



# MARBLE THE DIVINE STONE

ITS EXTRACTION, TRADE AND USE  
SINCE THE BEGINNING OF THE HUMANITY  
UNTIL THE PRESENT

**AUGUST 2015**

 **EXTRAEXPO**  
from extraction to exposition



This study was done in the framework of the EXTRA EXPO Project: *from EXTRAAction to EXPOsition: a journey on how rocks become masterpieces*, co-funded by European Commission – Enterprise and Industry Directorate-General; Programme: Cooperation projects to support transnational tourism based in European cultural and industrial heritage.

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## ABSTRACT

This study aims to address the importance and the role of the marble in the world, giving an overview on its extraction, trade and use since the beginning of the humanity until the present. Marble has been considered a superior and distinctive raw material and from ancient times its pureness and beauty is much appreciated. From the antiquity marble has been carved by talented and famous artists to decorate buildings of prestigious people and to praise the divine.

As an output of the project *Extra-Expo: from EXTRAction to EXPOsition: a journey on how rocks become masterpieces*, co-funded by the European Commission, the study was focused on the five European regions involved in the project: Algarve, Portugal; Attika, Greece; Lucca, Italy; Macael, Spain, and Wallonia, Belgium. In all these territories the same topics were discussed: geography, geology, history, culture and heritage and specific aspects and curiosities on the marble in each region were highlighted. In each territory marble has the potential to offer a richer and more diversified touristic offer based on the aspects that the contemporary tourists look for: identity, authenticity and memorable experiences.

As a complement to the existent touristic attractions in these five regions, marble routes may include several scenarios and offer different experiences for different profiles of tourists with distinct tastes and desires: from the usual shops and museums to the most hidden stages, the deep quarries. The possibilities are almost limitless and will depend on the political will as well as on an effective network of local structures and stakeholders, in an intelligent and sustainable management and in a worldwide marketing strategy. This study aims to be a modest contribution to this ambitious objective.

### **Key-words:**

Marble, Extraction, Exposition, Extra-Expo Project, Europe, European Regions, Stone, Rocks, Quarries, Culture, Industrial Heritage, Territories, Cultural Tourism, Itineraries, Marble Routes



## INTRODUCTION

The current study was developed in the framework of EXTRA EXPO Project: *from EXTRAAction to EXPOsition: a journey on how rocks become masterpieces*, co-funded by the European Commission – Enterprise and Industry Directorate-General through the Programme “Cooperation projects to support transnational tourism based in European cultural and industrial heritage”. The countries partners of the project are Italy, Greece, Belgium, Spain and Portugal.

The project aims to rise the awareness of local communities about the possibilities to convert traditional economy in sustainable tourism opportunities. Specifically it addresses the theme of industrial heritages linked to the chain of the marble for the purpose of creating and promoting a new transnational tourist itinerary based on this common cultural and industrial heritage.

The study *Marble, the divine stone - Its extraction, trade and use since the beginning of the humanity until the present* is an output of the above-mentioned project and it is focused in marble, trying to understand how it is considered a divine stone and how it has been exploited and used all over the time, focusing in the involved regions. It has four main chapters: I. Marble, the Divine Stone; II. The Uses of Marble throughout History; III. Marble Territories; and IV. Marble: Heritage and Tourism. The first two chapters are general. The third displays specific information of the five involved regions, presented by alphabetical order – 1. Algarve Region, Portugal; 2. Attika, Greece; 3. Lucca Province, Italy; 4. Macael, Spain; and 5. Wallonia, Belgium – following the same structure for a better understanding: a. Geography; b. Geology; c. History; d. Heritage and Culture. The fourth chapter, again of general nature, addresses issues of identity, culture and heritage and seeks to understand the role of the marble for the tourism development and the sustainable economy of these territories.



Because of its intrinsic characteristics, its softness and beauty, marble has been considered since the ancient times to the present, an elected stone both for the production of art and for the construction of buildings and functional objects.

Looking at Art History books, we can have a general view of various art pieces and monuments made with marble. Also, there are specialized books and studies, which focus the marble use throughout History, for instance "Marble Past, Monumental Present – Building with Antiquities in the Mediaeval Mediterranean"<sup>1</sup>, "Marble: The History of a Culture"<sup>2</sup>, "What Rome was Built with: A Description of the Stones Employed in Ancient Times for Its Building and Decoration"<sup>3</sup>, "Marble: Art Historical and Scientific Perspectives on Ancient Sculpture"<sup>4</sup>, and so on.

The amount and variety of studies and books focusing in marble stone, shows that this thematic has been much studied, and its bibliography is still growing.

Although there is a vast literature on this topic, the added value of this study may be that it compiles information which was scattered, in a simple and understandable way.

The etymology of the word marble comes from the Greek *marmairein* or of the Latin *marmor* and means the stone of quality or white stone<sup>5</sup>. Thus the denomination, by including the term "quality" refers to something superior, distinctive.

The first works of art carved in stone are dated of over 20,000 years, being the most iconic the Woman or Venus, found in 1908 in the Austrian town of Willendorf. The marble architecture was spread during the Roman Epoch. The Romans were the first to cut marble into thinner slabs and this was an innovation which reduced the construction costs and allowed to cover many buildings<sup>6</sup>. Also Arabs erected sumptuous buildings in a new style, having religious structures marbled inside, outside or both<sup>7</sup> but it was in the Italian Renaissance that marble has expanded on the floors, furniture, ornaments and sculpture. At the present there are modern approaches of marble in art and in buildings marble continues to be preferred, because it can give a good finish, allowing different patterns and colours.

Not only Marble has been used all over time but it has been also used by several civilizations all over the world. Marble had a predominant role, being intrinsically linked to European culture and history. In the five European regions involved in the Extra-Expo project, marble has had an important impact on the economy and culture. Regarding marble, each partner region presents similarities and differences and specific characteristics that can contribute to the attractiveness of the territories and to a rich tourist offer in terms of heritage and memorable experiences.

Contemporaneous tourists seek not only greater authenticity but also 'real experiences'. The 'new tourist' wants not only to look to beautiful scenery and recognize their general information, but also wants to experience the 'new' and the 'different', feel the subtlety, interact, thrill and experience unforgettable sensations. Marble routes can offer not only cultural heritage and identity but also authentic and unique experiences. Marble has the power of creating involving narratives (storytelling), as long as we will be succeeded in achieving a sustainable development and quality tourism.

1 Greenhalgh, 2009

2 Mannoni & Mannoni, 1984

3 Porter, 1907

4 True & Po-dany, 1990a

5 Lopes, 2007

6 Palmer, 2009.

7 Greenhalgh, 2009, p. 13.

## I. MARBLE, THE DIVINE STONE

The etymology of the word marble comes from the Greek *marmairein* or of the Latin *marmor* and means the stone of quality or white stone. For geologists marble is a crystalline carbonated and metamorphic rock composed of calcite crystals (calcite marble) or dolomite (dolomite marble), resulting in recrystallization of limestone or dolomite.<sup>8</sup> The «recrystallization is what marks the separation between limestone and marble.»<sup>9</sup>

At commercial level, the concept of marble refers to any sediment crystalline or metamorphic rock, carbonated or not, which presents an aspect similar to marble, that can be extracted in blocks, which shows good characteristics for cutting and liable to get good polishing.<sup>10</sup>

The marble colouring is usually of light-coloured – when it is formed from a limestone with very few impurities which give it white in colour – but in the entire world can be found other marble colours – e.g.: bluish, grey, pink, yellow or black – as result of impurities such as clay minerals, iron oxides or bituminous material.<sup>11</sup> The varieties of marble can be found in 31 countries: Egypt, Ethiopia, Tunisia, India, Turkey, Belgium, British Isles, Czech Republic, Croatia, France, Germany, Greece, Italy, Macedonia, Norway, Romania, Portugal, Russia,

<sup>8</sup> Lopes, 2007.

<sup>9</sup> <http://geology.com/rocks/marble.shtml>

<sup>10</sup> Lopes, 2007.

<sup>11</sup> <http://geology.com/rocks/marble.shtml>

Spain, Sweden, Israel, Oman, Palestine, North America, Bahamas, Canada, Mexico, United States, Guatemala, Australia and New Zealand.<sup>12</sup>

In order to distinguish the marble characteristics and the places of origin, a definition for each marble sort is attributed. For instance, the 'Carrara marble' from Tuscany, Italy, is characterized by being white or blue-grey; the 'Creole marble' from Pickens County, Georgia, United States, is white and blue/black<sup>13</sup>; and so on. For the marble business the places of origin give value and distinguish the quality of marble. Very often the marble's origin is sold as a brand, as a certification of its authenticity.

Four countries dominate the marble production. Italy is the world leader in marble production, with 20% share in the global marble production, China stands as second with 16%, following by India with 10% and Spain with 6%. Most of the production is used as tile application but also for other purposes, as building, sculpture, decoration, etc.<sup>14</sup>

Thanks to its physical and aesthetic properties, this divine stone is used since the dawn of humanity until the present day, due its softness for carving, its brightness, diversified colours and patterns, homogeneity and resistance. As natural material, marble is a strong stone, imbuing both emotion and cultural relevance, symbolizing also the wealth of those who acquire it.

Becoming the selected stone for several works, sometimes it is possible to find artificial marble, a technique that combines cement or synthetic resins to make reconstituted or cultured marble. The appearance of marble can be simulated with fake marbling, a painting method that imitates the stone's colour and patterns.<sup>15</sup> These two resources are used to minimize marble purchase and the inherent prices to obtain it.

Recently, marble started being promoted as a touristic product, essentially because of the rising interest of people in understanding the process of its extraction and discovering the existing cultural and artistic heritage produced from it. Like any high value product, marble started to be generated as a touristic product for those who want to know more about this amazing stone. The world-renowned Carrara marble that famous sculptors selected for their works of art, is an example that quarries can also be a touristic attraction, and boost the local economy.

Because of all the above-mentioned reasons, marble continues to be the preferred stone of all times, for businesses, arts, buildings, etc. It is definitely a divine stone.

<sup>12</sup> [https://en.wikipedia.org/wiki/List\\_of\\_types\\_of\\_marble](https://en.wikipedia.org/wiki/List_of_types_of_marble)

<sup>13</sup> <http://en.wikipedia.org/wiki/Marble>

<sup>14</sup> <http://en.wikipedia.org/wiki/Marble>

<sup>15</sup> Idem.

## II. THE USES OF MARBLE THROUGHOUT HISTORY

### 1. The Marble in Ancient Times: from Prehistory to the Renaissance

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#### a. From Venus of Willendorf to Venus de Milo

Since the dawn of humanity marble has been a raw material of election for artifacts and production, together with wood and bone. Therefore, discovering the history of the use of marble is like discovering a little of the history of the remotest antiquity, from the extraction of natural resources to its processing, marketing and application. The stone, since the beginning of humanity had the advantage of presenting a great durability and strength, although it is more difficult to work than other stones. From the earliest hominids, there are more than a million years, were accumulated experiences and knowledge of how to work the stone. First, there were the objects that assisted men in the search of food with the construction of the first bifaces, weapons and artifacts which prolong and enhance the hand in the fight for survival in a hostile environment. Afterwards, since the emergence of Modern Man (*Homo sapiens sapiens*) the manufactured artifacts came to be not only utilitarian objects, but also objects that have a strong symbolic and religious load, being more abstract than functional.

The birth of Art is located in the Upper Paleolithic, there are over 20,000 years, with it the first art works carved in stone, being the most iconic the Woman or Venus found in 1908, in the Austrian town of Willendorf. Being a representation of the mother goddess – the Earth – or a symbol of fertility and sexual reproduction or the representation of anything else that is unknown, or, even, all this simultaneously; these statuettes evoke, above all, an attempt to world's appropriation and, here, the stone is the material of election because it is (almost) eternal. Of all the stones, marble is the most chosen material and closer to the sacred, and to everything that wants to perpetuate the work of art.



Figure 1: Venus of Willendorf (11,1 cm – c. 24.000–22.000 B.C., limestone – Willendorf, Austria.)<sup>16</sup>



Figure 2: Marble sculpture called Venus (inspired by the famous prehistoric sculpture the Venus of Willendorf, made by Daniel Worthart, July, 2013<sup>17</sup>)

16 Source: <http://gabinetedehistoria.blogspot.pt/2014/06/do-mundo-pagao-ao-mundo-cristao.html>

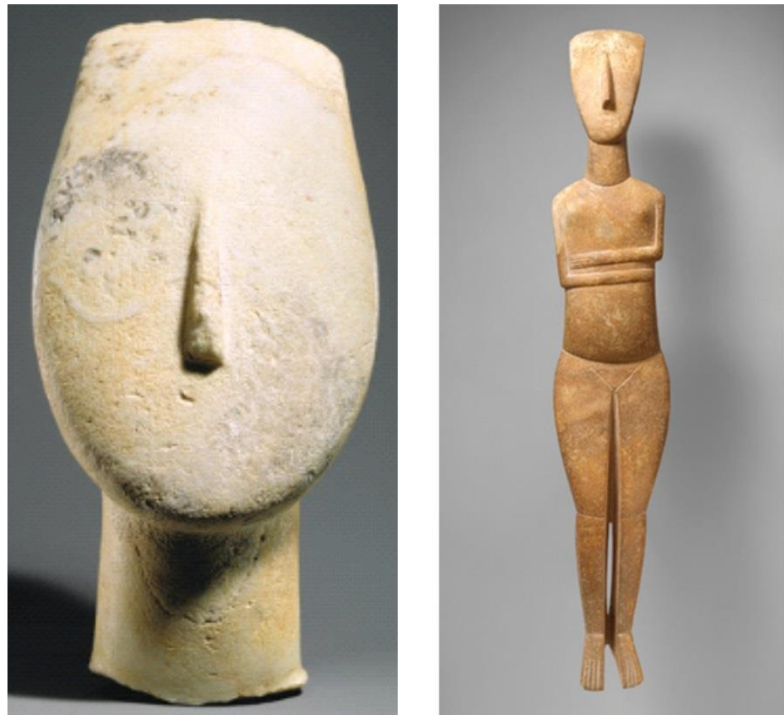
17 Please see: [http://danielworthart.blogspot.pt/2013\\_07\\_01\\_archive.html](http://danielworthart.blogspot.pt/2013_07_01_archive.html)



With the sedentarization, already in the Neolithic, man's relationship with space in which he chose to live in, becomes closer and more intimate. This period is essential for the exploitation of raw materials and experimentation, resulting in new discoveries and knowledge. The exploitation of stone and the innovation that results from it, translates into new utensils in polished stone. There are new artifacts connected to the world of everyday life and of otherworldly, to the earthly world and to the divine, where the marble – as the most noble of stones – mark presence.

In the fifth millennium B.C. finds of marble of anthropomorphic figurines made of marble come from archaeological sites from Southern Bulgaria. Small marble bowls have been found in graves at Varna in Southern Romania<sup>18</sup> as well as in megalithic tombs of Portugal<sup>19</sup>. Also in the Greek Cycladic islands, where archaeological evidence points to sporadic Neolithic settlements, the marble was exploited from the sixth millennium B.C., as attested by significant finds of marble figurines on Saliagos (near Paros and Antiparos). Many of the Cycladic Islands are particularly rich in marble and other mineral resources. The marble of Paros and Naxos are among the finest in the world.

The use of marble in prehistory is clearly evident in the Early Bronze Age of the Greek Cycladic islands<sup>20</sup>. The vast majority of Cycladic figures are female and, nowadays has inspired the contemporary art. Many of these figures, display a remarkable consistency in form and proportion that suggests they were planned with a compass.



*Figure 3: Head from the figure of a woman and a Standing female figure in marble, ca. 2700–2400 B.C.; Early Cycladic I–II Cycladic; Keros–Syros culture.*

The Early Cycladic culture (ca. 3200–2300 B.C.) has important archaeological sites on Keros and at Halandriani on Syros.

At this time, Egyptians were excellent in the work of stone, particularly with the construction of the pyramids during the Old Kingdom. Although they knew and worked the marble, the granite and the limestone were the elected stones for their works of art and architecture, due their abundance at the banks of the Nile River.

<sup>18</sup> Bailey, p. 223.

