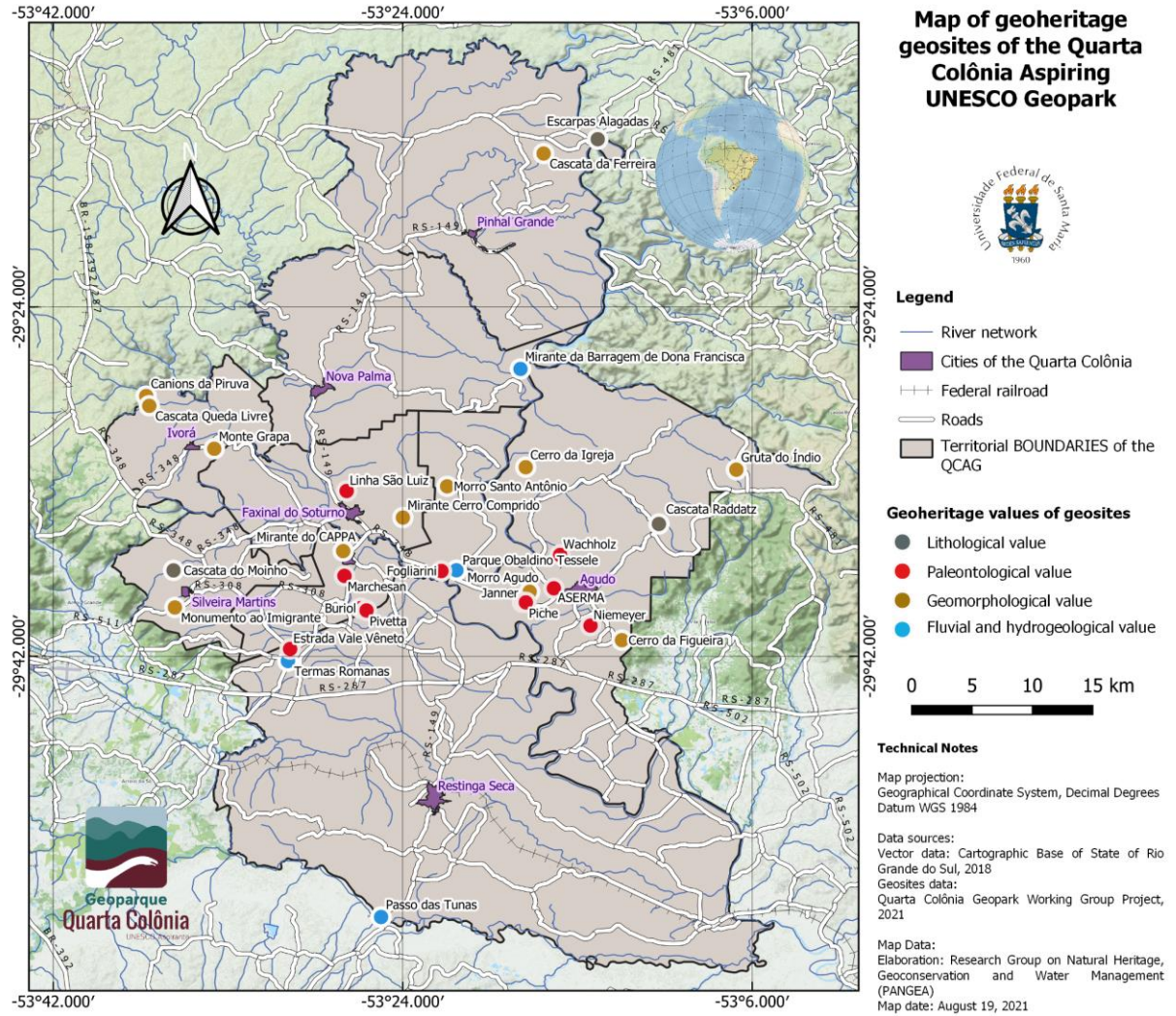
The QCAG support team has a full and diversified geosite database. The database includes available information from numerous scientific articles - also available in international scientific journals - and its geological survey and geosite mapping was carried out by the Serviço Geológico do Brasil - CPRM (Brazilian Geological Service), later refined by Ziemann (2016). Currently, the database is supplied and managed by UFSM researchers and by the UFSM Geopark technical team. Geographic coordinates, geological and geomorphological descriptions and images are constantly maintained and updated, with support from the management committee's thematic commissions. At the same time, the geopark has the entire spatial database in shapefile format for cartography production in a GIS (Geographic Information System) environment. The availability of this information on the geopark's website is under construction.

## **1. Inventory and significance of the geosites that can be found in your area**

### **1.5 Do you have a geosites' map for the Geopark?**



Figura 2 - Geosites maps os the UNESCO Quarta Colônia Aspiring Geopark



## 2. Strategy and legislation to protect against damage of geological sites and features

### 2.2 Part of the area is protected by law for its geological interest

Decree-Law No. 25 of 11/03/1937 - " Cultural Heritage Law (Lei do Tomabamento)": in view of the cultural value attributed by the Federal Constitution of 1988 to paleontological sites, the Cultural Heritage Law (complete document available at: [http://portal.iphan.gov.br/uploads/legislacao/Decreto\\_no\\_25\\_de\\_30\\_de\\_novembro\\_de\\_1937.pdf](http://portal.iphan.gov.br/uploads/legislacao/Decreto_no_25_de_30_de_novembro_de_1937.pdf)) is one of the legal instruments for preservation and protection of this heritage. The other conservation instrument is the National Nature Conservation System (Sistema Nacional de Unidades de Conservação - SNUC, established by Law 9.985 of July 18<sup>th</sup>, 2000 (complete document available at: [http://www.planalto.gov.br/ccivil\\_03/leis/l9985.htm](http://www.planalto.gov.br/ccivil_03/leis/l9985.htm)))

Fossil sites and, consequently, the fossils contained therein can be registered by IPHAN in the category of natural monuments. In spite of being a good protection device, the registration of a "paleontological" Natural Monument at IPHAN involves a substantial increase in bureaucratic procedures for carrying out collection and research activities at these sites.

The Federal Constitution of 1988: Articles 20, 23 and 24 of the Brazilian Constitution of 1988 are very clear in defining that fossils are public property and that the States, the Federal District and the Municipalities are responsible for the defense of our natural heritage. Besides being public goods, the Constitution also considered (in article 216) "sites of paleontological value" as Brazilian cultural heritage, which should be protected by the government through all legal forms of protection and preservation. In summary, articles 23, 24 and 216 of the Federal Constitution show that fossils and paleontological sites, as public goods, fit into several forms of heritage, such as: cultural, landscape and touristic.

State Laws (RS):

State Law 11.738/02, of December 13, 2001: Establishes paleontological sites located in municipalities of the state of Rio Grande do Sul state cultural heritage. The law names the municipalities of Agudo, Dona Francisca, Faxinal do Soturno and São João do Polêsine, among other municipalities outside the area of the Quarta Colônia Geopark and characterizes the fossil sites, the fossils contained therein and provides for the collection and preservation of this heritage.

#### 4. What measures are taken to protect geosites and infrastructure from damage and natural degradation?

##### 4.1 Regular maintenance and cleaning

The involvement of municipal public managers in the thematic commissions of the Management Committee gives certain guarantees and, mainly, due to its proximity to the geosites, makes the constant monitoring of the area viable and more effective when it comes to maintenance and cleaning. In private areas the maintenance is carried out by the owners and the geosites located in public areas receive maintenance from the municipal governments, according to the specific needs of each geosite.

#### 4. What measures are taken to protect geosites and infrastructure from damage and natural degradation?

##### 4.2 Conservation measures

Paleontological prospecting and salvage activities carried out periodically by the Cappa team and actions taken by the municipal government for the conservation of large geomonuments (Monte Grappa, Morro Agudo, Cerro Comprido, etc.).



## 1. Geology and landscape | 1.3 Natural and Cultural Heritage

### 1. Natural Rank

#### 1.2 National designation in part of the Geopark territory

A. The municipality of Agudo received the title of National Dinosaur Cradle (Berço Nacional dos dinossauros) by the bill PL 1313/21

The objective of granting the title of National Dinosaur Cradle (Berço Nacional dos dinossauros) to the municipality of Agudo is to draw the attention of the national scientific community and the Brazilian population about the significance of the fossils found there. Some of these fossils are among the oldest in the world, dating to the Triassic Period (with *circa* 233 Ma). Fossils found include *Sacisaurus agudoensis*, *Bagualosaurus agudoensis*, *Pampadromaeus barberenai*, *Macrocollum Itaquii* and *Erythovenator jacuiensis*. It is important to note that in addition to dinosaurs, other vertebrates were also found at the sites, such as: *Exaeretodon* and the *Trucidocynodon* which were cynodonts, and rhynchosaurs, herbivore reptiles belonging to a lineage ancestral to crocodiles and birds. The fossils found in Agudo are stored at the UFSM Center for Paleontological Research in the Quarta Colônia (CAPPA/UFSM), the institution responsible for research, publications and dissemination of the paleontological heritage of the Quarta Colônia territory.

Fig. 03 - *Macrollum itaquii* illustration.



Source: Márcio L. Castro

The above illustration shows the reconstructed appearance of *Macrollum itaquii*. The fossilized skeletons of this animal were excavated from Triassic rocks in Agudo. The rocks date to approximately 225 million ago, which makes *Macrocollum itaquii* considered the oldest long-necked dinosaur ever discovered.

## B. Memory Forest

The Mira-Serra Memory Forest (Bosque da Memória) is located in the Monte Grappa Municipal Nature Park, in the municipality of Ivorá. It is part of a campaign promoted by the Atlantic Forest NGO Network (Rede de ONGs da Mata Atlântica - RMA), the Mata Atlantica Biosphere Reserve National Council (CN-RBMA) and by the Atlantic Forest Restoration Pact (Pacto pela Restauração da Mata Atlântica) and is supported by the United Nations (UN). The “Bosques da Memória” is a campaign focused on “planting trees and recovering forests as a symbolic gesture in honor of the victims of COVID-19 and in gratitude to the healthcare professionals in Brazil,” as well as being “a space to publicize other initiatives that have the same objective and that are being developed by families, groups, and institutions.” The campaign seeks to transform a “moment of sadness and devastation into hope in the Atlantic Forest, marking the beginning of the Decade of Ecosystem Restoration 2021-2030 declared by the UN”. Its goal is to reforest two hectares of the Monte Grappa Municipal Nature Park with 200 native tree saplings - besides the basic proposal of the campaign, it intends to pay symbolic homage to the 242 lives lost in the Kiss Nightclub (in Santa Maria) and the biodiversity destroyed during the pandemic period.

## C. Designation of 5 (five) remaining *quilombola* territories

In the Quarta Colônia territory there are 5 *quilombola* communities that define themselves as “Remaining Quilombola Communities” (Comunidades Remanescentes de Quilombos - CRQs) - through the Palmares Cultural Foundation (Fundação Cultural Palmares - FCP), namely: O Rincão dos Martinianos, located in Restinga Seca and certified as Quilombola Community by Administrative Order 19/2004; São Miguel, located in the Restinga Seca, also certified by Administrative Order 19/2004; Vó Fermina E Vó Maria Eulina Community, located in Restinga Seca and certified through Administrative Order N. 58/2019; Rincão Santo Inácio, located in Nova Palma and certified by Administrative Order 36/2008; and lastly the Acácio Flores Community, located in Dona Francisca and certified by Administrative Order 44/2021. A recognized quilombola settlement territory confers protection under the National Plan for Protected Areas, in accordance with Mandate no. 5.758, published April 17<sup>th</sup>, 2006.

### 1. Natural Rank

#### 1.3 Regional designation in part of the Geopark territory

#### A. Quarta Colônia State Park:

The Quarta Colônia State Park (Parque Estadual Quarta Colônia) was created through Federal Law 9.985 of the National Nature Conservation System (Sistema Nacional de Unidades de Conservação) published on July 19<sup>th</sup>, 2000. It was established by State Mandate no. 44.186/2005 and its main goal is to promote the full protection of the Park’s natural resources, especially specimens of fauna and flora of the remaining formations of native wildlife, including

birds, amphibians and rodents, which are on the Brazilian List of Endangered Species. The Park is located in the municipalities of Agudo and Ibarama, with an area of approximately 1,847.90 hectares and is administered and managed by the State Environmental Office of (Secretaria Estadual do Meio Ambiente do Rio Grande do Sul), through the Conservation Units Division/Forest and Protected Areas Department. Currently, the Park is in the implementation phase and waiting for transfer of resources.

#### B. Quarta Colônia Ecological Corridor:

Administrative Order SEMA No. 143, December 16<sup>th</sup>, 2014, conferred official recognition of the Quarta Colônia Ecological Corridor (Corredor Ecológico da Quarta Colônia - CEQC). It aims to promote biodiversity conservation through territorial management strategies that maintain or restore ecological processes, especially gene and organism flow, between the Quarta Colônia State Park and significant remnants of the seasonal forest, defined as priority conservation targets, as well as generate income opportunities from the reorganization of production processes and the sustainable use of natural resources. The Corridor encompasses lands in the municipalities of Agudo, Dona Francisca, Faxinal do Soturno, Ivorá, Nova Palma, Pinhal Grande, Restinga Seca, São João do Polêsine and Silveira Martins, Santa Maria and Itaara, connecting the Quarta Colônia State Park with priority biodiversity conservation targets in areas of the Biological Reserve of Ibicuí Mirim, the Sobradinho Municipal Nature Park, the Salto Grande do Jacuí Indigenous Site and eleven (11) more remnants of seasonal forest.

#### C. Quarta Colônia proclaimed “Gaúcho Paleontology Region”

The Bill PL no. 259/2021 proposes to proclaim the Quarta Colônia region as the “Gaúcho Paleontology Region” due to its priceless paleontological heritage, with some of its dinosaur fossils considered the oldest found in the world, such as the *Buriolestes schultzi*, the *Bagualosaurus agudonensis* and the *Macrollum itaquii*.

Fig. 04 - Illustration of *Buriolestes schultzi*, small carnivore found in São João do Polêsine/RS in 2015.



Source: Márcio L. Castro

In 2015, *Buriolestes schultzi* fossils were found in rocks in the municipality of São João do Polêsine. The fossils represent one of the first lineages of sauropods - quadrupedal, giant, long-necked dinosaurs that fed on plants. The good condition in which they were found made it



possible to reconstruct the brain of this animal using computerized tomography, which helps to understand its behavioral habits.

#### **D. Rio Grande do Sul Capital of Paleontology Tourist Route Established**

The Rio Grande do Sul Capital of Paleontology Tourist Route (Rota Turística da Quarta Colônia - Capital Gaúcha da Paleontologia), is comprised of the municipalities of Agudo, Dona Francisca, Faxinal do Soturno, Ivorá, Nova Palma, Pinhal Grande, Restinga Sêca, São João do Polêsine and Silveira Martins. It is established on the paleontological heritage of the territory, with fossils from some of the oldest dinosaurs in the world. The Route is based on the following objectives: I - sustainable development of the region's tourism potential; II - strengthening, expansion and development of local production in the tourism, cultural, and gastronomy areas; III - implementation of environmental and heritage education structures and incentives for tourist ventures; IV - encouragement of productive organization of the local communities related to tourism, craftsmanship and the generation of new employment and sources of revenue.

### **1. Natural Rank**

#### **1.4 Local designation in part of the Geopark territory**

##### **A. Monte Grappa Municipal Nature Park (PNMMG)**

Based on the National Nature Conservation System - (Law 9985/2000), which classifies the Monte Grappa Municipal Nature Park as a Full Protection Unit (Unidade de Proteção Integral), its basic objective is to preserve nature and only indirect use of its natural resources is admitted. According to Supplementary Law CL 01/2010 (Urban Planning), Monte Grappa (FIG. X) is considered a prominent geological monument in the region and is defined as a site of natural heritage and landscape of the municipality of Ivorá. The Monte Grappa Municipal Nature Park was legally established through Law No. 1425/2020 and its area belongs entirely to the municipality, as a result of a compensation negotiation in the installation of a power line. The PNMMG, with a surface area of three hundred and thirty-three thousand square meters (333.000m<sup>2</sup>), has as its basic objectives to preserve the remaining Atlantic Forest Biome woodlands present in the area, as well as water resources and scenic beauty, allowing recreation in contact with nature, scenic contemplation of the city of Ivorá, the development of educational activities, scientific research and environmental interpretation.

Figure 05 - Monte Grappa in Ivorá/RS



Source: Tourism Unit Ivorá Municipal Administration.