<sup>19</sup> Leisner & Leisner, 1959; Cardoso, 2001–2002, p.79–80.

<sup>20</sup> Tambakopoulos & Maniatis, 2012.

The application of marble as selected stone in architecture and works of art has more expression in Ancient Greece. The Parthenon, built in the fifth century B.C. (447–432 B.C.), the Propylaea of the Acropolis and the temple of Olympus Zeus are significant examples of the application of marble in architecture. The Greeks, followed by the Romans, introduced an aesthetic dimension in the architecture, hitherto unknown. The temples and the public buildings of the Agora required increasingly ornaments and a dignity that distinguished it from the previous edifices. These buildings are often coated with marble or have parts built with the noblest of the stones, to create the illusion, either by the brightness of polished marble, but also for its texture and colour, to demonstrate that it belonged to the divine or transmitted an emanated power of the gods.



Figure 4: The Parthenon<sup>21</sup>. The marble was used in many temples, such as the Parthenon in Athens, which is decorated with Pentelic marble and marble from the Cycladic island of Paros.<sup>22</sup>

The huge technical and financial effort put into such buildings helped to create a detachment relative to "normal" human works. Indeed, as Colette Hemingway says, «The quarrying and transport of marble and limestone were costly and labor-intensive, and often constituted the primary cost of erecting a temple (...)». This effort, entailed by civic and religious groups of the city, strongly committed that the architect should closely monitor all states of the work: «He usually chose the stone, oversaw its extraction, and supervised the craftsmen who roughly shaped each piece in the quarry. At the building site, expert carvers gave the blocks their final form, and workmen hoisted each one into place». <sup>23</sup>

The marble features as well as its association with a worthy prestige material of Olympus, make it the preferred stone for carving, namely, for representing gods and heroes. In fact, Classical Greek marble sculpture and temple decoration displayed new conventions to depict the body and severe style facial expressions. During the early fifth century B.C. the Greek sculpture reached its maturity with the well-known Greek sculptor and art theorist Polykleitos. His Doryphoros, or Spear-bearer, is really a canon which describes the ideal, aesthetic body based on mathematical proportions and classical conventions. And it is opened the way for the emergence of the greatest masterpieces carved in marble of the human history, being the Venus de Milo just one example.

<sup>21</sup> Further information about Parthenon can be found in page 52, chapter of Attica region, Greece.

<sup>22</sup> Picture source: <https://en.wikipedia.org/wiki/Parthenon>

<sup>23</sup> Hemingway, 2000.



Figure 5: Doryphoros, by Polykleitos. Roman marble copy of a Greek brass original ca. 450 B.C.<sup>24</sup>



Figure 6: The Dying Gaul or The Capitoline Gaul, a Roman marble copy of a Hellenistic work of the late 3rd century BC, Capitoline Museums, Rome<sup>25</sup>

24 Source: Boundless

25 Source: [https://upload.wikimedia.org/wikipedia/commons/thumb/d/d4/Dying\\_gaul.jpg/600px-Dying\\_gaul.jpg](https://upload.wikimedia.org/wikipedia/commons/thumb/d/d4/Dying_gaul.jpg/600px-Dying_gaul.jpg)



*Figure 7: Venus of Milo, Melos, Greece, Late II century B.C. Marble of Paros<sup>26</sup>*

### **b. The Roman World and the Spread of Marble Architecture**

The practice of sculpting and building marble went from the Greeks to the Romans, being sharpened from the *Pax Romana* (Latin for "Roman Peace") initiated by Emperor Augustus. This Emperor, who reigned from 27 B.C. to 14 A.D., began a major process of integration of the provinces that laid the foundations of the Roman Empire. Augustus was also an enthusiastic builder. He rebuilt Rome, erecting or renovating many buildings, public or

<sup>26</sup> Source: <http://www.louvre.fr/en/oeuvre-notices/aphrodite-known-venus-de-milo>



religious, with marble. According to the Latin writer Suetonius, Augustus said at the end of his life, with some justification, that he found Rome a city of brick and left it a city of marble.<sup>27</sup>

The political stability and the economic progress were the proper conditions to establish and develop provincial cities in the likeness of Rome, always seeking "public munificence". This strategy had integrated indigenous communities in the lifestyle and in the Roman Culture, based on the construction of public buildings, where the construction of marble was an important element of construction and symbols of power.

A phenomenon of intensive exploration of marbles never before known was thus initiated which led to a broad organization of all activities related to the operational chain from the extraction, trade, production and application of marbled pieces.<sup>28</sup> The Romans were the first to cut marble into thinner slabs, called *opus sectile*<sup>29</sup>. The use of thinner marble reduced its cost and allowed to Romans to cover many buildings in this stone than the Greeks could cover with solid blocks of marble.<sup>30</sup>



Figure 8: Roman funerary mosaic with scenes of marble work, Bardo Museum

In this regard the Roman author of the first century, *Plinio* (Pliny the Elder), stated that «at the present day, these very mountains [the Alps] are cut asunder to yield us a thousand

<sup>27</sup> Suetonius, Aug. 28, p. 3.

<sup>28</sup> Russel, 2013.

<sup>29</sup> Art technique where materials were cut and inlaid into walls and floors to make a picture or pattern.

<sup>30</sup> Palmer, 2009.



different marbles (...) We now carry away the barriers that were destined for the separation of one nation from another; we construct ships for the transport of our marbles»<sup>31</sup>. The big search in Roman times, had encouraged the exploitation of marbles all over the Empire, and also converted the Mediterranean Sea in a large market carried by *naves lapidariae* that lead marbles to all provinces. The large quarries located mainly in Italy, Greece, Turkey, Egypt and Tunisia fed the main marble routes, proven by abundant testimonies in shipwrecks found in the Mediterranean Sea.

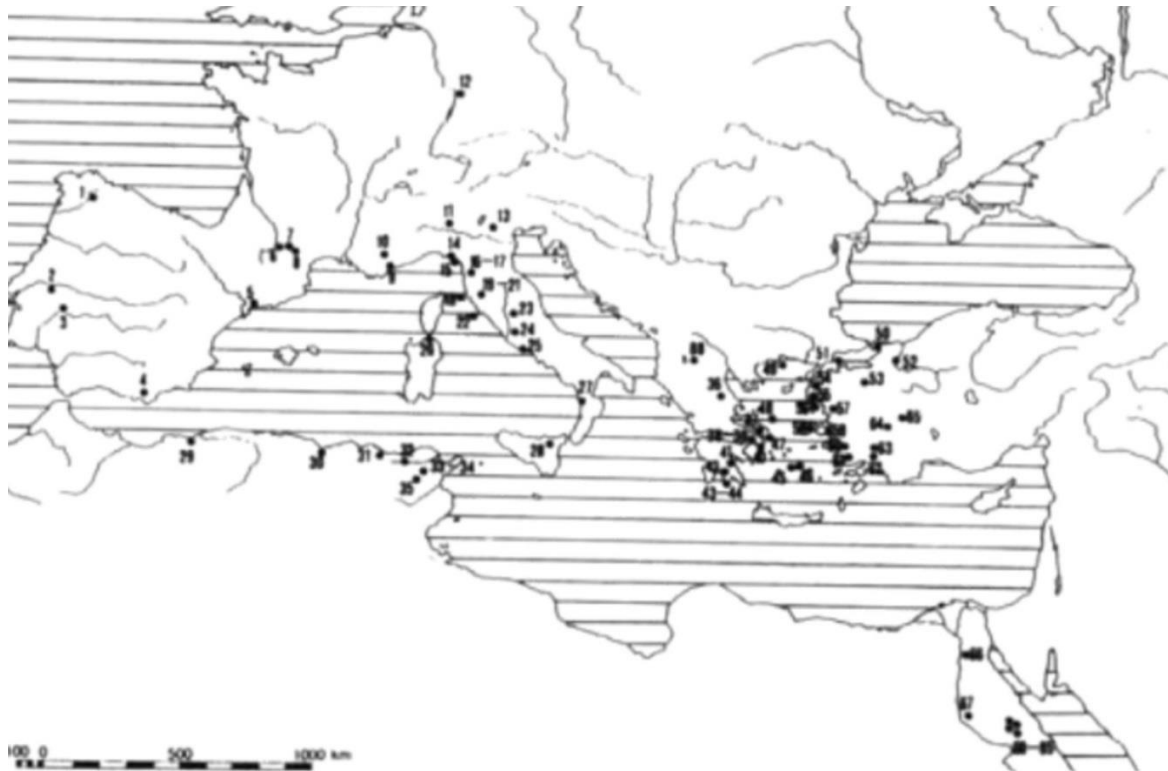


Figure 9: The quarries in the Roman world (Pensabene, 2012)

The import of marble, mainly from the middle of the first century, is generalized throughout the Empire. In a first phase the *fora* (civic centers) were built and we assisted to a marbling phenomenon of the main public buildings and the homes of local aristocracies. Later on, mostly from the third century, with the decline of cities and the expansion of model *villa*, marble had a huge expression in the decoration of these private residences. Many of these *villae* had the countryside residence of Emperor Adriano (second century, in Tivoli) as a model inspiration. In this Imperial *villa* near Rome, water and marble constituted the essential elements in the construction of idyllic spaces. These *villae* imported sculptural pieces and marbles of different regions of the Empire. As an example, the *villa* of Carranque (Toledo, Spain) in its decorative repertoire, imported and used circa four dozen sorts of marble of different origins.<sup>32</sup> These marbles were applied mainly as pavement and flooring boards (*opus sectile*) and, being more expensive than the mosaics, were the maximum expression of luxury in this type of countryside houses.

<sup>31</sup> Pliny, N.H. XXXVI, 1.

<sup>32</sup> García-Entero & Vidal Alvaréz, 2012.



Figure 10: The use of marble in the archaeological site of Carranque (Toledo) according to V. García-Enter and S. Vidal Álvarez (2012)

The marble in the Roman era, in addition to its wide use in architecture, was also used in sculpture, epigraphy and the construction of sarcophagi. In fact, when there was financial availability at the time to choose the inscription base that would host funeral memorial or the material for the final resting place, which was ment to be eternal, marble was the selected stone. Also for this purpose, marble was largely transported by Mediterranean, as witnessed, for instance, by the wreck at Torre Sgarrata (Taranto, Italy) whose weight of the marble cargo was estimated at 160 metric tons<sup>33</sup>. The ship, wrecked about 200 A.D., was carrying unfinished sarcophagi and semi-worked blocks from two quarries in Thasos but loaded in the same port.

<sup>33</sup> Gabellone; Giannotta and Alessio, 2009.

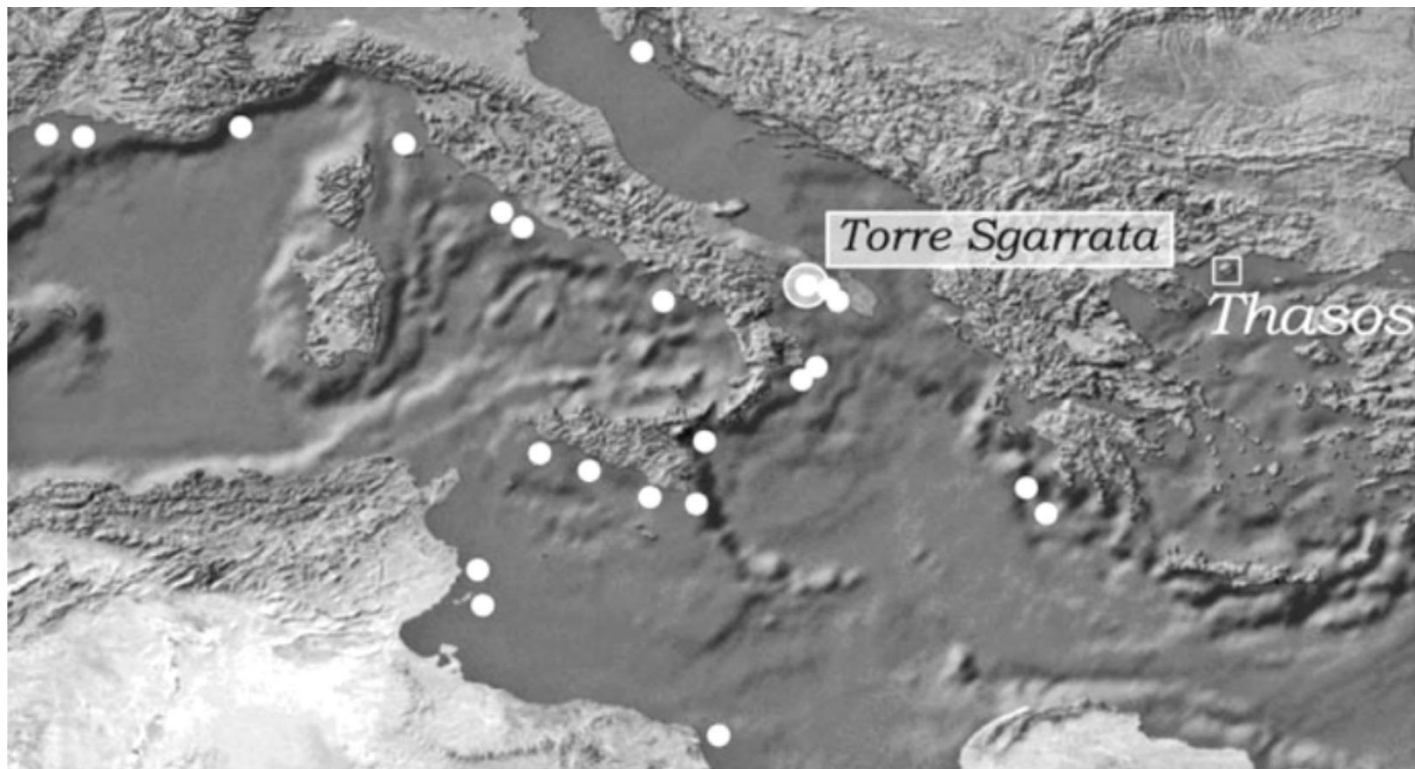


Figure 11: Torre Sgarrata Wreck, and the roman shipwrecks with marble cargoes (Gabellone; Giannotta and Alessio, 2009)

As many cargoes of the *naves lapidariae* of this period in ships wrecked along the coasts of the Mediterranean Sea, and particularly along the coast of Southern Italy<sup>34</sup>, the cargo of this ship was destined for the harbour at Ostia and the Roman market<sup>35</sup>.

The end of the golden age of public munificence, corresponding of the first to third centuries A.D., led to the abandonment of many quarries. But the long-distance transport of marble did not end with the fall of Rome<sup>36</sup>. With the introduction of Christianity and the need to build worthy temples and palaces for Christian elites, there was need of continuing the exploration and marble trade, although the majority of marbled ornaments were a reutilization of abundant and varied marbles of public or private Romans buildings.

### c. The Late Antiquity and the Marble's Reutilization

Few major Roman monuments, namely those located in major cities, have survived untouched from Antiquity. Throughout the post-antique period there was a demand for materials that could be burned to make lime, in particular marble and limestone. Hence, many of the monuments in Roman towns or rural villas in the countryside were demolished or stripped of their marble.

<sup>34</sup> see Parker, 1992 and Pensabene, 2002.

<sup>35</sup> Gabellone; Giannotta & Alessio, 2009.

<sup>36</sup> Russel, 2013, p. 360.





Figure 12: An opus sectile floor panel Italy, Rome (?) c. 8th -11th centuries, reusing ancient marble and coloured stone.<sup>37</sup>

As well as the removal of marble for recycling, blocks of stone, carved or otherwise, from Roman monuments were often taken for re-use in other structures. This was a practice especially widespread in Late Antiquity and later. Many of the largest medieval buildings in Mediterranean basin, particularly its *ornamenta* were built entirely out of spoliated material from ancient structures. «The Middle Ages within the area of the Roman Empire lived on top of and surrounded by the detritus of marble, brick and mosaic Antiquity, which provided ordinary building materials and high-quality marble elements, as well as inspiration for various stylistic revivals. Often the choice of re-usable marble varieties were wide, because of energetic Roman export practices, fashions and thirst for exotic varieties»<sup>38</sup>. The first Christian churches, bishopric headquarters and, after, the mosques and palaces of the Islamic world in the Mediterranean, were mainly responsible for keeping some activity in the quarries and trade of exotic marbles. Despite the continuation of distance commerce, particularly active between East and West, the ancient Roman monuments were the main source of supply for the construction of new religions and cultures. This is common in any temple, from the Palatine Chapel in Aachen (Germany) or the Holy Sepulchre in Jerusalem, to the imposing mosques of Kairouan, Damascus or Cordoba. Indeed, the beautiful and luxurious material quarried, transported or re-used continues to exude power and prestige, and is an essential material for the higher-quality churches tombs, mosques and palaces.