#### **B. Inscription of Fig Tree as Heritage site in Silveira Martins:**

The Fig Tree, a native species located in the urban perimeter of Linha Duas, municipality of Silveira Martins, was declared a "historic and ecological heritage site" of the municipality by Law No. 109 of July 23, 1991.

Figure 06 - Fig tree in Linha Duas, Silveira Martins



Source: Katiule Morais, Emater Silveira Martins, Rural Extension Technician.



## 2. Cultural Rank

### 2.1 International designation in part of the Geopark territory (except World Heritage Sites)

The international ties and recognition of the Quarta Colônia region are made through pacts, agreements, partnerships, among others.

A. Designation of the region as headquarters of the diplomatic representation of the Italian State, establishing the Honorary Consular Agency of Italy since 1914;

B. International recognition of *Gemellaggio* agreements - designation of sister cities - between cities of Quarta Colônia and Italy: São João do Polêsine, BR, and the cities of Loreo and Adria (Veneto region) - designated "sister cities";

C. Pact of Friendship (*Patto di Amicizia*) between the cities of Faxinal do Soturno, RS/BR and the city of Ficarolo, RO/IT, signed by the mayors on July 7<sup>th</sup>, 2017.

D. Landmark of recognition of the Quarta Colônia region as a cultural region of Venetian origin and symbol of recognition among Venetians throughout the world, the Vale Vêneto (Venetian Valley) district in São João do Polêsine integrated the Project "25 Leoni di san Marco nell 8<sup>a</sup> Provincia Veneta" through the installation of the monument of the Lion of Saint Mark next to the Eduardo Marcuzzo Museum head office, which was inaugurated in November, 2019.

E. In order to recognize 140 years of Italian immigration to RS, the Venetian/Italian government gifted the municipalities of Dona Francisca, Faxinal do Soturno, Nova Palma and São João do Polêsine with panels by the Italian painter Gian Antonio Checcin. This action sought to consolidate international relations between Italian entities and local governments of the Quarta Colônia. A report on these works of art "Merica Merica 1875/2015" was published in Feltre, Italy.

F. Italy's President granted Fr. Luiz Sponchiado (founder of the CPG in Nova Palma, focused on genealogical research and immigration documentation in Quarta Colônia), the honorary title of "Di Cavaliere", an admission into the Order of Cultural Merit through Mandate N.1826, Series IV of December 27, 2002.

## 2. Cultural Rank

### 2.2 National designation in part of the Geopark territory

#### A. Rincão dos Martinianos

A quilomba community located in the rural area of the municipality of Restinga Seca. It is made up of 55 families, with very strong ties relations of kinship, reciprocity and exchange with the community of São Miguel, located within the same municipality. Administrative Order No. 252 of October, 2007, recognized and established Rincão dos Martinianos as an official community with a territory of 98.6341 hectares and a perimeter of 4,801.009 meters.

## B. São Miguel

The quilombola community of São Miguel dos Pretos, located in the municipality of Restinga Seca, along RS-149 highway, covers 90 hectares and encompasses about 160 families. The transmission of the knowledge by the oldest residents is an important factor in the perpetuation of the spatial organization of São Miguel.

## C. Vó Fermina e Vó Maria Eulina Community

Quilombola Community certified by the Palmares Cultural Foundation (Administrative Order N. 58/2019) on March 21<sup>st</sup>, 2019. It is located in Restinga Sêca, RS. It had the expressive support from Emater Rural Extension Development Agency and other quilombola communities in the municipality.

## D. Rincão do Santo Inácio

Located in the municipality of Nova Palma, the 55 families had the support of the Catholic Church and the local Emater Development Agency to carry out its first historical surveys, going back to the founding of quilombo. The Vovó Isabel Remaining Quilombo Association was founded in 2006, and received a certificate of self-designation as a Quilombola Community in 2008 (SILVA, 2019).

Figure 07 - Ancient dwelling of the quilombola community Vovó Isabel at Rincão Santo Inácio / Nova Palma



Source: Nova Palma CPG archive.

## **E. Remaining Quilombolas Association Acácio Flores**

Located in the municipality of Dona Francisca and certified by the FCP Administrative Order No. 44 of February 3<sup>rd</sup>, 2021. The community is made up of approximately 178 families throughout the territory. It has a dance group, a percussion group and its own head office.

## **F. Talian Dialect**

The Talian Dialect is a variety of Veneto spoken in Brazil. It received the title of Brazilian cultural reference by the National Institute of Artistic and Historical Heritage/Ministry of Culture (IPHAN/MinC) and is listed on the National Inventory of Linguistic Diversity. The dialect is present in several municipalities of the QCAG and is the co-official language of Ivorá. This co-officialization of the Talian Dialect was decreed by the Municipal Law No. 1.307, dated March 23, 2018, in the municipality of Ivorá/RS.

## **G. Fr. Luiz Sponchiado**

Fr. Luiz Sponchiado was granted the title Commander of the Order of Cultural Merit and the Cultural Distinction Award by the Brazilian Ministry of Culture, in the year 2000. The Order of Cultural Merit title was instituted through article 34 f Law No. 8.313, of December 23, 1991. This recognition was given for the relevant contributions of Fr. Luiz Sponchiado to Brazilian culture, including research on immigration, colonization, and genealogy in the Quarta Colônia territory and the construction of the CPG (Center of Genealogical Research) in the city of Nova Palma in 1984. Nowadays, the CPG is located in the Centro Cultural (Cultural Center) of Nova Palma. The Ministry of Culture's webpage shows those honored with the Order of Cultural Merit from 1995 to 2002:

<https://web.archive.org/web/20120730133603/http://www.cultura.gov.br/site/aceso-a-informacao/programas-e-acoes/ordem-do-merito-cultural/ordem-do-merito-cultural-1995-2002/>

## **2. Cultural Rank**

### **2.3 Regional designation in part of the Geopark territory**

## **A. Italian Culture Week and International Winter Festival**

Take place in the District of Vale Vêneto, in São João do Polêsine. They were recognized as regional festivities and included in the Official Events Calendar of the State of Rio Grande do Sul by its Legislative Assembly via Law 15.526 of September 22, 2020. This Festival also has the designation of municipal festivity of São João do Polêsine (Law No. 021/1993).



Figure 8 -Italian Culture Week the International Winter Festival



Source: São João do Polêsine municipal administration

A) 36<sup>th</sup> Vale Veneto Italian Cultural Week and UFSM's 36<sup>th</sup> International Winter Festival; B) Parade at the 34<sup>th</sup> edition of the event, in 2019, celebrating religion, cuisine and education; C) Music event held at one of the editions; D) Typical Italian cuisine prepared by the community and served at dinners and lunches during the event.

Source: QCAG Archive.

## B. Legislative Assembly Bill No. 175/2021 adds *Volksfest* in Agudo to the Official Events calendar of the state of Rio Grande do Sul.

The *Volksfest* means People's Festival in German. The festival seeks the economic development of the municipality and the region through the expansion of commercial, handcraft, touristic and service activities. The Cultural Week and the Exhibition Fair, called *Expovolks*, take place at this event. The Cultural Week includes choir meetings, theatrical presentations and Folkloric Dance Groups.

Figura 09 -*Volksfest* in Agudo



A) Hertha and Frantz, mascots of the *Volksfest* in Agudo; B) Traditional German cuisine on display at the event  
Sources: A) Rádio Agudo, 2021; B) Associação Comercial, Industrial e de Serviços de Agudo (ACISA)

### C. Alberto Pasqualini's House

Located in the municipality of Ivorá is on the official heritage list of the Institute of Historical and Artistic Heritage of the State of Rio Grande do Sul (Instituto do Patrimônio Histórico e Artístico do Estado do Rio Grande do Sul), through Administrative Order 20/1991, published in the Brazilian Federal Gazette on October 7<sup>th</sup> 1991. This house, now a museum, was built in 1896 and is representative of the early days of Italian immigration and the birthplace of the Brazilian senator and one of the founding mentors of Petrobras, Alberto Pasqualini.

### D. Rio Grande do Sul Capital of Paleontology Tourist Route

Bill No. 250/2021 which institutes the Rio Grande do Sul Capital of Paleontology Tourist Route (Rota Turística da Quarta Colônia - Capital Gaúcha da Paleontologia), which includes places of interest for their culture, history, nature, gastronomy and entertainment in the nine municipalities of Quarta Colônia.

## 2. Cultural Rank

### 2.4 Local designation in part of the Geopark territory

A. Inscription of Capitel de Santo Antônio de Padova as heritage site: in Val Feltrina, Silveira Martins - LAW No. 185/1993 - as the religious symbol of the immigrants who came to the region; it designates Saint Anthony of Padua as the patron saint of Silveira Martins.

B. João Luiz Pozzobon Historical Museum House: Officially designated the birth residence of Deacon João Luiz Pozzobon (Law No. 807/2016, São João do Polêsine) this Museum House has strong appeal for international and national religious tourists.

C. Italian Culture and Language: Approval of the inclusion of the Italian Language and Culture subject for students of the Public Education Network in the School Curriculum in the Municipality of São João do Polêsine, by proposal No. 006/2000 of the São João do Polêsine City Council.

D. Rice Festival: established by Law No. 018/1993, in the municipality of São João do Polêsine, is a municipal and regional event and an integral part of the economy of several municipalities. It features activities such as parades that celebrate historical and technological developments, religious ceremonies, gastronomic events with traditional cuisine and farmers markets with handcrafted and agroindustrial products.

E. Designation of the “Nono and Nona” figures as official symbol of Italian colonization in São João do Polêsine. The first monument was installed at the Vale Vêneto District Plaza.

Figura 10 - “Nono and Nona” monument at the Vale Vêneto District Plaza.



Source: QCAG collection.



Figura 11 - Designation of “Frantz” and “Herta” as mascots of Agudo/RS through Law No. 2.210/2021 of May 04, 2021.



Source: Djulia Ziemann personal archive, 2021.

F. Protection of Cultural and Natural Heritage - Inscription as heritage: Municipality of Ivorá Organic Law (No. 1.209 of 05/18/2016) that regulates the inscription of 26 buildings of cultural-historical interest, strictly prohibiting modifications of these buildings. The conservation of the property and a license to carry out any renovation or intervention is recommended. Heritage buildings under the Organic Law include indigenous sites, Italian colonial-style houses, churches and public and private buildings.

### 3. Promotion and maintenance of Natural and Cultural Heritage

#### 3.1 Promotion of the links between Geological Heritage sites and the existing Natural and Cultural sites within the Geopark

##### A. Interdisciplinary Trajectories for Teacher Training in Heritage Education

The Interdisciplinary Trajectories for Teacher Training in Heritage Education (Jornada(s) Interdisciplinar(es) de Formação de Professores em Educação Patrimonial - JIFPEP) took place in two editions the first a live event in February 2020, bringing together around 300 teachers of the public school network of the municipalities in Quarta Colônia. The second took place online due to the Covid-19 pandemic, from July to September 2020, with lectures every Friday afternoon, bringing together more than 400 attendees, mostly teachers of municipal and state school networks and reaching more than 12,000 views on the QCAG Youtube channel. The JIFPEP provides continuing education, with a broad, reflective and instrumental vision utilizing specific themes and subjects that involve knowledge about Quarta Colônia, from the formation of the first signs of life up until the constitution of a culturally and politically integrated region, as foundations for the conception and territorial/regional organization of a Geopark.

**B. “Geopark Quarta Colônia Historical and Cultural Heritage: memory, education and preservation”**

“Geopark Quarta Colônia Historical and Cultural Heritage: memory, education and preservation” (“Patrimônio Histórico Cultural Geoparque Quarta Colônia: memória, educação e preservação”) is a booklet publication, with the goal of providing training for all those involved through actions that contribute to the construction and dissemination of local/regional history and heritage, by producing resources together with public school teachers (municipal and state schools) from the cities in the QCAG. [Available at UFSM's website.](#)

**C. “Heritage Education in Geopark Territories: an interdisciplinary view in the Quarta Colônia”**

“Heritage Education in Geopark Territories: an interdisciplinary view in the Quarta Colônia)” (“Educação Patrimonial em Territórios de Geoparques: uma visão interdisciplinar na Quarta Colônia”) is a book publication, written by all the researchers, exhibitors and organizers of the JIFPEP, published as an e-book by FACOS-UFSM, 2021. [Available at UFSM's website.](#)

### 3. Promotion and maintenance of Natural and Cultural Heritage

#### 3.2 Interpretation

##### A. Teaching resources

Teaching resources have been and continue to be produced via UFSM extension projects, in partnership with municipalities, schools of the territory and other institutions, on a variety of themes, as important tools to promote interpretation of the Quarta Colônia heritage. These resources can be used free of charge by teachers, tourists, managers, entrepreneurs, and/or any other member of the Quarta Colônia community. Here is a list of the resources produced so far, followed by access links:

- Podcast and E-book “Between Nature and Cultural Heritage: exuberances of Agudo, Nova Palma e Restinga Sêca” (“Entre Natureza e Patrimônio Cultural: as exuberâncias de Agudo, Nova Palma e Restinga Sêca”), resulting from the “Online Text Workshop” Project.

[Spotify Podcast link](#) | [E-book access link](#)

- Podcast Memory Space (“Espaço de Memória”), resulting from the “Espaço de Memória” Project. [Access Link](#)
- Teaching Booklet “Discover Archaeology with Toni Tatu and Mulita” (“Descubra a Arqueologia com Toni Tatu e Mulita”), resulting from the Quarta Colônia Geopark: heritage education and cultural heritage project. [Access Link](#)
- “Exploring the territory, Vol. 1, Collection Territory of Discoveries” (“Explorando o território” Volume 1, a Coleção Território de Descobertas), activity textbook resulting from the “The Geopark goes to the school project. [Access Link](#)
- “Quarta Colônia Circuit Faith, Nature and Art” (“Circuito Quarta Colônia Fé, Natureza e Arte”) Tourist route advertising resource. [Access Link](#)
- “Quarta Colônia, Rio Grande do Sul” CONDESUS brochure. [Access Link](#)
- Geopark Geosites Map 2020, produced by the PANGEA Research Group. [Access Link](#)
- Booklet “Geopark Quarta Colônia Historical and Cultural Heritage: memory, education and preservation” (“Patrimônio Histórico Cultural Geoparque Quarta Colônia: memória, educação e preservação”) booklet, resulting from the Project Historical and Cultural Heritage: memory, education and preservation. [Access Link](#)
- Booklet “Historical Heritage: memory, education and preservation in São João do Polêsine, RS: ‘A record of memory during a pandemic’” (“Patrimônio Histórico, Memória, Educação e Preservação no Município de São João do Polêsine, RS: ‘Registro da memória em tempos de pandemia’”), resulting from the Project Historical and Cultural Heritage: memory, education and preservation. [Access Link](#)



- 1-minute radio spots about the Quarta Colônia Geopark, Rocks and Fossils. [Access Link](#)
- “Route of the Capitéis” Project (“Caminho dos Capitéis”): book, tourist routes booklet and poster.

## B. “Heritage Education in Geopark Territories: an interdisciplinary view in the Quarta Colônia”

In 2021, an e-book was published by the FACOS-UFSM publishing house titled [“Heritage Education in Geopark Territories: an interdisciplinary view in the Quarta Colônia”](#) (“Educação Patrimonial em Territórios Geoparques: uma visão interdisciplinar na Quarta Colônia”), which presents a compilation of chapters related to heritage education: from fossil heritage to biodiversity, landscape, history and culture and the perspective of language as identity heritage of society, which builds the Quarta Colônia territory. The e-book was organized and written by researchers at UFSM who were directly involved in the Interdisciplinary Trajectories for Teacher Training in Heritage Education - JIFPEP), which took place from July to September 2020. The chapters complement and deepen the debates that took place at that event, offering resources that contribute to the curriculum and a heritage education policy, especially at schools and Education Departments of the nine municipalities that make up the Quarta Colônia territory.

## C. Quarta Colônia Geopark Social media and website

Quarta Colônia Geopark Social media and website (Instagram: @geoparkquartacolonia; Facebook page: Geoparque Quarta Colônia; Website: <https://www.geoparquequartacolonia.com.br/home> ) as well as CAPPÁ-UFSM (Facebook and Instagram pages: @cappaufsm ) are important means of heritage interpretation, since they provide regular publications presenting and describing the geosites and sites. The posts include guidance on how to conserve heritage, publicity of lectures, events and other news related to the theme of heritage education and Geoparks, as well as dissemination of resources, such as books, booklets, brochures, among others. The Geopark site also provides access to all the academic publications by researchers from different fields in scientific journals, e-books, meetings, among others.