<sup>37</sup> Source: <http://www.londonartweek.co.uk>

<sup>38</sup> Greenhalgh, 2009, p. 4.



Figure 13: View of the apse of the Church of San Vitale, Ravenna, Italy, c. A.D. 526-547<sup>39</sup>

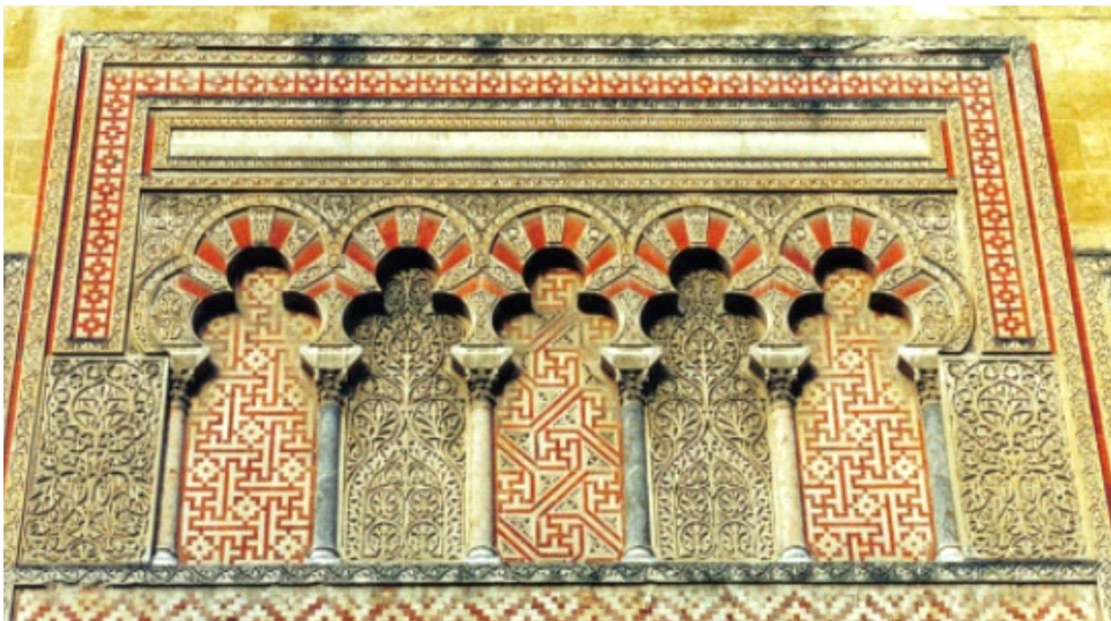


Figure 14: Trefoil arches supported by marble columns on the outside of Mosque of Cordoba, ninth century<sup>40</sup>

39 <http://apah.lakegeneva.badger.groupfusion.net/>

40 [http://commons.wikimedia.org/wiki/Category:Arches\\_in\\_the\\_facades\\_of\\_the\\_Mosque\\_of\\_Cordoba](http://commons.wikimedia.org/wiki/Category:Arches_in_the_facades_of_the_Mosque_of_Cordoba)



#### d. From the Medieval Cathedral to the Renaissance Palace

With the turn of the Millennium and the gradual awakening of Europe for influence of the Islamic world or the Italian city-state, the world witnessed a new reality. «In Spain (Córdoba), Tunisia (Kairouan) and Syria (Damascus), to take but three examples, the Moslems erected sumptuous buildings in a new style, affirming their architectural precedence over the rest of the Mediterranean. They established a standard which would profoundly affect Western reuse of marble, seen in the cathedrals at Pisa and Salerno, the Basilica of S. Marco in Venice, large numbers of smaller religious structures marbled inside, outside or both, and perhaps numbers of long-vanished palaces and civic buildings of which we know little.»<sup>41</sup>

From the 12<sup>th</sup> century, throughout Europe, Catholicism showed all its splendor by erecting cathedrals which points to the sky. But, with the exception of Italian architecture closely related to the Byzantine Eastern influence, there were few architectural works that used the marble. In fact, the marble had a minor role in the great cathedrals of Spain or France, «except for precious items such as columns, shrines and the odd bas-relief. For most purposes, the local limestones were perfectly sufficient, even for fine detail sculptured tympana or cloister capitals» (idem 521). The 14<sup>th</sup> century and the extension of the Renaissance throughout Europe, starting from Italian cities, reversed this situation and opened an epoch of marble apogee, using marble to adorn magnificent temples and public and private edifices. Building with noble stone is indeed the physical manifestation of power, the divine power and secular power.



Figure 15: The Cathedral of Santa Maria Assunta, the Duomo of Siena, began in the mid of 12<sup>th</sup> century. White marble, black and pink, its main facade was the work of Giovanni Pisano and was finished in 1380 <sup>42</sup>

<sup>41</sup>Greenhalgh, 2009, p. 13.

<sup>42</sup>[http://2.bp.blogspot.com/-pl9aKV0WtVo/U1\\_6WsyCTnl/AAAAAAAwI4/njv-T7xC\\_lo/s1600/DSC08051.jpg](http://2.bp.blogspot.com/-pl9aKV0WtVo/U1_6WsyCTnl/AAAAAAAwI4/njv-T7xC_lo/s1600/DSC08051.jpg)

It was during the Italian Renaissance that marble has expanded on the floors, furniture, ornaments and sculpture. It had as reference the splendid ancient Rome, designed and conceived in marble, with the intention of imitating it. The famous and influential Medici, rulers of Tuscany, were the largest enthusiasts of marble application in the palaces. Soon to Florence and other Italian cities were filled with stoneworkers and artisans. The growing search for works made with the noblest of stones also led to an explosion of sculptors and artists who saw the work of marble as the greatest encouragement and challenge.

Michelangelo used to say that «the truly great artist has not designed any way that is not confined before of a marble block» adding that "break the spell of marble is all that can make the hand at the service of brain». As an effect of the genius Michelangelo the *Pietà* was born and from the whittle of a block that was thought unusable, the colossal *David* arised. These marble statues are the aesthetic result and the corollary of an Era, the Italian Renaissance, which may be defined as the *Golden Era* of the use of marble at the service of aesthetics, architecture and sculpture. So then, quarries and marble trade gained new life and, unlike previous times, its reuse became little more than residual.



Figure 16: Michelangelo's Pietà<sup>43</sup>

43 Photo: Stanislav Traykov, CC BY-SA 3.0. Source: <https://goo.gl/RxVC3A>



## 5. The Explosion of Marble Use: from the Renaissance until the Present

### a. The Renaissance Urbanism and the Magnificent Trevi Fountain

As stated in the previous chapter, the Renaissance was the period where marble was used as the golden stone.

The Italian Renaissance style was widespread in Western Europe, that lived a great cultural splendor period. In England, Germany, the Netherlands, Portugal and Spain occurred Renaissance manifestations of major importance.

Moreover, with Renaissance arose a new urbanism, the cities are organized according to a regular grid, being the square the noble location of the city, prevailing architectural and statutory elements, giving richness to urban sites, appealing the citizens to live and experience the cities in another way.

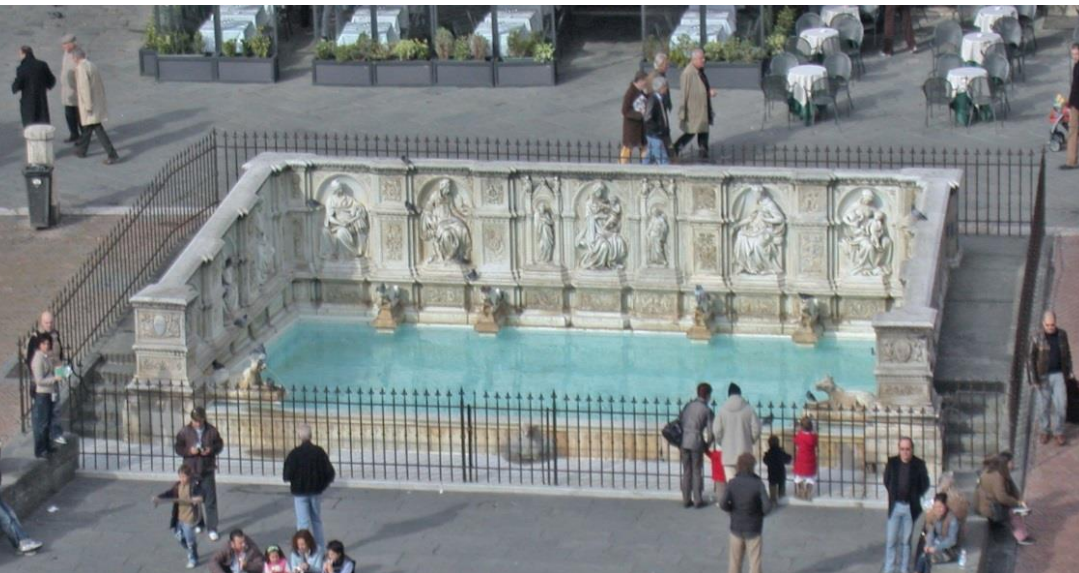


Figure 17: Fonte Gaia, Siena, Italy <sup>44</sup>

The Fonte Gaia, located in the Piazza del Campo in the center of Siena, Italy, is a monumental fountain in white marble. Originally designed and built by Jacopo della Quercia, in 1419, whose bas-reliefs from the basin's sides are conserved in the Ospedale di St. Maria della Scala in Piazza Duomo. The original marble panels were replaced by copies sculpted by Tito Sarrocchi in 1858.

The technique of carving marble, often used during the classical period and rediscovered in the Renaissance with perfection and mastery, continues in the 16<sup>th</sup> century with Mannerism style<sup>45</sup>. Thanks to the increase of engravers, Mannerism spreads<sup>46</sup> more quickly than any previous styles. In this epoch, Carrara marble continues being the most chosen by Italian and European artists, for statuary and architectural decoration.

<sup>44</sup> [https://en.wikipedia.org/wiki/Piazza\\_del\\_Campo](https://en.wikipedia.org/wiki/Piazza_del_Campo)

<sup>45</sup> The word derives from the Italian *maniera*, meaning "style" or "manner".

<sup>46</sup> In France, Netherlands, Bavaria, Spain and Prague.



Figure 18: Giambologna, *The Rape of the Sabine Women*, (1574–82), Florence.<sup>47</sup>

The Mannerism is characterized by the academism, exaggeration, extravagance and sense of drama, reflecting the need to amaze and be original.<sup>48</sup> Michelangelo has been the main artist to achieve these objectives, giving the marble work an incredible realism and bidimensionality.<sup>49</sup>

The mannerist sculptor Jean de Boulogne (known as Giambologna), well-known by his sculptures full of action, movement and with a refined finishing of marble surface, in his masterpiece "The Rape of the Sabine Women" highlights his magistral originality and technique of working the marble, in a composition carved from a single block with 4.10 m high.

Italy is definitely the largest center of attraction for artists throughout Europe, and Rome as seat of the Catholic Papacy and capital of the Papal States, became a major center of artistic influence, and the Church the main artistic patron. In the 17<sup>th</sup> century the Catholic

<sup>47</sup> Source: [https://es.wikipedia.org/wiki/Juan\\_de\\_Bolonia](https://es.wikipedia.org/wiki/Juan_de_Bolonia)

<sup>48</sup> Sproccati, 2002, p. 73.

<sup>49</sup> E.g.: The statue David was carved from a single block of marble.

Church encouraged the popularity and success of Baroque<sup>50</sup>, a style full of innovation, explosion, drama, tension, exuberance, and splendor in sculpture, painting, architecture, literature, dance, theater, and music<sup>51</sup>. In Italy, France, Spain and Germany important artistic schools were founded that formed well-known artists such Bernini, Borromini, Caravaggio, Rubens, Poussin, Lorrain, Rembrandt, Ribera, Zurbarán, Velázquez, etc.

Gian Lorenzo Bernini a brilliant and complete artist<sup>52</sup>, was one of the Baroque founders who worked uninterruptedly for the pontifical authorities, what justifies his numerous religious works of art<sup>53</sup>. The "Ecstasy of Saint Teresa"<sup>54</sup> [figure below], 1651, located in Santa Maria della Vittoria, Rome, is the central sculptural group in white marble set in an elevated aedicule. In this chapel, Bernini also designed the setting in marble, stucco and paint.

In the urban context, Baroque architecture assumed a new connotation. The facades no longer delimit the inside from the outside. I.e., they are built and decorated with curvilinear movements that, somehow, beautify the external environment, which features a sculptural, rich and complex structure. It is clearly an antithesis of Classicism.<sup>55</sup>

Following the Renaissance, Baroque continued building fountains<sup>56</sup> and very impressive public sculptures as decorative elements of the cities. The famous Trevi Fountain, in Rome, designed by Italian architect Nicola Salvi and completed by Pietro Bracci, is an incredible example of public manifest of Baroque, with 26.3 meters in height and 49.15 meters in width. The design of the fountain is based on three architectural elements: a facade made of travertine stone, statues of Carrara marble and a sea reef also of travertine<sup>57</sup>.



<sup>50</sup> Derives from the Portuguese word "barroco" which means irregularity, and in Spanish "barrueco" defines a rough or imperfect pearl. The word was used by goldsmith as a synonym of precious and extravagant art (Sproccati, 2002, p. 87).

<sup>51</sup> Sproccati, 2002, p. 87.

<sup>52</sup> Sculptor, architect, urbanist and painter (Sproccati, 2002, p. 88).

<sup>53</sup> Sproccati, 2002, p. 88.

<sup>54</sup> Source: [https://en.wikipedia.org/wiki/Gian\\_Lorenzo\\_Bernini](https://en.wikipedia.org/wiki/Gian_Lorenzo_Bernini)

<sup>55</sup> Sproccati, 2002, p. 95.

<sup>56</sup> As important water resources for the cities and, at the same time, a meeting point for the citizens.

<sup>57</sup> <http://www.trevifountain.net/trevifountainhistory.htm>





Figure 19: Fontana di Trevi, Rome, Italy, Nicola Salvi, 1732–1762<sup>58</sup>

### b. The Use of Faux Marble and the Representation of Love in the Divine Stone

In the first decade of the 18<sup>th</sup> century, the Rococo style<sup>59</sup> inherits the exuberance of Baroque, expressing itself in a lighter and delicate way. Rococo illustrates the aristocracy lifestyle, where palaces and parks were decorated with beautiful and pleasant ornaments, reflecting the particular desire by pastoral scenes, and also erotic and sensual themes. As happened in the Baroque period, the painting continued to be used in the ceilings and staircases, expanding illusorily architectural spaces, but in a lighter and more ephemeral style. The painting technique of faux marble<sup>60</sup> was commonly used to simulate architectural elements and statuary, as a resource to minimize the implementation of marble and of other noble materials. Another fact is that, for statuary, porcelain was more used rather than marble because it allows a more delicate appearance. Often, marble was replaced by stucco to create the effect of carved stone. However, the use of marble did not disappear during the 18<sup>th</sup> century. At the end of that century two opposing trends emerged: Romanticism<sup>61</sup> and Neoclassicism<sup>62</sup>, which dominated until the mid 19<sup>th</sup> century.

58 <http://www.jasabia.com.br/as-melhores-atracoes-turisticas-de-roma/>

59 Rococo was developed in Paris, France. The term "rocaille" refers to a type of decoration based on the shape of the shell and naturalistic elements (Sproccati, 2002, p. 99).

60 Marbleizing: <https://en.wikipedia.org/wiki/Marbleizing>

61 Romanticism emphasizes the individual experience of the artist, with heady works, visionary and dramatic. In Romanticism, painting was the main artistic resource.