## D. Tourism businesses

Tourism businesses in the area help to promote heritage interpretation, such as Agudo Ecotourism and Adventure (Agudo Ecoturismo e Aventura), which leads guided hiking trails with environmental interpretation along the way, connecting elements of cultural and natural heritage of the geosites and sites. [Webpage link](#)

## E. “Hummingbird Nest” Initiative

“Hummingbird Nest” (“Ninho do Beija-Flor”) Initiative, classified as a “Green Room” (Sala Verde) by the Ministry of the Environment. This initiative takes place in the Quarta Colônia State Park, with the development of workshops, interpretive hiking trails and interdisciplinary activities that seek to promote and integrate natural heritage with the surrounding communities.

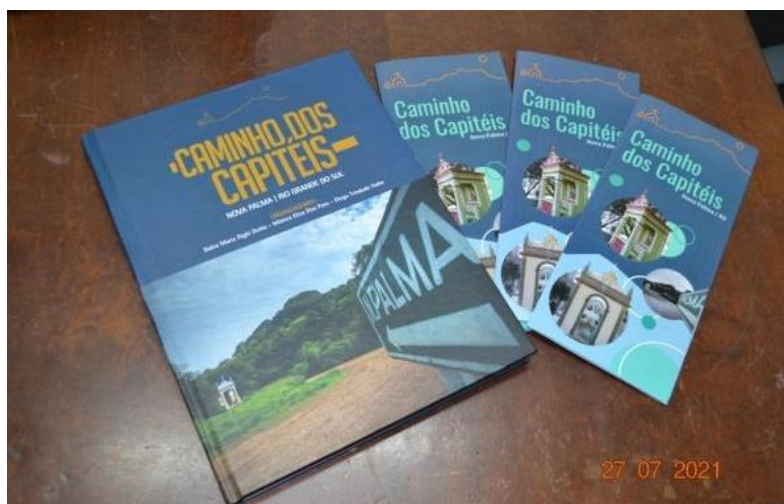
#### F. Center for Paleontological Research in the Quarta Colônia- CAPP-UFMS

The Center for Paleontological Research in the Quarta Colônia- CAPP-UFMS (Centro de Apoio à Pesquisa Paleontológica) - schedules guided tours to teach about the fossil heritage of the territory. Schools, tourist groups, and/or any other member of the community can schedule visits. The guides are CAPP employees, which include an excellent team of researchers, teachers, paleontologists, biologists and others. It is worth mentioning that for the time being these visits have been suspended due to the Covid-19 Pandemic.

#### G. “Route of the Capitéis”

Publication of a catalog book, a booklet with suggestions of tourist routes and a poster of the extension project “Route of the Capitéis” (Caminho dos Capitéis”). The Project is a partnership between the Municipality of Nova Palma and the Tourism Management Program at UFSM, featuring the precious open air historical-religious collection that exists in the municipality, with more than 40 examples of small chapels scattered throughout the territory.

Fig. 12 - “Route of the capitéis” project.



Source: Nova Palma Municipal Administration, 2021.

### 3. Promotion and maintenance of Natural and Cultural Heritage

#### 3.3 Communication

The main communication channels are QCAG's social media (YouTube, Instagram and Facebook), CAPP and the Geopark's website. The Geopark's Instagram and Facebook Pages, over the past two years, have published approximately 37 posts publicizing historical buildings,

fauna, flora and cuisine and Dinosaur fossils uncovered in the region. Events and other activities that promote and encourage heritage conservation are also publicized, such as lectures, extension projects, training courses, regional and national events. In addition, the YouTube channel offers productions that highlight Quarta Colônia's natural and cultural treasures, such as films, videos and institutional podcasts presenting sites, geosites and also personalities of the territory.

Printed materials are distributed to schools, museums, town halls, among other places. These are the products of more than 90 extension projects developed over the last three years (2019-2021) on a wide variety of topics;

The Cappa paleontologist participates in a special "Memory" column, published every two weeks in a regional newspaper. In this space, the researcher shares paleontological knowledge and contributes to the popularization of science, reaching varied audiences and interpreting diverse contents.

Members of the Geopark team are frequently invited to interviews about the Project on local radio shows, where they take the opportunity to reinforce the importance of heritage and the need for its conservation.

It is also worth mentioning a news story broadcasted on one of the most widely viewed Brazilian TV programs -Fantástico, on Rede Globo - with more than 10 minutes of duration, during prime time. The content raised awareness and promoted the paleontological heritage of the QCAG to the entire country. Broadcast available at <https://globoplay.globo.com/v/8076301/>

### 3. Promotion and maintenance of Natural and Cultural Heritage

#### 3.4 Education programmes

##### A. Paleodia (Paleoday)

Annual event held since 2017 (in 2020, the event did not take place due to the Covid-19 Pandemic) at the CAPP/UFES in São João del-Rei, which seeks to unite the celebrations of children's month (October) with Paleontology. In this event, children, families and the whole community can learn more about Paleontology while having fun, through playful activities such as "fossil hunting", "fishing" games, drawing workshops, face painting, paleontological exhibitions, among others. Visitors can also enjoy and buy local colonial products, both gastronomic and arts and crafts, which are on display at the event's stands.

##### B. Interdisciplinary Trajectories for Teacher Training in Heritage Education

Interdisciplinary Trajectories for Teacher Training in Heritage Education - JIFPEP (Jornada Interdisciplinar de Formação de Professores em Educação Patrimonial) - Geopark Institutional

Project. Aimed at teachers from the territory's school network, two editions have been held so far, one live event in February 2020, with more than 250 attendees, and the second held online from July through September 2021, with more than 450 attendees and 11,000 views on the QCAG's Youtube Channel. The third edition is scheduled for October 2021. The event provides continuing education, with a broad, reflective and instrumental vision utilizing specific themes and subjects that involve knowledge about Quarta Colônia, from the formation of the first signs of life up to the constitution of a culturally and politically integrated region as foundations for the conception and territorial/regional organization of a Geopark.

### **C. UFSM's Professional Master's Degree in Cultural Heritage**

Supplemental student spots specifically for professionals from Quarta Colônia region at the UFSM's Professional Master's Degree in Cultural Heritage since 2020. Around 55 professionals are already enrolled in this master's program, most of whom are teachers and work with Heritage Education.

### **D. "Quarta Colônia's Historical Heritage: memory, education and preservation"**

Booklet "Quarta Colônia's Historical Heritage: memory, education and preservation", product of a UFSM Extension Project. The project's main goal was to provide training through actions that would contribute to the construction and dissemination of the history and local/regional heritage by producing knowledge resources, prepared by teachers from the local public schools (municipal and state schools) in the Quarta Colônia territory. [Resources link](#)

### **E. Virtual Exhibit "Heritage Education during a Pandemic"**

Virtual Exhibit "Heritage Education during a Pandemic" ("Educação Patrimonial em Tempo de Pandemia") - Part of the QCAG Institutional Project entailing activities at local schools. Project Authors: Maria Medianeira Padoin, Flavi Ferreira Lisboa Filho. [Access Link](#)

### **F. "Historical Heritage: memory, education and preservation in São João do Polêsine, RS: 'A record of memory during a pandemic'"**

Booklet "Historical Heritage: memory, education and preservation in São João do Polêsine, RS: 'A record of memory during a pandemic'" ("Patrimônio Histórico, Memória, Educação e Preservação no Município de São João do Polêsine, RS: "Registro da memória em tempos de pandemia"). Authors: Maria Medianeira Padoin, Jorge A. S. Cruz, Flavia Coradini, et al. [Access Link](#)

### **G. "Discover Archaeology with Toni Tatu and Mulita"**



Teaching Booklet: “Discover Archaeology with Toni Tatu and Mulita” (“Descubra a Arqueologia com Toni Tatu e Mulita”), resulting from the Quarta Colônia Geopark: heritage education and cultural heritage project. Author: André L. R. Soares. [Access Link](#)

#### H. “Exploring the territory, Vol. 1, Collection Territory of Discoveries”

Activity Textbook “Exploring the territory, Vol. 1, Collection Territory of Discoveries” (“Explorando o território” Volume 1, a Coleção Território de Descobertas), resulting from the “The Geopark goes to the school project. Author: Adriano Figueiró. [Access Link](#)

#### I. Podcast Memory Space

Podcast Memory Space (“Espaço de Memória”), resulting from the “Espaço de Memória” Project. Authors: Thais Danzmann Chaves and Flavi Ferreira Lisboa Filho. [Access Link](#)

#### J. Geopark Geosites Map 2020

Geopark Geosites Map 2020, produced by the PANGEA Research Group. Authors: Djulia Regina Ziemann, Adriano Severo Figueiró. [Access Link](#)

#### K. “Between Nature and Cultural Heritage: exuberances of Agudo, Nova Palma e Restinga Sêca”

“Between Nature and Cultural Heritage: exuberances of Agudo, Nova Palma e Restinga Sêca” (“Entre Natureza e Patrimônio Cultural: as exuberâncias de Agudo, Nova Palma e Restinga Sêca”), resulting from the “Online Text Workshop” Coordinator: Cristiane Fuzer. [Access Link](#)

#### 4.Overlapping

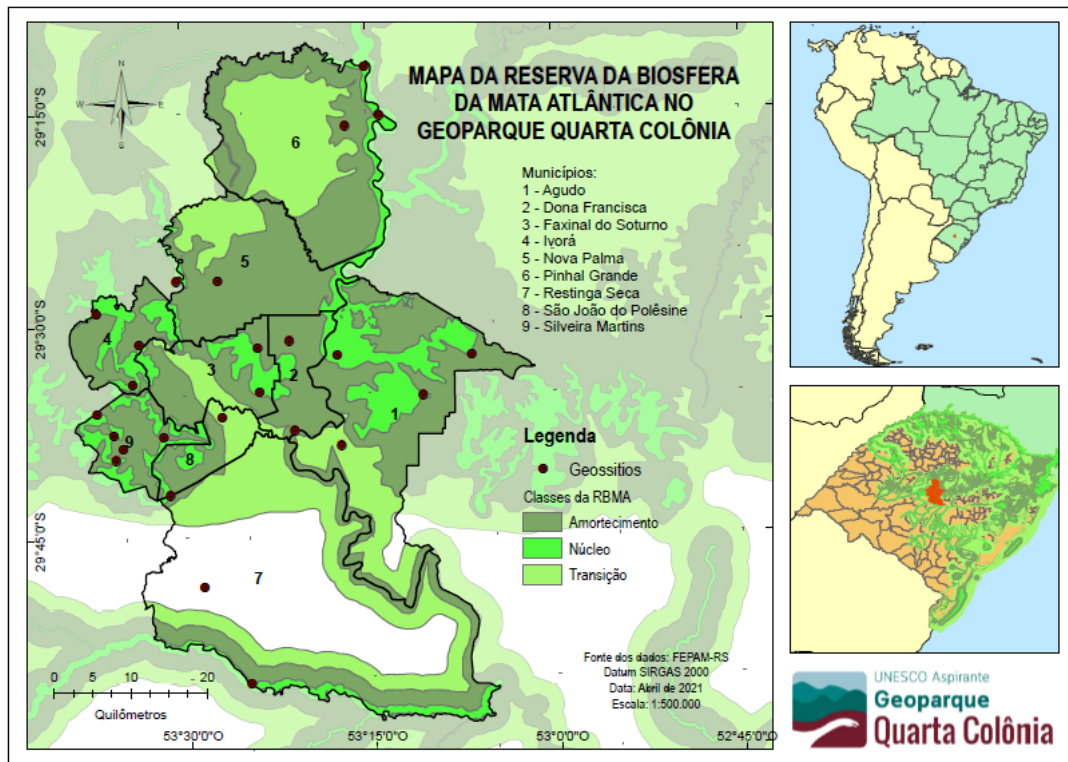
UNESCO

designations

#### 4. Your Geopark overlaps partly or totally with a World Heritage Site and/or Biosphere Reserve

The QCAG partially overlaps with the Atlantic Forest Biosphere Reserve. This overlap consists of core, buffer and transition zones.

Figura 13 - Map of the Atlantic Forest Biosphere at Quarta Colônia Aspiring Geopark



Source: QCAG collection.

However, the Geopark will add value for its initiatives of sustainable territorial development, which share the principles of the AFBR from the viewpoint of biodiversity conservation and other natural attributes of the Atlantic Rainforest, including landscape and water resources. The QCAG will be complementary, encouraging and acting together with the communities of the municipalities in an effective way to value the socio-diversity, biodiversity, geodiversity and the ethnic and cultural heritage linked to it. The AFBR prioritizes the consolidation of conservation units integrating the Atlantic Rainforest Domain (core areas of the Biosphere Reserve) and the implementation of an integrated system of surveillance and environmental education and the development of scientific research.

In this way, while contributing to the consolidation of the identity of the territory, the QCAG fosters sustainable development through a network of actors. One example of this is the development of native fruits products from the Atlantic Rainforest, which unite traditional

recipes to the appreciation of forest fruit species of the forest. The target consumers are tourists.

Fig. 14: Workshops and gastronomic geoproducts (jellies and candies) produced with native fruit.



Source: QCAG collection.



UNESCO Aspiring

**Geopark**

**Quarta Colônia**

APPLICATION DOSSIER FOR UNESCO GLOBAL GEOPARKS  
QUARTA COLÔNIA ASPIRANT GEOPARK (South Brazil)  
Self Evaluation Document

## II. Management Structure

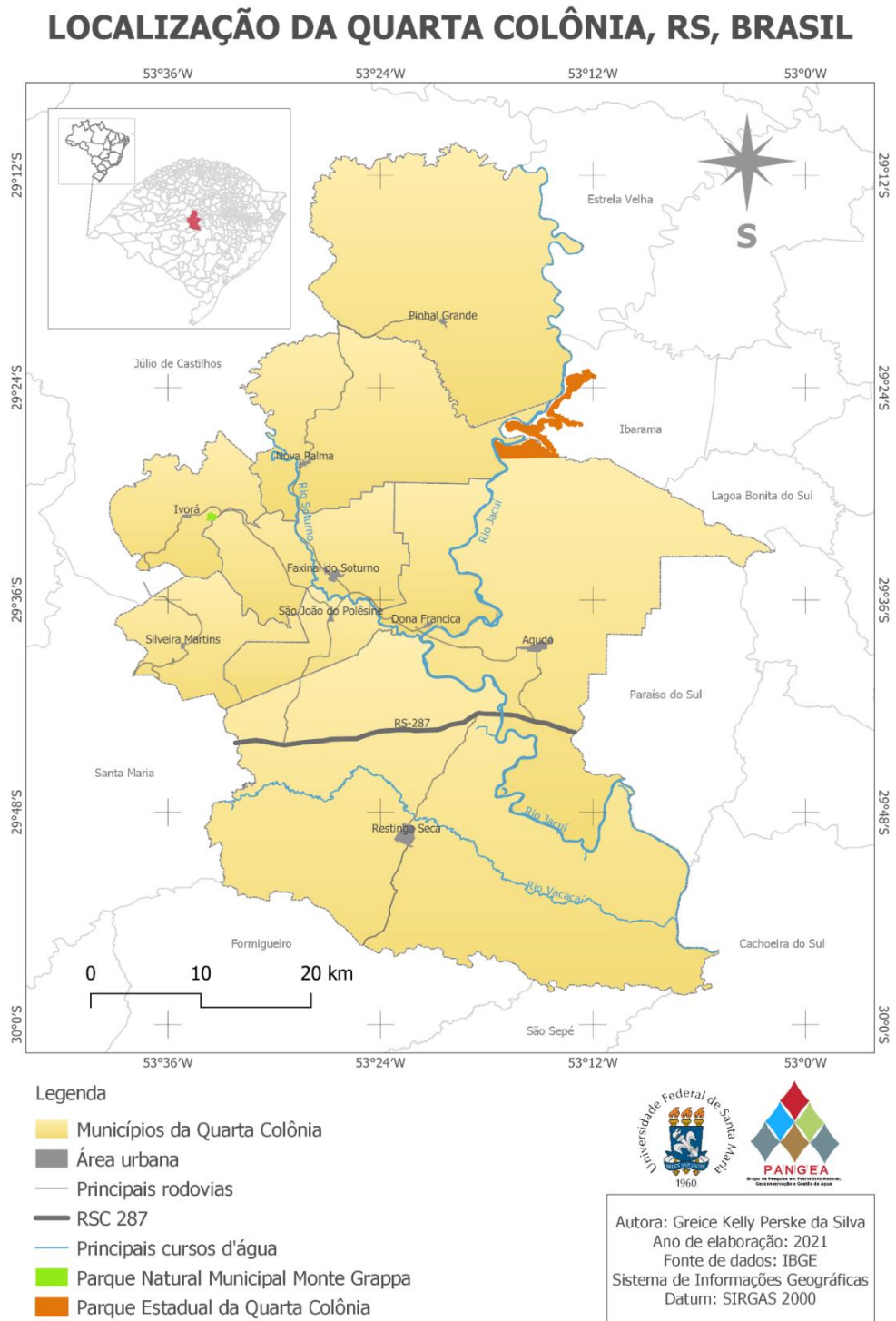
1. How is the Geopark's management structure organised?