62 Neoclassicism recovers the classic art and esthetics, and imposed a moralizing social and political function for art.



Figure 20: *Psyche Revived by Cupid's Kiss*, 1777 (Marble 1.55 x 1.68 x 1.01m), Louvre Museum, Paris, France<sup>63</sup>

Antonio Canova, master of neoclassical sculpture, in "Psyche Revived by Cupid's Kiss" presents two mythological lovers in a polished marble sculpture. This is one of his most delicate works, because of bodies' movements, elegance and subtle sensuality. Like in Antiquity, Canova chose marble both for representing female figures, heroes and mythological scenes, and for funeral works.

The representation of two lovers and nude bodies was also represented by the French sculptor Auguste Rodin<sup>64</sup>. In his masterpiece "The Kiss" two naked bodies emerge from a block of marble. In his works, the artist prefers to give an "unfinished" appearance, leaving intact parts of the raw stone for giving the impression that figures emerge and gain shapes in the instant that the spectator observes.

<sup>63</sup> [http://musee.louvre.fr/oal/psyche/psyche\\_acc\\_en.html](http://musee.louvre.fr/oal/psyche/psyche_acc_en.html)

<sup>64</sup> Considered the mentor of modern sculpture, in its sculptures used several materials, including marble.



Figure 21: *The Kiss*, 1882, (Marble, 181.5 cm x 112.5 cm x 117 cm), Musée Rodin, Paris, France <sup>65</sup>

A curious fact is that during the 19<sup>th</sup> century the Tinos marble from Greece became of special importance when schools of sculptors and stonemasons were established at Pyrgos. Tinos marble had its presence on the international market. For example, this marble was used in the restoration of the northern facade of Basilica di San Marco in Venice, Italy, because its original marble had badly deteriorated.<sup>66</sup>

The architecture of the 19<sup>th</sup> century, marked by the tendency of copying the architecture of the past, giving rise to the architectural styles Neoclassical and Neo Gothic, continued to apply marble but not as a single material, due to the frequent use of wood, iron, glass and of other stones.

The artistic movements at the end of the 19<sup>th</sup> century, such as Realism, Impressionism, Symbolism and Post-Impressionism, had more expression in painting.

### c. The Modern Times and the New Approaches of Marble Use

The Industrial Revolution<sup>67</sup> and the consolidation of capitalism, were enhancers of the growing of a new society. In the 20<sup>th</sup> century, in the arts field, a new paradigm of culture and society was created, suppressing with all that was tradition. It becomes the Modern Art and its several movements: Art nouveau, Fauvism, Pointillism, Abstraction, Expressionism, Cubism, Futurism, Dadaism, Surrealism, Functionalism, Constructivism, Pop Art, Neo-realism, Action Arts (as Performance, Happening, Fluxus), Installation, Video Art, Op Art, Minimalism, Conceptual Art, Photorealism, Land Art, Arte Povera, Body Art, Postmodern Art, Neo-expressionism, etc.

The Art Nouveau made use of many technological innovations of the late 19<sup>th</sup> century, especially the use of exposed iron and large irregular pieces of glass for architecture. The

<sup>65</sup> Source: <http://www.tate.org.uk/art/artworks/rodin-the-kiss-n06228>

<sup>66</sup> Lazzarini & Antonelli, 2003, p. 543.

<sup>67</sup> Occurred during 18th and 19th centuries and made the transition to new manufacturing processes.



marble was applied as a decorative architectural element and in the decorative arts, as furniture and small statuettes.

The architectonic works<sup>68</sup> of Antoni Gaudí summarize perfectly the concept of the style, where he created a distinctive expression, using various materials and shapes. In Güell Palace, Barcelona, Gaudí used marble throughout the interiors, including arcades of parabolic marble arches carried on round columns and ceiling of marble slabs carried by exposed iron beams. Gaudí's work is also famous by the application of broken pieces<sup>69</sup>, such as ceramics and marble, an ornamental effect created by the architect.



Figure 22: Detail of spiral roof terrace of Casa Milà (Mila House)<sup>70</sup>, Barcelona, with the application of ceramic and marble<sup>71</sup>

A modern approach of marble use in art was made by the cubist Georges Braque. He used stenciled letters onto paintings, blended pigments with sand, and copied wood grain and marble, in order to achieve great levels of dimension in his paintings.

The architect Le Corbusier also used marble patterns in some works, covering walls with fake marble prints made with concrete and paint.

In the 1920s and 1930s, Art Deco<sup>72</sup> reaches the apogee in Europe and North America, an eclectic and modernist style that combines traditional craft motifs with industrial materials. Characterized by the straight lines, the combination of various materials disguises the apparent lack of ornamental decoration. The use of several types of stones, like marble, serve to adorn floors, stairs, fireplaces and furniture, configuring a richness chromatic environment.

In painting and sculpture, the representation is increasingly stylized and abstracted. Alberto Giacometti<sup>73</sup>, who clearly did not follow the classical canons in his sculptures, developed a new and innovative approach. He used various materials for his works, including marble.

68 Ambitious creations, extraordinarily innovative in its functional, constructive, and ornamental aspects.

69 Well-known as "Gaudí effect".

70 Built between 1906 and 1910 for the Milà family, is known as La Pedrera (the quarry).

71 <https://www.lapedrera.com/en/catalan-modernisme-space>

72 It spreads in decorative arts, architecture, interior design and industrial design, as well as the visual arts, fashion, painting, graphic arts and cinema.

73 More about the artist in: <http://www.moma.org/interactives/exhibitions/2001/giacometti/start/flash.html>



Figure 23: Alberto Giacometti, *Tête qui regarde*, 1927, marble, Schenking, London<sup>74</sup>

Noticeably, the frequent use of marble in the 20<sup>th</sup> century was not an exception. In the contemporary epoch, the stone continues to be the chosen material, because it can give a good finish, allowing different patterns and colours. Furthermore, its use is the result of a desire to recall the grandeur of historical monuments and can also mean refined taste, discernment and wealth of the authority and the current patrons.

With the development of Design, marble gained new approaches and purposes. Contemporary designers and design consumers are conscious that marble is valuable and a versatile stone. Due to its characteristics, it is possible to find it applied in luxury interiors and modern settings, in combination with natural materials such as copper, leather and wood, and in faux decoration and ornamentation. Nowadays, we can see marble's versatility in furnishings, lighting, storage, accessories, tableware, interiors and fashion.<sup>75</sup>



Figure 24: Elementare design Studio Lievito<sup>76</sup>

<sup>74</sup> <http://arttattler.com/archiveleporello.html>

<sup>75</sup> <http://yatzer.com/a-marbleous-trend>

<sup>76</sup> <http://www.opinionciatti.com/en/prodotto/85-elementareELEMENTAREdesign%20Studio%20Lievito>

The Italian fashion brand "Missoni" created a women's winter collection based on patterns and marble colours.<sup>77</sup> It is a tribute to Italian heritage of extraction, trade and use of stone.

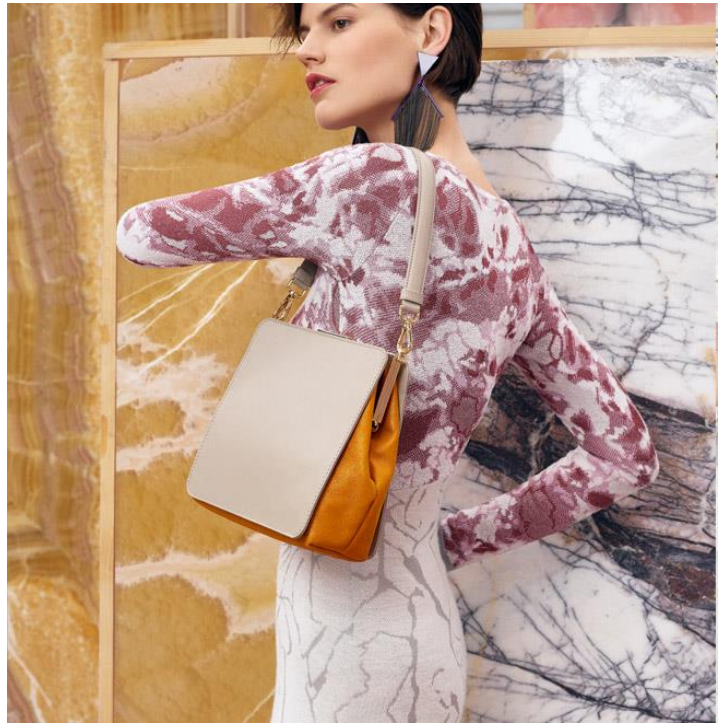


Figure 25: Photo campaign of Missoni collection <sup>78</sup>

The fashion designer Alexander Wang, when invited by a surfboard brand to create printed surfboards, drew inspiration from marble slabs.



Figure 26: Photo campaign of the Alexander Wang's surfboards <sup>79</sup>

<sup>77</sup> Missoni website, winter 2015 collection: <http://www.missoni.com/experience/us/collection/winter-2015-4/>

<sup>78</sup> <http://talesofendearment.com/marble-missoni/>

<sup>79</sup> Source: <http://trendsylva.net/wang-x-haydenshapes-surfboards/>

The contemporary artists have demonstrated a great originality and mastery in the work of marble.

The sculptors Alex Seton<sup>80</sup> and Kevin Francis Gray<sup>81</sup> made unexpected marble works giving it impressive realism, which shows a high level technique such as the classical sculptors.

Alex Seton<sup>82</sup> works mainly with marble, carving ordinary objects as blankets, hoodies, inflatables and national flags, evidencing originality and extraordinary technique in working the stone.

Kevin Francis Gray works with other materials (e.g.: bronze, glass) but should be detached from his marble sculptures, where the stone is carved like if it is a liquid and delicate substance, and the bodies' shapes with a supreme elegance and realism. The polished effect enhances the brightness of the Carrara marble.



Figure 27: Alex Seton's sculpture<sup>83</sup>

80 <http://www.alexseton.com/>

81 <http://www.kevinfrancisgray.com/>

82 On the right, Alex Seton's sculpture. Picture source: <http://ashesinorangepeels.com/kevin-francis-gray-alexander-seton/>

83 Source: <http://ashesinorangepeels.com/kevin-francis-gray-alexander-seton/>



Figure 28: Kevin Francis Gray, *Ballerina*, 2011 (Carrara Marble, 195 x 49 x 49 cm)<sup>84</sup>

In the jewelry industry, marble also has a significant role as a precious stone, combined with gold, silver, leather, etc. Jewelry with marble application, with different colours and patterns, and with diverse styles such as classical or contemporary, can be found in current times.

In 2014, the well-known brand Bulgari used marble, instead of diamonds, for their luxurious rings inspired by the Roman style.<sup>85</sup> The brand RillRill uses marble as main material for jewelry pieces.



Figure 29: Necklaces of RillRill<sup>86</sup>

<sup>84</sup> <http://www.kevinfrancisgray.com/work/ballerina.html>

<sup>85</sup> <http://jewelryblog.co.uk/beautiful-marble-jewellery/>

<sup>86</sup> <http://rillrilljewelry.com/>



Also, you may save your jewelry, or anything else, in a beautiful marble box and decorate your house with it.



Figure 30: Marble boxes with mini cleat handles, West Elm<sup>87</sup>

Undoubtedly, marble is an inspiring stone for any person and to the business sector. Marble is definitely a trend and a luxurious material.

<sup>87</sup> Source: <https://www.decorpad.com/bookmark.htm?bookmarkId=28183>

The image shows a background of marbled paper with a vertical crease down the center. The marbling pattern consists of intricate, swirling, and wavy lines in various shades of purple, lavender, and magenta, creating a complex, organic texture. The colors are layered and blended, giving the paper a rich, multi-dimensional appearance. The central crease is a dark, vertical line that runs from the top to the bottom of the page, slightly offset from the exact center.

### **III. MARBLE TERRITORIES**





## 1. Alentejo Region, Portugal

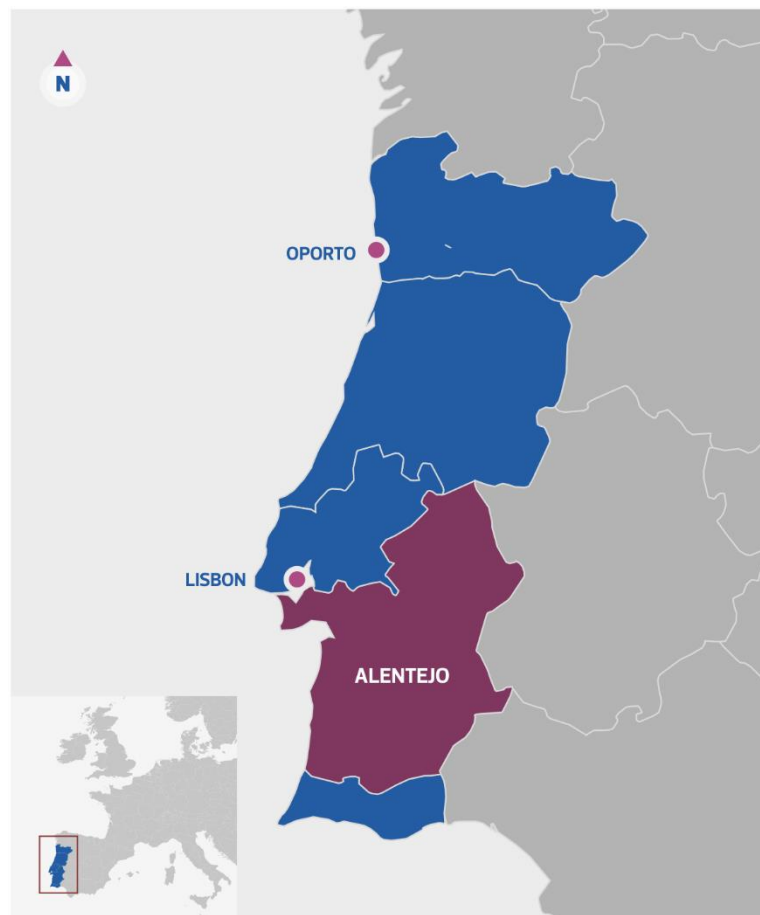


Figure 31: Map of Portugal, Alentejo is the region in purple.

### a. Geography

Alentejo is in the South-Central part of Portugal and is the Portuguese region with the most extensive area.<sup>88</sup> It is defined by the land bordering the left bank of the Tejo River to

<sup>88</sup> <http://www.visitalentejo.pt/pt/o-alentejo/mapa-do-alentejo/conheca-o-alentejo/>

the North and extending to the South where it borders the Algarve region. In the West it is limited by the Atlantic Ocean, and in the East by Spain.

The origin of its name, "além" + "Tejo" combined as Alentejo, literally means "Beyond-the-Tejo" or "Across-the-Tejo". The main cities of the whole region are: Évora, Elvas, Portalegre (Upper Alentejo), Beja, Moura, Serpa (Lower Alentejo) and Sines (Coastal Alentejo). In administrative terms Alentejo region includes 3 districts – Portalegre, Évora and Beja, and is one of the more recent seven regions of Portugal (NUTS II subdivisions). Today, Lezíria do Tejo subregion, formerly belonging to Lisboa and Vale do Tejo region, is part of Alentejo NUTS II region.

The landscape varies from high cliffs and golden beaches on the Atlantic coast, to golden plains in the inland, marked by soft and round hills and the cork trees, vineyards, olive trees, and its interior lakes, creating an amazing atmosphere for resting, exploring and performing distinct outdoor activities. Alentejo is the European area where the sun shines the most, which makes it a pleasant region to be visited throughout the year.

## b. Geology

From a geological point of view, Portugal is a diverse and complex country, with various mineral and non-mineral resources.

Alentejo is occupied by Ossa-Morena zone, which is an extremely complex and diverse unit that begins with a poly-metamorphic Precambrian, followed by Cambrian and Silurian formations, and ends with a flysch sequence from the late Devonian period.