1.1 Does the Geopark have a clear and well-defined boundary?

Yes, the Geopark's limits are defined by the political and administrative boundaries of the nine municipalities that make up the Sustainable Development Consortium of the Quarta Colônia - CONDESUS - Agudo, Dona Francisca, Faxinal do Soturno, Ivorá, Nova Palma, Pinhal Grande, Restinga Seca, São João do Polêsine and Silveira Martins - located in the central region of the state of Rio Grande do Sul/Brazil.



Figura 15 - Location Map of Quarta Colônia region, RS, Brazil



Source: QCAG collection.

## **1. How is the Geopark's management structure organised?**

### **1.2 Does the Geopark have a well-defined and effective management structure able to take and implement decisions to enhance protection of Geological Heritage and promote sustainable regional development for the Geopark area?**

The management structure of the QCAG, directly linked to the Sustainable Development Consortium of the Quarta Colônia - CONDESUS, is composed of members from all municipalities of the territory and consists of a Management Committee and three Commissions: 1) Tourism and environment; 2) Education, culture and communication; and 3) Business and revenue. Its members were instituted through an administrative order and became part of the territory's management board, in order to ensure the participation of the civil society and of UFSM - which supports the geopark's implementation. The members are from diverse array of areas of knowledge and professions, guaranteeing a broad and multidisciplinary approach to sustainable development.

## **1. How is the Geopark's management structure organised?**

### **1.3 Is the Geopark staff employed directly, or indirectly by Geopark partners?**

The Geopark's technical team is formed by the Executive Director Jaciele Carine Vidor Sell - geographer, who will coordinate the actions conducted at the Geopark, paid by UFSM; and by the Vice Director Michele Hennig Vestena, geographer, dedication to coordinate action at the Geopark, paid by CONDESUS. In addition, the Management Committee has some members who are public agents nominated by their agencies (municipal government and university) and others who were nominated by the community through specific commissions. These members are paid directly by the municipalities or by partner institutions and perform functions both for their institutions and for the project. The accounting, legal and auditing services are carried out by employees of the municipalities of the territory who are made available to CONDESUS with defined attributions and paid through bonuses. The other specialized services are contracted through a bidding process, such as Web Designer, Graphic Designer for the production of tourism brochures, among others, in which these professionals integrate the technical team during the period of performance. In addition, the territory also counts on administrative support from UFSM, through its Geoparks Technical Team, with the support of 1 administrator who dedicates 50% of her workload to the project, 1 biologist with a PhD, 1 Technician in Educational Affairs with exclusive dedication and two scholarship students from the area of communication, responsible for social networks, transmissions of events and preparation of graphic pieces. UFSM also provides support through an average of 30 researchers/teachers per year, who contribute to various extension projects in the territory, along with their scholarship students and undergraduate and graduate students, often coming from the municipalities that make up the Quarta Colônia territory.

## 1. How is the Geopark's management structure organised?

### 1.4 Does the Geopark have an independently administered budget?

The budget of the QCAG corresponds to the sum obtained by the contribution of R\$ 10,000 from each of the consortium member municipalities, a total annual amount of R\$ 90,000.00. It also receives additional revenues from public calls for proposals, public funding, among others. All funds collected are invested in the QCAG.

Moreover, because it is considered a strategic project for regional development at UFSM, the QCAG has received a significant funding from the university in the last three years (2019, 2020 and 2021) which is directed to the promotion of extension actions in the territory. The resources were used to pay student scholarships - also contributing to the academic training of more than a hundred students, transportation costs (UFSM is located 30 km from the closest municipality to the QCAG and 88km from the farthest one), printing of graphic material and supplies.

UFSM Investment	
2019	R\$ 61,000.00
2020	R\$ 132,528.00
2021	R\$ 208,900.00
<b>Total</b>	<b>R\$ 402,428.00</b>

Being the result of a partnership between UFSM and Condesus, the QCAG also receives investments from the Consortium and these amounts were used in expenses such as transportation of Consortium employees for appointments related to the Geopark Project and printing of graphic materials, as shown in the table below:

CONDESUS Investment		
2019	R\$ 8,000.00	Travel expenses
2019	R\$ 8,920.00	Tourist information brochures
2020	R\$ 4,300.00	Web development
2020	R\$ 6,500.00	Tourist brochure for the "Quarta Colônia Nature, Faith and Art Circuit"
2020	R\$ 6,000.00	Travel Expenses
2021	R\$ 8,100.00	Administrative assistant salary
2021	R\$ 11,000.00	Travel Expenses

Total	R\$ 52,820.00	
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Besides these investments, the Consortium went to great effort to contract the CPRM geological study in 2007, an expense of R\$ 300,000.00 and to raise funds for the construction of the current Center for Paleontological Research in the Quarta Colônia - CAPP-UFMS, at a cost of R\$ 3,080,000.00.

Another way to raise funds is through public grants (quotas for state and federal representatives) or direct agreements with Ministries. In 2019, UFMS received the amount of R\$ 1,080,000.00 from the Ministry of Citizenship, the result of articulation mediated by Condesus, to offer training in the areas of culture and tourism in the scope of the QCAG. Due to Covid-19, the planned actions will be developed in the years 2023 and 2024 and aim to serve more than 2000 people and offer 4100 hours of training courses.

Being a result of a partnership between two non-profit public institutions (Condesus and UFMS), the QCAG does not sell products.

Other forms of investment are the resources that each municipality invests in its tourist infrastructure, education and culture, as can be seen below:

Action	Area (tour, cult., edu.)	Year	Municipality/Institution	Amount
Placing Dinosaur Replicas in public spaces	Education and tourism	2021	S.J. Polésine	R\$ 40,000.00
Revitalization of the Municipal Anthem of Pinhal Grande	Culture	2021	Pinhal Grande	R\$ 4,800.00
Music workshops	Culture	2021	Pinhal Grande	R\$ 16,700.00
Pinhal Grande in Lenses Photography Contest	Culture	2021	Pinhal Grande	R\$ 2,300.00
Acquisition of a bibliographic collection on local paleontology for the municipal public library	Culture and education	2021	Agudo	R\$ 4,000.00;
Production of a municipal craft catalog	Education, culture and tourism	2021	Agudo	R\$ 3,500.00;
Acquisition of forms to represent the topography of the city of Agudo for teaching	Education and culture	2021	Agudo	R\$ 1,000.00



Acquisition of a booklet and play-based activity about two dinosaur fossils found in the city	Education and culture	2021	Agudo	R\$ 3,000.00
Production of a book resulting from the "Route of the Capitéis" Project	Education, culture and tourism	2021	Nova Palma	R\$ 18,000.00
Investments in the Nova Palma Cultural Center	Education, culture and tourism	2021	Nova Palma	R\$ 57,000.00
Investment in the Municipal Library	Culture and education	2021	Nova Palma	R\$ 4,500.00
Investment in the Casa do Artesão (Craft Center)	Culture and tourism	2021	Nova Palma	R\$ 2,500.00
Subsidies for the Genealogical Research Center CPG	Culture	2021	Nova Palma	R\$ 62,000.00
Investments in the Balneário das Tunas Water Park	Tourism	2021	Restinga Seca	R\$ 23,116.55
Construction of the Municipal Historical Park	Culture and tourism	2021	Silveira Martins	R\$ 245,236.29
Heritage Education Classes	Education and tourism	2021	Silveira Martins	R\$ 31,969.80
Revitalization of Giuseppe Garibaldi Square	Tourism and culture	2021	Silveira Martins	R\$ 12,300.00
Investment in the Municipal Library collection	Education and culture	2020	Nova Palma	R\$ 3,000.00
Completion of the Nova Palma Cultural Center	Education, culture and tourism	2020	Nova Palma	R\$ 242,000.00
Investments in maintenance of cultural spaces	Education, culture and tourism	2020	São João do Polêsine	R\$ 2,170.00
Investments in activities to promote local tourism	Tourism and culture	2020	São João do Polêsine	R\$ 36,020.72