Relatively to non-metallic minerals, this geo-tectonic unit is rich in ornamental rocks, like granites ("calcalkali", porphyritic, biotitic) in Portalegre district, and marble of Estremoz, Borba and Vila Viçosa, an area known as "marble triangle"<sup>89</sup> because it contains the most important ornamental rock deposit of Portugal. At Portuguese mining panorama, Estremoz is the only geologic structure with uninterrupted activity, growing considerably in the last seventy years. In 2009, 150 active quarries were reported in Estremoz anticlinal, spread over 5 mining districts: Estremoz, Borba, Vigária, Lagoa and Pardais.<sup>90</sup>

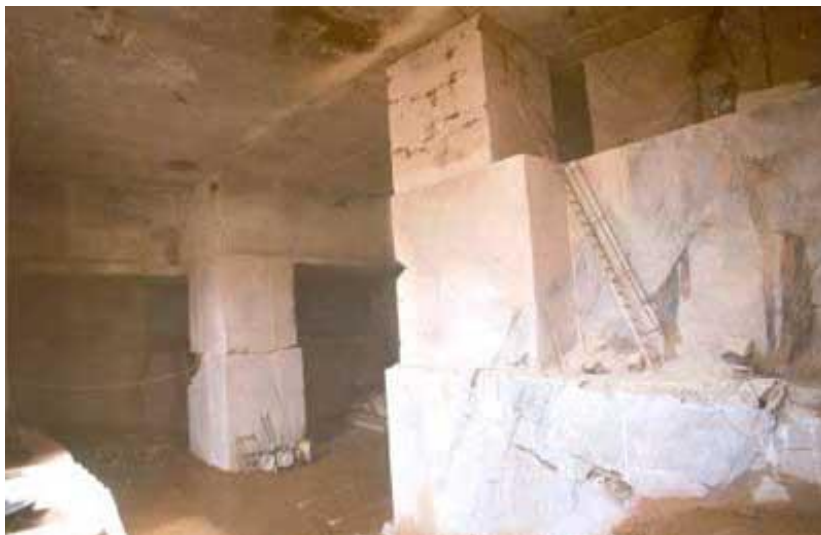


Figure 32:  
Underground marble  
exploration, Estremoz  
Anticline<sup>91</sup>

<sup>89</sup> Lopes, 2007, p. 6.

<sup>90</sup> Carvalho, 2013, p. 17-18.

<sup>91</sup> [http://www.ineg.pt/CienciaParaTodos/edicoes\\_online/diversos/ind\\_extractiva/texto](http://www.ineg.pt/CienciaParaTodos/edicoes_online/diversos/ind_extractiva/texto)

In the south of the region, the basic character of the intrusions gradually increases, with “calcalcali” becoming predominant: gabbro, diorites, serpentinites and anorthosites (Beja ophiolite complex), various different porphyries, and later intrusions comprising gabbrodiorites, granodiorites, tonalites and granites (Évora Massif).

Alentejo has a great historical wealth and a well-preserved heritage. Its rural areas have unrivalled environmental conditions, a diversified countryside and natural reserves, being the most active marble region in Portugal.

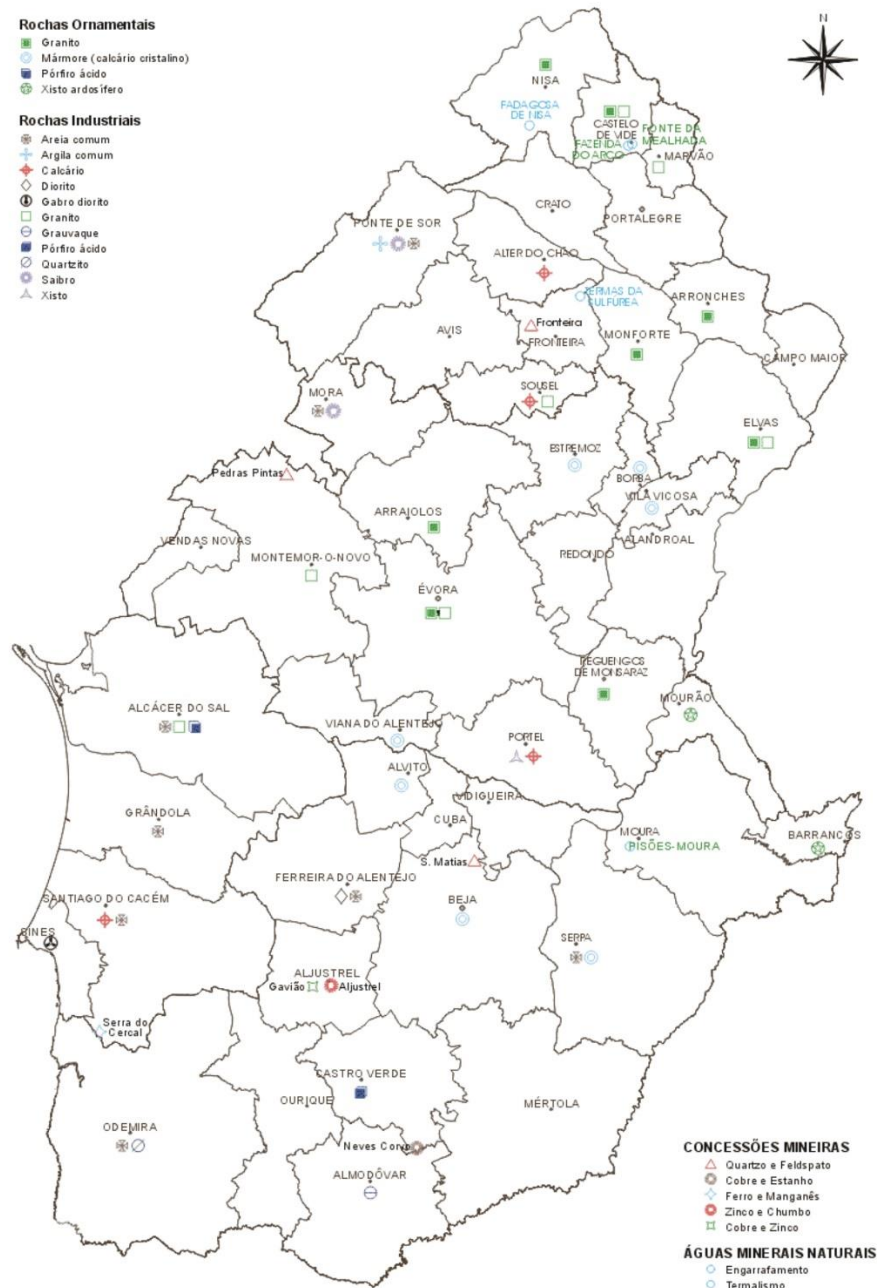


Figure 33: Mineral Resources and Exploration Hydromineral in the Alentejo Region<sup>92</sup>

92 [http://www.ineg.pt/CienciaParaTodos/edicoes\\_online/diversos/ind\\_extractiva/texto](http://www.ineg.pt/CienciaParaTodos/edicoes_online/diversos/ind_extractiva/texto)

### c. History

The history of Alentejo goes hand in hand with the history of the Iberian Peninsula. The earliest evidence in the region of marble exploration dates back to 370 B.C.<sup>93</sup> In many sites of Alentejo it is possible to find prehistorical proofs (e.g.: dolmens and cromlechs) of the use of local rocks, like marble.<sup>94</sup> The Phoenician civilizations, from 3,000 year ago, Celts, Romans, Visigoths and Arabs occupied the region and left an important legacy. The normalization of the country and the region was thanks to the conquering by Portuguese Kings.



Figure 34: The main quarries of Lusitania

With the urbanization of Lusitania, from the Emperor Augustus (27 B.C.–A.D. 14), began the systematic exploitation of marble and also its transformation and application in architecture, in ornaments, especially in sculpture. The Roman Empire was built at Rome's style architecture, and the public buildings constructed mainly by stone, especially with marble, as *sine qua non*<sup>95</sup> condition. Archaeological findings prove the existence of quarries at the shaft Estremoz–Vila Viçosa, which were explored in Antiquity, due the quality of white marble basically destined for statuary.<sup>96</sup> In the Roman period, the marble of Estremoz was used in several monuments, in Portugal and also in Spain, underlining the preference of this marble<sup>97</sup>. Concerning exploration, the marble blocks were extracted only at the surface, because the processes used did not allow exploring the deposits in dept<sup>98</sup>. The development of Alentejo quarries contributed to the rise of villae and to the settlement of specialized people in the region, to work in the extraction and commercialization of marble.

93 Carvalho, 2013, p. 17.

94 Cardoso, 2001–2002, p. 79–80.

95 Refers to an indispensable and essential action, condition or ingredient.

96 Maciel, 1998, p. 234.

97 Lopes, 2007, p. 6.

98 Maciel, 1998, p. 235–237.

With the decline of cities and the end of the Roman Empire, many quarries were abandoned and the monuments dismantled for reusing the materials in new constructions. Many statues were burned to make whitewash; marble slabs served to write funerary inscriptions and big blocks to carve funeral sarcophagi.

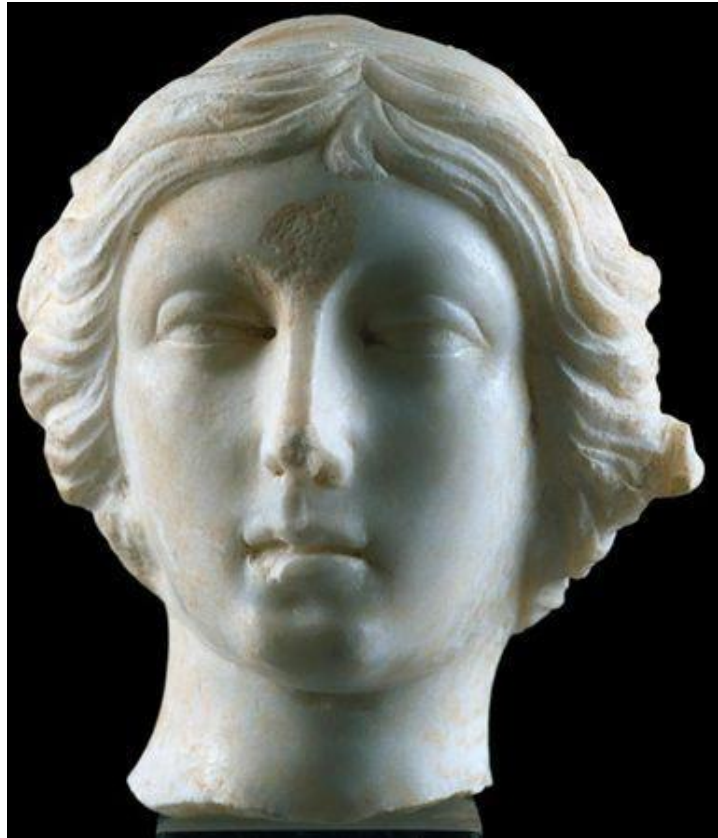


Figure 35: Quinta da Longas, Elvas, Alentejo (Carrara marble)

With the onset of Islamic presence in Portuguese territory, the marble reuse continued, along with the import of some marbled elements for mosques and palaces.

The following civilizations continued to use the marble from Alentejo, not only in Portugal,<sup>99</sup> going on with the extraction activity and trade. Nevertheless, Portugal has also received marble from other European countries, as it is shown through Portuguese spoils (e.g.: statues made with Carrara marble, etc.).

#### d. Heritage and Culture

Alentejo's cultural heritage is easily noticed all over the territory and can be seen in archaeological sites, castles, churches, ancient mines, museums, cities and small villages, with its typical buildings reflecting the diversity of cultural influences that marked this region through the times.

As mentioned above, marble has a big impact on the region. In order to dignify the marble of the region, the Marble Museum Raquel de Castro, in Vila Viçosa, at Gradinha quarry was inaugurated in 2013. The museum intends to show the whole process related to the extraction and transformation of this ornamental rock.

<sup>99</sup> As an example, the columns of Merida Theater are in marble of Estremoz.



Figure 36: Showroom of the museum Raquel de Castro, in Vila Viçosa <sup>100</sup>

Also, a luxurious five star hotel was built in Vila Viçosa covered and decorated with marble from Vila Viçosa (Portugal) and from other countries – the Alentejo Marmòris Hotel & Spa – being like a real museum dedicated to marble.



Figure 37: Interior of the hotel Marmòris Hotel & Spa, in Vila Viçosa, covered with marble <sup>101</sup>

Turismo do Alentejo (Alentejo Tourism Board) created the project "Tons de Mármore"<sup>102</sup> (Shades of Marble) to promote and highlight the industrial and cultural heritage of the marble of Estremoz Anticline.

The Portuguese sculptor João Cutileiro, which works mainly with marble, since 1985 lives and works in Évora, Alentejo, due to the abundance of this stone. Cutileiro is a well-known artist, both in Portugal and internationally, because of his innovative sense of carving marble and for carving human bodies with a modern and stylized approach.

But Alentejo is not just marble. In the region one can find clay, cork, rattan sticks, wood, wool and linen, which are transformed in handicraft works that reflect the collective memories. Also traditional fairs, festivals, religious celebrations and events keep the region alive and attractive, both for the locals and tourists.

<sup>100</sup> <http://www.visitalentejo.pt/pt/catalogo/o-que-fazer/museus-e-locais-a-visitar/museu-do-marmore-raquel-de-castro/>

<sup>101</sup> <http://www.alentejomarmoris.com/index.php/en/>

<sup>102</sup> Website: <http://www.rotatonsdemarmore.com/en>



Alentejo cannot be culturally defined without a reference to its wines and its traditional gastronomy with Mediterranean flavours.

Additionally, the "Cante Alentejano" (typical polyphonic song of Alentejo) distinguished in 2014 by UNESCO as Intangible Cultural Heritage, can still be listened to in local taverns and restaurants or even in public places.



Figure 38: Lago das Tágides, Lisbon, João Cutileiro, 1998, marble <sup>103</sup>

<sup>103</sup> <http://perspectivasdoolhar.blogspot.pt/2014/08/lisboa-parque-das-nacoes-lago-das.html>



## 2. Attica Region, Greece

### a. Geography

Attica is a region that encompasses the entire metropolitan area of Athens, the capital of Greece. Located on the eastern edge of Central Greece, Attica covers about 3,808 square kilometers. In addition to Athens, it contains within its area the cities of Piraeus, Eleusis, Megara, Laurium, and Marathon, as well as a small part of the Peloponnese peninsula and the islands of Salamis, Aegina, Poros, Hydra, Spetses, Kythira, and Antikythera. Attica is currently the wealthiest and most densely populated part of Greece. About 3,750,000 people live in the region, of which more than 95% are inhabitants of the Athens metropolitan area.

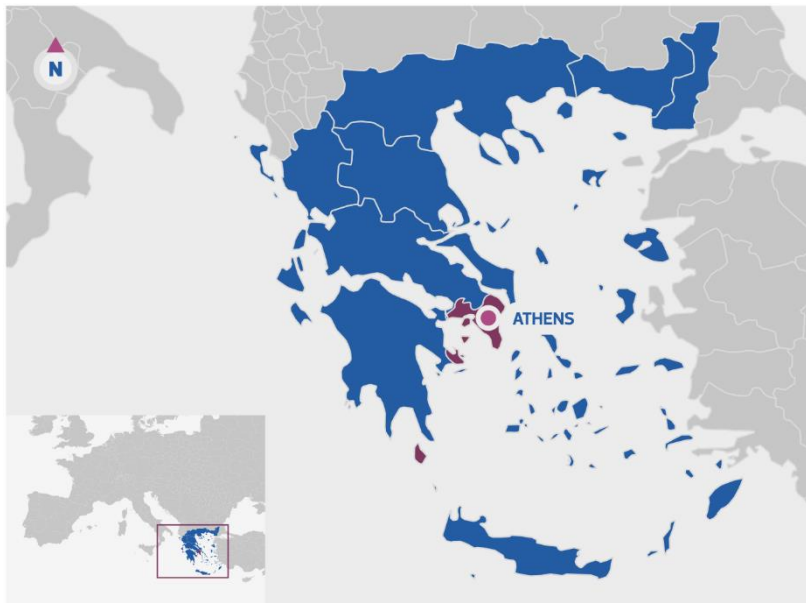


Figure 39: Map of Greece. Attica is the region in purple

Attica is a triangular peninsula jutting into the Aegean Sea. From three sides, this peninsula is watered by gulfs of the Aegean Sea, while at the Northern side it borders with Boetia through the 16km long mountain range of Kithairon. To the West, it also borders with the Corinth Canal. The geography of Attica has various features. In the centre of the peninsula is a large basin where the entire metroplex of Athens–Piraeus has been constructed. This basin is surrounded by four mountains: Hymettus, Parnitha (the highest mountain of Attica), Egaleo and Penteli. To the East of Mount Hymettus is the plain of Mesogia, a totally different landscape than the urban style of Athens. In Mesogia, you will actually see large vineyards and in fact many wineries are spread in this region. In the mountains Parnitha and Penteli, there are large forests of pine trees and shrubberies that actually refresh the atmosphere of the Greek capital. Very frequently in winter these forests are covered with snow. On the North Eastern side of Attica is the Lake Marathon, an artificial lake created by damming in 1920 and the water reservoir of Athens.

## b. Geology

In Attica soils, the proper conditions are ensured in areas that were rock formations, like marbles, limestones, and dolomites outcrop having a large surface and underground development, such as the mountains of Penteli, Hymetus, Parnitha, Egaleo, Merenta, Keratovouni, and Olympus of Anavissos but also in Lavrion metalliferous area, where granodiorites, and hornfels (plakites) have an analogous surface development.

The geological history of Greece has been influenced by conditions of intense orogenesis, magmatism and metamorphosis that led to the creation of extended areas of deposits of ornamental stones. The following ornamental stones are widely used in Greece:

- \_ Metamorphic stones: Calcitic marble, dolomitic marble, cipollins and opicalcites;
- \_ Sedimentary stones: Limestone, travertine, brace, onyxes and alabasters;
- \_ Magmatic rocks: (Granites), granodiorites and gneiss.

The great wealth of Greece as concerns the deposits of high quality marble, being mainly white types, in combination with a very long tradition in the art of marble, have much contributed to the development of the modern and dynamic Greek marble industry, which is highly rated among the top world producers of decorative natural stones, both in terms of production and exports.



Figure 40: Pentelikon – Dionysus  
White Marble<sup>104</sup>

The marble deposits in Greece are immense and a lot of geologists characterize them as practically inexhaustible. There are a great variety of types and colors, but mainly white sorts, some of which are very famous and are included among the finest ornamental natural stones in the world. That's why Greece is regarded as the country with the widest collection of white and light colored marble sorts.

<sup>104</sup> [http://www.dionyssomarble.com/uploads/Products/thumbs/dionyssos1\\_640x480.jpg](http://www.dionyssomarble.com/uploads/Products/thumbs/dionyssos1_640x480.jpg)

Apart from white marble, there are also other splendid marbles: black, gray, beige, red and other coloured marbles, with very good features. Moreover, travertine and onyx types of exquisite texture and good quality are produced.

In general, the quality of the Greek marble sorts is excellent and their physical and mechanical properties, as scientific laboratories have defined them, fully comply with the constructors' standards.

ΦΥΛΛΟ 460\_4200 - ΚΑΤΜΑΚΑ 1:25.000

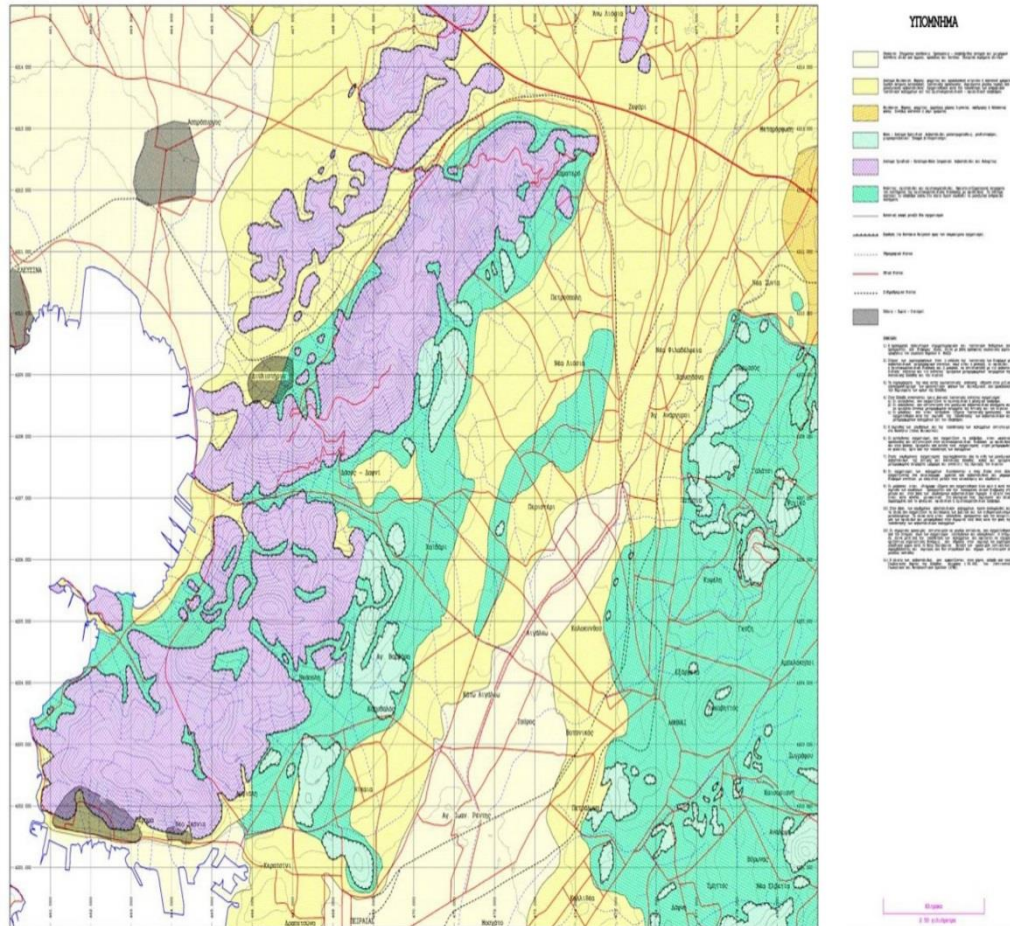


Figure 41: Geological Map <sup>105</sup>

### c. History

The surrounding area of Athens is one of the oldest marble quarrying and processing centers in Greece, but also in the world. In Attica, the marble quarries started their operation mainly after the Persian Wars.

This area produced the white marble of Penteli, which has been regarded as the best one, the yellowish type of Ymittos of inferior quality, as well as the type of Agrileza, near Sounio, which was used for the construction of the temple of Poseidon.

The ancient quarries of the Pentelikon marble type were located mainly on the South West side of Penteli Mountain, the valley of Spilia, as it is known today. It has been reported that there were 25 quarries which produced more than 400,000 cubic meters of blocks.

<sup>105</sup> <http://www.bezes.gr/images/4604200.jpg>

The Greek marble sorts are well-known all over the world since they have been associated with the masterpieces of sculpture and architecture of Ancient Greece with unique and exceptional works of art, which through the centuries have always been the focus of the world attention and praise.

In Ancient Greece, the use of marble had been very wide. Marble and stone were the materials that deeply touched the human sensitivity and driven man to the world of aesthetics and symmetry.

Since the depth of distant centuries, the Greek sculptors and architects had discovered that stone and marble were the building materials with the exceptional beauty that with their natural grace could convert the lifeless constructions into masterpieces of art. And they chose marble and stone to express the splendor of the ancient Greek civilization upon them.<sup>106</sup>

#### d. Heritage and Culture

The various monuments, located all over the Greek territory, as well as the sculptures that ornament the museums in Greece and abroad, magnetize the observer, since their every single detail contains an unusual gratitude that only marble can offer. It seems that marble, as it is worked patiently, absorbs stroke by stroke, more and more artist's energy and passion to be finally shaped into a monumental work of art. The Venus of Milos, Hermes of Praxitelis, Victory of Samothrace, but also the Parthenon, the Erechtheum, the Propylaea of Acropolis of Athens are only a few representative samples of expression of the ancient spirit upon the unrivalled Greek marble.



Figure 42: Hermes of Praxitelis

<sup>106</sup> The Parthenon, in Athens, was an inspiration for the following artists and architects. Regarding this subject, please see the chapter 1. The marble early: Prehistory to the Middle Ages, page 12.





Figure 43: Victory of Samothrace



Figure 44: The Erechtheum



Figure 45: The Propylaea of Acropolis of Athens



The most striking is that the makers of Dionysos quarries – Penteli cooperating with the Acropolis Restoration Service (YSMA) – undertook the task of supplying the necessary marbles to restore the Acropolis monuments, including the Parthenon. The project began in 2002 and is ongoing.

## Main attractions / Curious facts

### Acropolis

Acropolis of Athens is probably the most famous and most visited monument in the world from the Antiquity times. It is the symbol of Athens and its most famous landmark. Every year, thousands of visitors from all over the world come to admire this symbol of the Ancient Greek civilization. On the rock of Acropolis are several monuments from the Greek Antiquity, most of the monuments were built on the Prehistoric temples of the Sacred rock during the golden age of Pericles of Athens during the 5<sup>th</sup> century B.C..

Among those monuments of the Acropolis, Parthenon is the most magnificent, the temple of Parthenon was dedicated to the goddess Athena, protector of the ancient city of Athens.

The Parthenon is one of the most famous buildings in the world and if it had been built some centuries before, we would probably be talking about eight wonders of the world instead of seven. Its unique architecture inspired the architectural style of the Western world. Universities, public buildings, palaces, parliaments, libraries have been built inspired from the Dorian style and the architecture of the Parthenon. The Parthenon was built during the Golden Era of Athens under the Pericles administration by the architects Iktinos and Kalikrates. For its construction they used marble from the mount of Penteli.

### Acropolis museum

The Acropolis Museum is an archaeological museum focused on the findings of the archaeological site of the Acropolis of Athens. The museum was built to house every artifact found on the rock and on its feet, from the Greek Bronze Age to Roman and Byzantine Greece. It also lies on the archaeological site of Makrygianni and the ruins of a part of Roman and early Byzantine Athens.

The museum was founded in 2003, while the Organisation of the Museum was established in 2008. It opened to the public on June 20, 2009. Nearly 4,000 objects are exhibited over an area of 14,000 square metres.

### Panathenaic Stadium (Kallimarmaro)

The Panathenaic Stadium is located on the site of an ancient stadium and for many centuries hosted games in which nude male athletes competed in track events, athletics championships as we would call them today. The games, which since antiquity had been held in an area far from the city, were included in the programme of the Panathenaia festival celebrations in 566–565 B.C..

Thanks to the generosity of Herodes, significant works were carried out in the Stadium between A.D. 139 and 144, which resulted in two main changes to the initial form: the conversion of the original rectilinear shape to horseshoe shape by adding the sphendone, characteristic form of Greek stadia in Roman times, and the installation in the space for spectators, the theatron, of rows of seats (edolia) of white Pentelic marble.

## Odeon of Herodes Atticus

The Odeon of Herodes Atticus is a stone and marble theatre structure located on the Southwest slope of the Acropolis of Athens. It was built in A.D. 161 by the Athenian magnate Herodes Atticus in memory of his wife, Aspasia Annia Regilla. It was originally a steep-sloped amphitheater with a three-story stone front wall and a wooden roof made of expensive, cedar of Lebanon timber. It was used as a venue for music concerts with a capacity of 5,000. It lasted intact until it was destroyed and turned into a ruin by the Heruli in A.D. 267.

## National Archaeological Museum

The National Archaeological Museum is the largest museum in Greece and one of the world's greatest museums. Although its original purpose was to secure all the finds from the 19<sup>th</sup> century excavations in and around Athens, it gradually became the central National Archaeological Museum and was enriched with finds from all over Greece. Its abundant collections, with more than 11,000 exhibits, provide a panorama of Greek civilization from the beginnings of Prehistory to Late Antiquity.

The museum is housed in an imposing neoclassical building of the end of the 19<sup>th</sup> century, which was designed by L. Lange and remodeled by Ernst Ziller. The vast exhibition space (numerous galleries on each floor accounting for a total of 8,000 square meters) house five large permanent collections.

## Archaeological Museum of Marathon

The Archaeological Museum of Marathon is situated in Vranas and is characterized as an historic heritage gem of the city. However, the birth of this museum resembles to an incredible jigsaw puzzle constituted by short human stories, starting in 1969. The Archaeological Museum is divided into six large rooms, in which the rare findings are being exposed.

### Varnava museums

The Interactive Historical Folklore Museum Varnava, Municipality of Marathon, established during the summer of 2002. The aim and ambition is not only the preservation, the promotion of the local historical cultural root, but also the active gathering of clues and information (by following the steps from the past and by having an open-minded view of the future) of the broaden area, of Attica, in order to have a new start when everything seems to have been already determined.

The basic activities of the past "THE HOUSEHOLD" is being represented at a satisfactory degree in the museum. The household didn't have the comforts of today's household. It consisted of one or two rooms which were enough for the necessary demands of the people during that period.

In the museum the visitor will have the ability to see some household appliances, traditional local clothing, handmade table clothing, lamps, and ways of measurement. Moreover there are rooms displaying the loom, the grape harvest, agricultural tools, weapons and books of the old time.

In the same building, the visitor can see also the European Museum of Bread which is consisted be exhibits which comprise the biggest collection of decorative bread in Europe. The three thousands (3000) varied exhibits cover the whole of Greece as well as forty (40) other countries and are being added to continuously. As a result, the collection is unique in both size and shape. This is a rare collection because of its educational value for all ages.

There is also a big exhibition with pieces of art by Greek marble made by local artists.

### 3. Lucca Province, Italy



Figure 46: Marble district location map

#### a. Geography

The Apuan Alps – a massif with very steep sides and peaks between 1,800 and 2,000 metres in height – are located in the North of Tuscany. The stone-working district of the Apuan Alps and the Versilia coast covers two regions – Liguria and Tuscany – and three provinces – La Spezia, Massa–Carrara and Lucca. Massa–Carrara and Lucca have been included in the stone-working district recognized by the Tuscany Region in 2000. Extra Expo is focused on the province of Lucca and, in particular, on two main areas Garfagnana and Versilia. The territory is dominated both by the presence of the Apuan Alps and the

Tyrrhenian Sea, with its wide Versilia beach and coastal resort towns. «Versilia is the name of the river that descends from the calcareous bastions of the Apuan Alps, through the foothills, to conquer the sea and it lends its name to all the territory it crosses. On one side, broad, softly sanded dunes and mountains with jagged profiles, the delicate colours of the olive groves on the hills that are the custodians of an important part of Versilia's history, the blinding white scars on the marble mountains, the restful sound of the sea and the rhythms at the *à la mode* night-spots. On the other side, Garfagnana where nature reigns supreme: the Orecchiella nature reserve, the Apuan Alps regional park and the Orrido di Botri nature reserve, a genuine calcareous canyon, can boast a large variety of mountain flora and fauna with different species of plants and birds.» (Giusti, 2010)



Figure 47: Saint Anthony sculpture, made by Novello Finotti – Marina di Pietrasanta jetty<sup>107</sup>

## b. Geology

The geology of this region is well explained in the excerpt from *The Tuscan marble identities*<sup>108</sup>:

*The Apuan Alps are one of the most interesting area in the Northern Apennines. They form a tectonic window where the deepest structural layers of the chain can be observed. The Apennines are a thrust-and-fold chain that originated in the tertiary period due to the overlapping from West to East of the Ligurian units onto the external Tuscan and Umbria-Marchigiana domains. The Apuanes metamorphic complex is composed of two overlapping tectonic metamorphic unit: the Apuanes unit ("Autoctono") and the Massa unit above. Both have a Palaeozoic basement which a discordant meta-sedimentary sequence lies upon*

<sup>107</sup> Stefano De Franceschi  
<sup>108</sup> I.M.M., 2009.