Revitalization of the municipal square	Tourism, culture	2020	São João do Polêsine	R\$ 153,304.00
Renovation of the Br. Ademar da Rocha Photography Museum and restoration of capitéis	Culture and tourism	2020	Faxinal do Soturno	R\$ 21,573.00
Music workshops	Education and culture	2020	Pinhal Grande	R\$ 6,400.00
Cultural events	Culture	2020	Restinga Seca	R\$ 45,825.87
Maintenance of the Municipal Museum and Library	Education, culture and tourism	2020	Silveira Martins	R\$ 33,700.00
Resources for the improvement of the Artisans' Association office building	Culture and tourism	2020	Silveira Martins	R\$7,500.00
Tourist signage	Tourism	2019	Ivorá	R\$ 5,725.00
Acquisition of tourist brochures	Tourism	2019	Ivorá	R\$ 985.00
Acquisition of kayaks for classes at the Balneário Municipal Atilio Aléssio Water Park	Culture and education	2019	Nova Palma	R\$ 20,000.00
Elaboration of the municipal tourist brochure	Tourism	2019	Nova Palma	R\$ 2,000.00
2nd Book Fair	Education and culture	2019	Nova Palma	R\$ 5,000.00
Renovations and improvements at the Mãe Rainha Sanctuary in the Municipal Woods and at the Faxinal house	Culture and tourism	2019	Faxinal do Soturno	R\$ 17,930.00
Music, dance and craft workshops	Education and culture	2019	Pinhal Grande	R\$ 22,450.00
Cultural events	Tourism and culture	2019	Restinga Seca	R\$ 206,144.10
Cultural events	Tourism and culture	2019	São João do Polêsine	R\$ 153,550.42

Heritage Education Classes	Education and culture	2019	Silveira Martins	R\$ 7,992.45
TOTAL:				R\$ 1,364,142.78

As a future form of investment in the QCAG, some municipalities have also included items in their Pluriannual Plans and Budget Guideline Laws, as described below:

- Silveira Martins. Rubric for maintaining QCAG activities in the Pluriannual Plan 2022/2025: total amount of R\$ 34,481.00;
- Faxinal do Soturno. Rubric in the Budget Guideline Law (LDO) 2022 for the Geopark Project: total amount of R\$ 54,199.89.
- São João do Polêsine. Rubric for maintaining QCAG activities in the Pluriannual Plan 2022/2025: total amount of R\$203,365.00.

## 2. Does a management or Master Plan exist?

### 2.1 Management or Master Plan exists (not older than 10 years)

In addition to specific objectives for the areas mentioned in the next topics of this dossier, the QCAG Management Plan makes use of a SWOT matrix, identifying the territory's strengths, weaknesses, opportunities and threats. The marketing plan and priority advertising actions for the coming stages are organized based on this analysis. The Management Plan also contains information related to people, processes, management structure and territory governance as a whole. The strategic planning goals are described, as well as the mission, vision, and values of the QCAG and its most strategic objectives.



### 3. The Master Plan - What components does it include?

#### 3.13 Do you have specific targets for goals in the following areas

CQAG Management Plan Objectives for the indicated fields:

##### A. Geology

1. Preserving and conserving the geosites, overlooks and natural and semi-natural landscapes of the Quarta Colônia territory, reducing anthropic impacts;
2. Monitoring natural erosion processes in geosites of paleontological interest in order to salvage naturally exposed fossil material;
3. Mapping new areas of rock exposure to evaluate their fossil potential;
4. Expanding research on the heritage value of the Geopark's geosites;
5. Encouraging school visitation to geosites with the most educational value, aiming at arousing interest for science, broadening the knowledge of the students and preparing them to welcome future visitors;
6. Keeping a permanent group of scientific consultants from several fields involved in the Geopark's activities, including geosciences.

##### B. Geotourism and Landscape Protection

1. Attracting visitors with interest in paleontology, geotourism and nature;
2. Attracting professionals for scientific research;
3. Involving the local population with the promotion and conservation of the Geopark's landscapes;
4. Training local environmental guides capable of meeting the visitation demands of the Geopark;
5. Guaranteeing the production of interpretation instruments for all geosites with visitation potential;
6. Guaranteeing access and adequate visitation conditions to the geosites for geotouristic and educational use of the Geopark;

##### C. Agriculture and Afforestation

1. Increasing organic food production in the territory;
2. Decreasing the production of monocultures in the territory;
3. Decreasing the use of agrochemicals;
4. Water Preservation for crops and consumption;
5. Preserving the existing forests and regulating permanent preservation areas;
6. Encouraging the cultivation of fruit trees, legumes, roots and other edible native species;
7. Conserving the agricultural and forest soil.



### **III. Information and Environmental Education**

5. Geology provision for school groups (for example, organized visits, etc.)

5.2 Guided tours through a member organisation

#### **A. Agudo Ecotourism Geotrails Program (Agudo Ecoturismo Geotrilhas)**

Guided trails offered by a company of local guides from the municipality of Agudo for schools. In 2020 they were hired by the municipal government and several activities were developed within the school curriculum, despite the pandemic.

#### **B. Cappa**

Frequently offers guided tours of the paleontological exhibit available at the research location. They need to be booked previously and are led by paleontologists and researchers from related areas of knowledge.

UFSM/Geosciences: UFSM researchers and professors can also lead guided tours in the territory, as long as they are previously scheduled in advance and subject to availability.

5. Geology provision for school groups (for example, organized visits, etc.)

5.5 Are alternatives available if tours are not possible due to bad weather conditions?

Visits to the Cappa can be maintained under bad weather conditions because it is an indoor space, as well as visits and virtual tours of the paleontological exhibit under development. Similarly, cultural tours of museums and churches can be maintained.

5. Geology provision for school groups (for example, organized visits, etc.)

5.6 Do programmes exist aimed at different age groups?

Paleoday (paleodia) is an event aimed at children, which takes place annually and has science popularization activities aimed at different age groups.

At Cappa's permanent scientific exhibition, it is also possible to interact with different interactive screens, which are classified by age group.

## 5. Geology provision for school groups (for example, organized visits, etc.)

### 5.8 Is teacher training offered in matters relating to the Geopark?

Yes. The Interdisciplinary Trajectories for Teachers Training in Heritage Education (Jornada Interdisciplinar de Formação de Professores em Educação Patrimonial - JIFPEP), created through the QCAG, is aimed at teachers of basic education schools within the territory. Two editions have been held so far, one live event in February 2020, with more than 250 attendees, and another online, from July through September 2021, with more than 450 attendees and 11,000 views on the QCAG's Youtube Channel. The third edition is scheduled for October 2021. The event provides continuing education, with a broad, reflective and instrumental vision utilizing specific themes and subjects that involve knowledge about Quarta Colônia, from the formation of the first signs of life up to the constitution of a culturally and politically integrated region as foundations for the conception and territorial/regional organization of a Geopark.

## 6. Education - Guides

### 6.2 Do you have at least one qualified expert in a partner organization providing guided visits that your organization has a role in developing?

Cappa leads guided tours of the paleontological exhibit available at the research location. All tours are led by qualified paleontologists, researchers and specialists.

## 6. Education - Guides

### 6.4 Personal guides by partner organisation

Agudo Ecotourism and Adventure (Agudo Ecoturismo e Aventura): provides guided hiking trails, with environmental interpretation and emphasis on ecological and geological conservation issues.

Paths of Ivorá (Caminhos de Ivorá): offers guided hiking trails with emphasis on the municipality's waterfalls.

Viaggio Tour (Viaggio Tur): welcomes tourists, articulating with various partners to offer activities, guided tours, hiking trails, museum visits, accommodation and meals.





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Self Evaluation Document

## V. Sustainable Regional Economy

5. What kind of contracts are regularly offered to businesses in your area?

5.3 Other equipment and/or services to support geotourism and interpretation, e.g. transport, display cabinets etc

QCAG counts on the support of public institutions that are very active in the territory, whether through actions developed by UFSM or through the Consortium of the nine municipalities. Together with the private initiatives, they provide most of the services needed for the good maintenance of the territory. Occasionally and in strict conformance to legislation, companies are contracted for: website development, general services; itinerary arrangements; fabricating and installing signs and boards; photographic surveys; cleaning; reception, etc.





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