*Triassic–Oligocene for the Apuanes units and middle Triassic for the Massa unit. The different varieties of marble, meta-breccias and calcareous schist occur in different layers. From them, a wide range of materials are quarried and they are commercially known as Apuanes marble varieties.<sup>109</sup>*



Figure 48: Cervaiolo quarries, "bancate"<sup>110</sup>

### c. History

Tuscan marble has been quarried since the pre-Roman period in the Apuan quarries. The "Lunense Marble" was used to build the most important public buildings of Rome and several patrician houses, since the remote times of Gaius Julius Caesar. The ancient Roman port of Luni, thanks to its strategic position, was used mainly for the transportation of the white marble from the Apuan Alps to Rome. After a long period of discontinuation following the Roman period, quarrying activity revived in the 12<sup>th</sup> century, increasing during the Renaissance. Legendary is the example of Michelangelo's works of art carved in marble blocks extracted in the Carrara quarry basins. Michelangelo spent many years of his life also in Versilia and gave a remarkable contribution to the economic development of the area

<sup>109</sup> I.M.M., 2009, p. 12.

<sup>110</sup> Stefano De Franceschi.

with the opening of the road from Mount Altissimo to Forte dei Marmi. The territory of Garfagnana has been involved in the marble process of industrialization only in the second half of the 19<sup>th</sup> century, thanks to the improvement of connections and infrastructures. In more recent time, the introduction of new technologies (such as the use of diamond wire cutters or diamond chains driven by powerful machinery) have completely revolutionized the work in the quarry. Researches on new technologies are evolving over the years thanks also to Garfagnana Innovazione, a technology center equipped with robotic stone cutting equipment and access to the best sculptural marble in the world.<sup>111</sup>



Figure 49: Marble blocks transportation <sup>112</sup>

### Curious facts

Michelangelo Buonarroti, the great sculptor of the Italian Renaissance, spent three years in the Apuan Alps working for Pope Leone X. In that period he built a road which went as far as the sea and opened the quarries of Trambiserra and Cappella. Further on, the Grand Duke Cosimo extended Michelangelos' road to the very core of Mount Altissimo. In 1965, the Director Carol Ree directed the movie "The Agony and the Ecstasy" starring Charlton Heston<sup>113</sup> as Michelangelo<sup>114</sup> and Rex Harrison<sup>115</sup> as Pope Julius II.<sup>116</sup> The film was partly based on Irving Stone's<sup>117</sup> biographical novel of the same name.<sup>118</sup> This film deals with the conflicts of Michelangelo and Pope Julius II during the painting of the Sistine Chapel's<sup>119</sup> ceiling. Most of the scenes of the movie have been shot in Italy, in particular on the Apuan Alps. The location where Michelangelo choose the marble for its sculptures is the Cave delle Cervairole (Cervairole Quarries)<sup>120</sup>.

Another curious fact is that the cities of Pietrasanta (IT) and Ecaussines (BE) have historical links which date back to almost 100 years ago. They have strengthened their cooperation in 1946 when a group of quarrymen from Pietrasanta (mainly coming from the Henraux quarries) have started working at the Merbes Sprimont quarries in Belgium (Henraux subsidiary). The quarrymen where sent to Belgium, for a period of 5–6 years, due

<sup>111</sup><http://www.digitalstoneproject.com/>

<sup>112</sup> Stefano De Franceschi.

<sup>113</sup> [https://en.wikipedia.org/wiki/Charlton\\_Heston](https://en.wikipedia.org/wiki/Charlton_Heston)

<sup>114</sup> <https://en.wikipedia.org/wiki/Michelangelo>

<sup>115</sup> [https://en.wikipedia.org/wiki/Rex\\_Harrison](https://en.wikipedia.org/wiki/Rex_Harrison)

<sup>116</sup> [https://en.wikipedia.org/wiki/Pope\\_Julius\\_II](https://en.wikipedia.org/wiki/Pope_Julius_II)

<sup>117</sup> [https://en.wikipedia.org/wiki/Irving\\_Stone](https://en.wikipedia.org/wiki/Irving_Stone)

<sup>118</sup> [https://en.wikipedia.org/wiki/The\\_Agony\\_and\\_the\\_Ecstasy\\_%28novel%29](https://en.wikipedia.org/wiki/The_Agony_and_the_Ecstasy_%28novel%29)

<sup>119</sup> [https://en.wikipedia.org/wiki/Sistine\\_Chapel](https://en.wikipedia.org/wiki/Sistine_Chapel)

<sup>120</sup> [https://en.wikipedia.org/wiki/The\\_Agony\\_and\\_the\\_Ecstasy\\_%28film%29](https://en.wikipedia.org/wiki/The_Agony_and_the_Ecstasy_%28film%29)

to the lack of work in Italy soon after the Second World War. After that period some of them came back to Italy and some of them remained in Belgium. Nowadays, the Italian community in Ecaussines, hailing from Versilia, is of about 400 families.

#### d. Heritage and Culture

Pietrasanta (Versilia) is the best example of a symbiotic relationship of a town with marble. Known also as the "little Athens", the town is famous for its arts and cultural scene. Marble is manifested everywhere from the houses, the magnificent cathedral to the ateliers of the town. Famous artists such as Botero, Yasuda, Vangi and Mitoraj have decided to live and work there.<sup>121</sup> One of the most popular bathing resorts of the Tyrrhenian Sea, Forte di Marmi, owes its name to the ancient port used for the transportation of marble (the origins of the town are ascribed to the construction and use of a route "Via dei Marmi", which connected the hinterland with the seaport)<sup>122</sup>. Local marble is very famous for the statuary quality and has been used by all of the most famous sculptors in the world such as Michelangelo, Donatello and Canova. Signs of marbles left by famous artists are everywhere in Tuscany, just to mention two worldwide known cities: Florence (70 km from Lucca) and Pisa (25 km from Lucca). In Florence, at the Accademia Gallery it is possible to admire Michelangelo's *David*, one of the greatest masterpieces ever created by mankind and, perhaps, the most famous statue in the world.<sup>123</sup> In Pisa, marble can be admired at the Field of Miracles home to the Leaning Tower, the Cathedral, the Baptistery and the Monumental Cemetery. The square, unique in its kind, stands apart in a beautiful contrast between the green grass and the white marble<sup>124</sup>.



Figure 50: Pietrasanta Cathedral and Mitoraj bronze sculpture<sup>125</sup>

<sup>121</sup><http://www.turismo.intoscana.it/allthingstuscany/aroundtuscany/pietrasanta-tuscany/>

<sup>122</sup>[http://www.comune.fortedeimarmi.lu.it/index.php?option=com\\_content&view=article&id=3486&Itemid=670](http://www.comune.fortedeimarmi.lu.it/index.php?option=com_content&view=article&id=3486&Itemid=670)

<sup>123</sup><http://www.accademia.org/explore-museum/artworks/michelangelos-david/>

<sup>124</sup><http://www.behindthetower.com/en/pisa/sights/leaningtowerofpisa>

<sup>125</sup> Katia Gerunda.

Marble is not only an important economic resource for the territory but it plays a very important cultural role for the Lucca province. Tourists, while in Versilia, can visit museums related to the history and tradition of marble such as the *Museo della Pietra Piegata* (Levigliani di Stazzema)<sup>126</sup>, a small museum recounting 3,000 years of marble quarrying and dressing. They can visit also the *Museo del Lavoro e delle Tradizioni Popolari della Versilia Storica* (Seravezza)<sup>127</sup>, located inside the wonderful context of the *Palazzo Mediceo*, where they can discover the daily life of ancient Versilia inhabitants from the 1700s to the 20<sup>th</sup> century.

In Forte dei Marmi, tourists after a day spent on the seaside can take the occasion to dive in the world of marble at the museum of one of the most important Tuscan sculptors of the 20<sup>th</sup> century Ugo Guidi.<sup>128</sup> Another very peculiar cultural stopover, in Pietrasanta, is the *Museo dei Bozzetti* – “Maquettes’ Museum”<sup>129</sup>, containing 600 sketches and models of sculptures by more than 300 artists who have worked in Versilia. Still in Pietrasanta, tourists can have also a virtual experience at the MUSA – Virtual Museum of Sculpture and Architecture.<sup>130</sup> The territory, the quarries, the mining and extraction activities, the processing of the materials, the laboratories, the companies, the foundries are the protagonists that give life to the MUSA in its twofold dimension (real and virtual).



Figure 51: MUSA: Virtual Museum of Sculpture and Architecture, Pietrasanta<sup>131</sup>

On the other side of Apuan Alps (Garfagnana), each year, on the second Sunday of August, tourists can live the experience of the cutting of marble: a group of elderly quarrymen will show how to cut it with the helical wire with water and sand, according to tradition. During the rest of the year, they can continue to learn about marble and its practices at the *Museo dell'Identità dell'Alta Garfagnana "Olimpio-Olinto-Cammelli"* – Marble Museum (Gorfigliano)<sup>132</sup>.

If tourists decide to visit Versilia in February/March, beside marble, they cannot miss the opportunity to have fun in Viareggio, the Italian Carnival capital.<sup>133</sup> For a whole month the city transforms into the factory of fun, including parades of *papier-mâché* giant, night

<sup>126</sup> [http://www.apuanegeopark.it/apuanegeopark\\_museo\\_pietra\\_piegata.html](http://www.apuanegeopark.it/apuanegeopark_museo_pietra_piegata.html)

<sup>127</sup> <http://www.terremedicee.it/museo.php>

<sup>128</sup> <http://www.ugoguidi.it>

<sup>129</sup> <http://www.museodeibozzetti.it/>

<sup>130</sup> <http://www.musapietrasanta.it/content.php>

<sup>131</sup> CCIAA Lucca Italy.

<sup>132</sup> <http://gorfigliano.blogspot.it>

<sup>133</sup> <http://viareggio.ilcarnevale.com/en/>



parties, fireworks and masked balls. In summer, at Torre del Lago Puccini, they will have the possibility to spend their nights dreaming with Puccini's masterpieces. In fact, during the months of July and August, the annual Puccini Festival<sup>134</sup> presents the most famous operas of the Italian composer (born in Lucca) in the open-air theatre, with a wonderful view on the Massaciuccoli Lake. Music is also the main actor of Lucca summer nights thanks to the Lucca Summer Festival<sup>135</sup>, one of the main pop musical events in Tuscany. On the stage, some of the most influential international artists of the musical panorama take their turns. Finally, during the last weekend of October, each year, Lucca is literally invaded by comics and games lovers. In fact, the city hosts the International Festival of Comics, Animation, Illustration and Games. Lucca Comics & Games is the largest comics festival in Europe and the second biggest in the world after the Comiket (Japan).<sup>136</sup>

134 <http://www.puccinifestival.it/en/>

135 [www.summer-festival.com](http://www.summer-festival.com)

136 <http://www.luccacomicsandgames.com/en/lcg/home/>



## 4. Macael, Spain

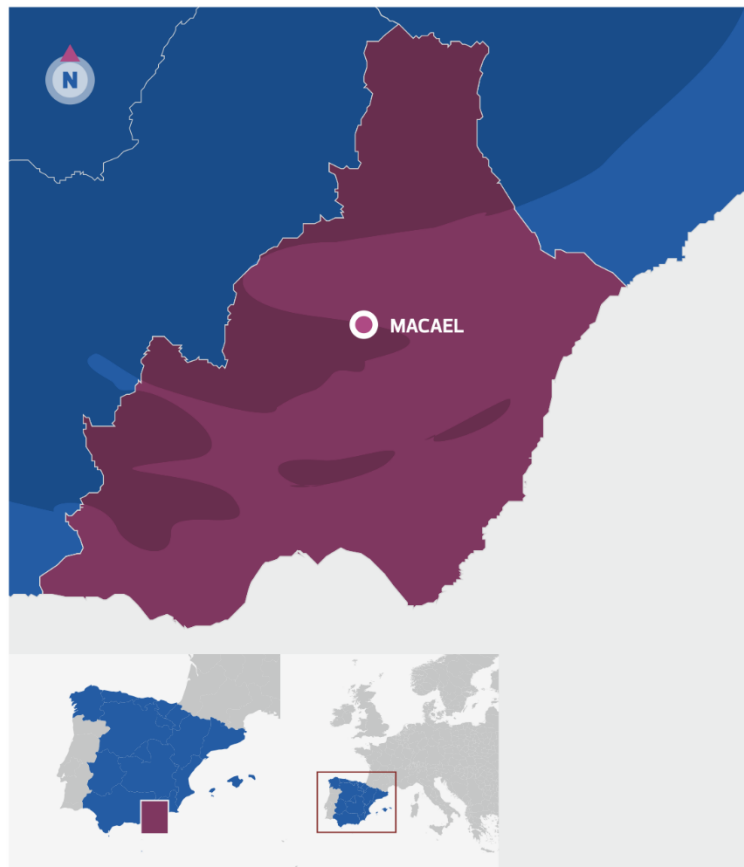


Figure 52: Map of Macael, Spain

### a. Geography

The extraction zone of marble of Macael is situated on the Northern slope of the Sierra de los Filabres. It belongs to the Cordillera Bética, a vast mountain range that stretches over 600 Km from the Strait of Gibraltar to the Balearics islands which is located in the internal zone also called Penibético System.

The Sierra de los Filabres is the main mountain range in the province of Almería, with a length of 63 Km, width of 28 km and a total area of 151,000 hectares.

The quarries are located to approximately 3 Km to the South of Macael. Its 124 quarries are located very near each other, in different areas of extraction: Australia, Barranco Arispe–Cerro Arispe, Polonia, Cerro Pelao, Rambla Orica, Horcajos– Plantones, Carretera Alta–Hoyos, Canteras de Río, Cañaila– Azules, Macael Viejo, Jotatell, Puntilla–Barranco Puntilla, Umbría del Marchal, Culebrón, Gran Parada, La Reina, Polvorín, Pozo–Umbría del Pozo or Umbría Pila.

The marble vein is directed towards northwest, approximately 345 degrees, occupying the areas of municipalities of Lubrín, Albánchez, Cóbdar, Lijar, Macael and Chercos, though the excellence area of marble is in the Municipal term of Macael, where most quarries are concentrated in an area of 4 x 2.5 Km.

Macael's district council area has an extension of approximately 45.25 km<sup>2</sup>, with a population of 5,936 inhabitants according to census of 2012. It is located in the Sierra of the Filabres which forms, along with *Sierra de Las Estancias*, the Almanzora Valley. It is placed in the Sierra of the Filabres, which together with the Sierra de las Estancias form the Valley of the Almanzora. This Valley begins at Villaricos's Coasts and Palomares, and ascends up to Hijate's Plains of the altiplane of Baza, splitting in two, the Province of Almería.

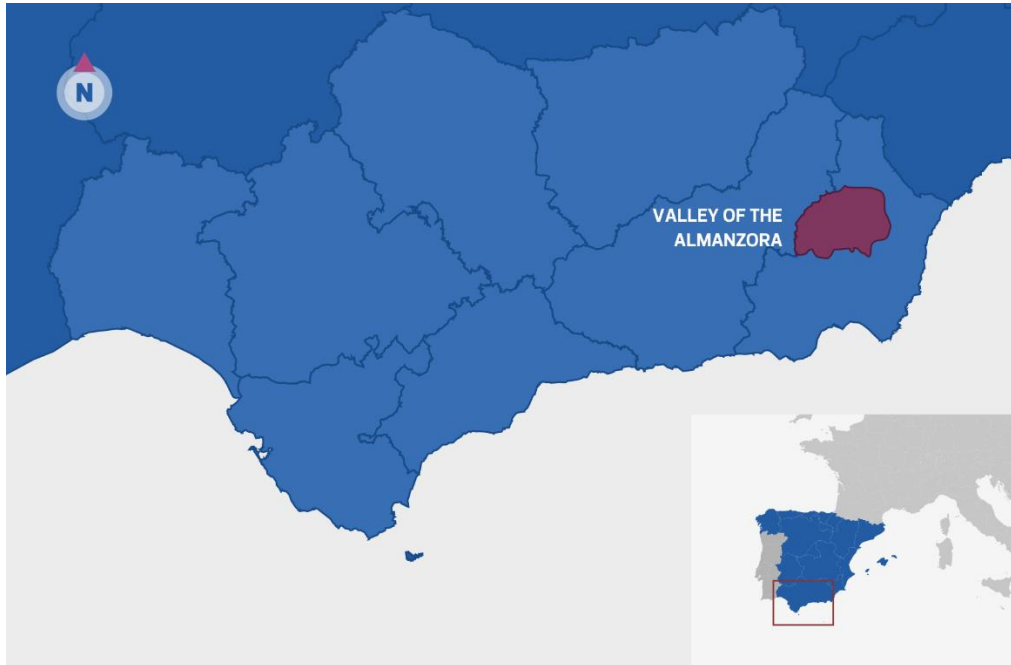


Figure 53: Location of the Region of the Valley of the Almanzora

It borders in the Northern part on Olula del Río municipalities and Fines, in the Eastern part on Cantoria and Lijar, in the Western part with Purchena and Laroya, in the Southern part with Chercos and Tahal. Its higher level is the Cerro Pintado, to 1.267 m. Its urban area is in a north latitude of 37 ° 20 '0 and length of 2 ° 18 '8, being the altitude of 554 m.

## b. Geology

Macael marbles belong entirely to the Nevado–Filabride complex, within the Penibético system, consisting on very old rocks with over 550 million years. The valuable marble outcrops are sandwiched between mica schist and yellowish recrystallized limestone. The area is characterized by a large tectonic complexity with the presence of regional metamorphism alpine.



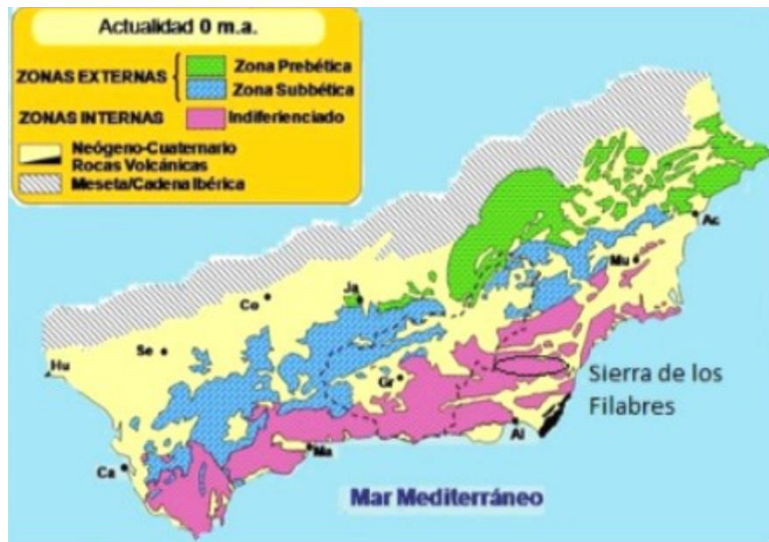


Figure 54: Location of Sierra de los Filabres<sup>137</sup>

The marble areas of Sierra de los Filabres are seven (Alcántar–Bacares, Purchena–Cagoya, Macael, Chercos–Córdoba, Lijar, Albalchez–Los Trancos–Sierra Lisbona and El Chive in Lubrín).

Whitin the Macael marble area were differentiated five main layers of marble, with a sufficiently defined position. There are several more layers, but with lesser distinctive features and continuity.

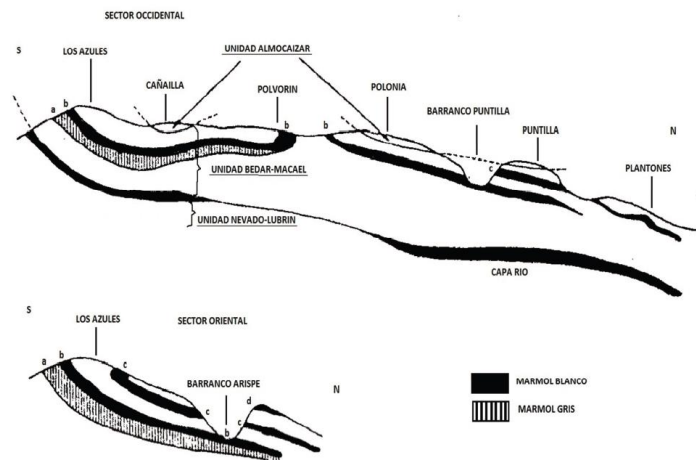


Figure 55: Caps of marble<sup>138</sup>

In Macael's quarries can be found diverse sorts of marbles that can be classified by colours, attending to the trade names registered for "Marca Macael", e.g., white marble Macael, marble Anasol, white marble Macael Río, white grey marble Macael, marble Macael veined river, etc.

137 Wikipedia.

138 Macael Turismo.

### White Marble Macael

The White Marble Macael, of hard and thick grain, is suitable for construction though it is also very used in sculptures, tombs and other funeral uses, as well as sinks, mortars and other pieces of crafts. It qualifies depending on the purity of the white color being the completely white marble, up to 99 % of calcita, an expensive and exclusive stone with an impeccable luminosity. Its white tonality contains slight blue nuances. Probably it is the most international white Spanish marble.



Figure 56: White Marble Macael

### White Marble Macael Río

It is a uniform white–grey marble of average grain. Proceeding from a place in Macael's municipality called Río, its main incidental mineral is the quartz, which gives it a greater hardness.

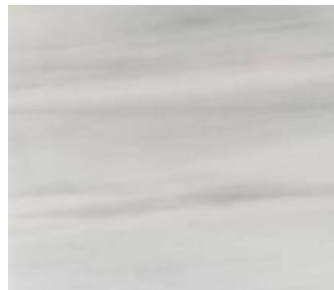


Figure 57: White Marble Macael Río

### White Marble Macael Veined River

White marble with bottom and gray seam, whose essential mineral is the calcita and as incidental mineral the quartz. It has the grain of average size and is of thick crystallization.



Figure 58: White Marble Macael Veined River

### Grey Marble Macael

A sort of marble similar to White Macael but with a much darker tonality. Its seams have smooth transitions when compared to Anasol Macael which has high contrast seams. It contains quartz, muscovite and albite as inherent minerals of calcita. These types of marble are also known as "the blue ones"



### Anasol Marble Macael

Anasol is a "Cipollino" marble. The adjective comes from the famous Greek marble "Cipollino" (onion), proceeding from the island of Eubea marble "Cipollino" and it is due to its structure in thin caps of mineral incorporating parallel green, yellow seams, roses and gray on a white bottom. The characteristic stratification of the marble Anasol in caps of onion is due to the presence of the mica, concretely Muscovite. It is one of the four most famous "cipollino" marbles in the world, together with the above-mentioned Greek, the Italian marble proceeding from the Alps Apuanos and the Serbian marble.



Figure 59: Grey Marble Macael

Figure 60: Anasol Marble Macael

### Yellow Marble Macael Rio

A dolomitic marble of a uniform light-yellow colour, with incidental presence of calcita and oxide of iron and manganese. It has yellow and green veins darker than the base color.



Figure 61: Yellow Marble Macael Rio

### Green Marble Macael

Of green color, its texture is irregular with some zones inserted of calcita. Commercialized as marble, in geological terms it is, in fact, a serpentinita ("Peridotita serpentinizada").

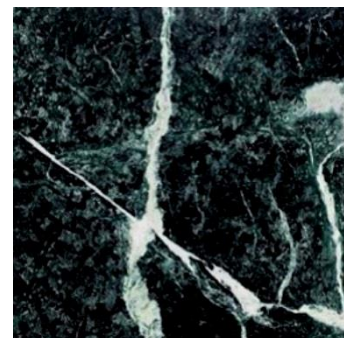


Figure 62: Green Marble Macael

### c. History

Macael is strongly linked to the word marble. The quarries on the outskirts of the urban area constitute the most important place of exploitation of ornamental rocks in Spain and have been exploited since ancient times.

The Neolithic and Chalcolithic populations of the Valle del Almanzora, used the stones of white marble dragging waterways to develop small schematic figures, called "ídols cruciforms" or "ídols almerienses", that were deposited in mass graves. Ancient

archaeological research considered it one of the characteristic elements of the culture of Almería. With the Romans began the exploitation of the quarries of Macael, which were imperial property on a larger scale. But it was in Arab when the greater period of extraction occurred, because marble was frequently used by the Arabs in civil and religious construction. Along with the marble exploration in Macael, marble blocks were exported to Morocco to be used in buildings.

With the Christian repopulation of Macael, reappeared the activity of marble sector. The "Book Apeo" of Macael (1573) notes that in that time people explored the marble mountains without restrictions. Unrestricted extraction of Macael marble was considered a traditional right for citizens. Through a complex and lengthy process that right was eventually extinguished and the marble exploration became part of the county.

The commissioning Almanzora railroad from 1895 marked the beginning of the taking off of the industry Macael marble and the possibility of distributing their products to the rest of Spain and Europe. Until then the marble was transported from the quarries to the port of Garrucha, with oxcarts, for distribution throughout Spain.



Figure 63: Oxcarts coming from the quarries of Macael season Fines-Olula

The first record of industrial activity related to marble processing in the county was in 1838 with the installation of the factory *The Catalans in Fines*". Until that time agriculture was the main source of income. The extraction of marble quarries, which until then had been something complementary, became the main economic activity instead of agriculture. This change resulted in the emergence of hydraulic sawing mills located in the "Arroyo del Marchal", "Arroyo Laroya" and "Arroyo Macael", which were favorable places to take advantage of water streams. Near Macael there are still some traces of these factories.

Most of these factories were existing flour mills along the streams; depending on the season, its usage alternated between activities of grinding and marble processing, using it as a flour mill in the summer and as sawing factory in the winter. The blocks of marble were delivered by oxcart from the quarries.

Marble workers alternated their work in factories and the land and were known as "piches". They produced sumptuous marble works to cemeteries, being guided by a skilled trainer. These were dedicated to developing sumptuous marble cemeteries, run by a teacher. The polishing work was in the hands of the female millers and children (the working age started at around 9 or 10 years).

Prior to the opening of these marble factories the production was made directly in the extraction area, i.e., in the quarry.



In the 20<sup>th</sup> century, the marble industry in Macael did not evolve much. The predominance of small business was absolute. The processing companies, barely equipped, were in a difficult situation by not being able to make a well finished product. Furthermore, because of the limited size of their facilities, they were not able to cover bigger orders nor providing a homogeneous product. Most owners had an indifferent attitude towards marketing and little knowledge of the quality of raw materials, which resulted in a finished product of lesser value.



Figure 64: Quarry at beginning of 20<sup>th</sup> century <sup>139</sup>

The first plan of intervention occurred in the 2nd half of the 1950s and some small improvements in marketing were achieved. In 1973 began a crisis in the sector, which led to the "purge" of old enterprises, and to the emergence of new entrepreneurs. In 1977 these new entrepreneurs founded the APEM (Provincial Association of the Marble) as a mediating instrument and a catalyst of everything concerning the marble activity and natural stones (price list, collective labour agreements, negotiations with administrations, etc.).

The last two decades of the 20<sup>th</sup> century were characterized by a profound transformation and modernization of the sector.

The vision takes shape, the marble quality and processing becomes the biggest concern of businessman, who expects that the marble from Macael will fully meet the needs of customers, in terms of price, quality and fast delivery. All these requisites had improved significantly the image of the Macael marble.

Then came a period of accelerated growth of the sector, a stage of greater production, marketing and promotion of Macael, linked as usual to the good situation of the construction sector (the housing boom of 1997–2007).

Production increased over 40%. Companies worked not only with Macael natural stones, but there was also a significant increase of the import of raw materials especially from Turkey, Italy and Portugal.

The excellent economic existing situation led to the creation of new business and to investments in art machinery, enabling a finished product of very high quality with a flawless finish to rival the best in the world.

After the best year for marble sector in Macael (2007), the crisis of 2008 brought the recession that sharply attacked the sector. Likewise, the collapse of the construction sector, on which the Macael industry is very dependent, and increasing competition from

other materials at competitive prices, made a reversal in the marble sector. At present, Macael is the major producer of marble in Spain and the second in the world.

#### d. Heritage and Culture

Since immemorial times the Macael's marble is considered a luxury and majestic material, used by ancient civilizations of the most important epochs in history until present. The Phoenicians were the first folk using Macael's marble though they did it in a sporadic way. Evidence of this is the anthropoid sarcophagi of the S.V B.C. found in Cadiz. Besides the Phoenicians, the Greeks also used the marble in their constructions; a clear example of it is the ruins of Rosas and Ampurias (Girona).



Figure 65:  
Anthropoid  
Sarcophagi S.V  
a.C., Cádiz<sup>140</sup>

In the Roman Epoch, the quarries were of imperial property. From them were extracted the whitest and major quality marble for works as the Roman Theatre of Merida, the mosaics in Italica (Seville), the early Christian sepulchre of Berja, the Dionisos of Chirivel, Vespasiano head of Écija or the Mercury of the Museum of Sevilla.



Figure 66:  
Roman theater  
in Mérida <sup>141</sup>

In the Arabic Epoch, Macael's marble was frequently used in civil and religious constructions. Sills, capitals, baths and columns of Medina Azahara; the Mosque of Cordoba; the Alcazaba of Almeria or the Alhambra of Granada, with emphasis on 124 columns with different capitals and the source that gives name to the Court of the Lions. In addition, blocks of marble were exported to Africa for the utilization in multiple constructions.



Figure 67: "Patio  
de los Leones",  
Palace of  
Alhambra,  
Granada <sup>142</sup>

In the Modern Age the marble extraction sector reappeared, marble being the favorite material for the construction of cathedrals and other architectural monuments. It is possible to find the testimony of the use of the marble in diverse works as the Royal Chapel of the Catholics Kings, the Palace of Carlos V, the Cathedral of Granada, the Monastery of the Escorial in Madrid, the Cathedral of Sevilla, the Cathedral of Almeria, the Castle of the

<sup>141</sup>Macael Turismo.

<sup>142</sup>Macael Turismo.

Marquess of the Vélez, nowadays exposed in the Metropolitan Museum of New York, the Royal palace of Madrid or the Monument to Coloraos of Almeria.



Figure 68: Inside of Castle Marquesado of Los Vélez, Metropolitan Museum, N.Y. <sup>143</sup>

The passion, the innovation, the creativity, the design and the experience of the professionals have led Macael to acquire today a significant presence, at national and international level. The beauty and the singularity of its natural stone and the craftsmen of Macael remain reflected in works recognized like: The Hotel Burj Al Arab in Dubai, the Presidential Summer Palace of Russia, the Hotel Crowne Plaza in Indonesia, the Hotel Mandarin Oriental in Miami, the Mosaico IZNK in Dubai, the Central Library of Kansas, the Ralli Museum, of Caesarea (Israel), the Mansion-Hotel Cap Estel in Nice, the shopping center Euroma of Rome, the Hotel Silver City in Dongguan (China), the shopping center So Ouest of Paris, the Offices Aker in Oslo, the Le Yacht in Casablanca, the museum of Barda in Azerbaijan, the Obelisk Fountain in Florida, the building Barney's in Los Angeles, the building Embrujo Banus or the Palace Al-Riyad of the royal Saudi house in Marbella, the reply of the Palace of the Alhambra in Riyadh, the Hotel Hilton Buenavista of Toledo, the Hotel Sorolla Center of Valencia, the Hotel Elba Carlota of Fuerteventura, the Hotel Nagari in Vigo, the



Hotel Urban in Madrid, the Hotel Portobello in Roquetas de Mar, the Hotel Abama of Tenerife, the Hotel Sheraton of Bilbao, the Hotel Villa Padierna in Marbella, the Complex Mare Nostrum in Tenerife, the Memorial Cultural Center of Andalucía in Granada, the Islamic center of Malaga, the extension of the front of the Headquarters of the Bank of Spain in Madrid, the rehabilitation of the *Básilica* of Cristo del Gran Poder in Sevilla or theatre Victoria Eugenia in San Sebastián, the restoration of the Church Santa Maria in Mahón in Menorca, the airports of Barcelona or Almería, the Palace of Fairs and Congresses of Málaga, the city hall of Cartagena, the file of Indias in Sevilla, the Courthouse of Plasencia, the source of Mar in Adra, the source Jado in Bilbao, the Plaza Mayor of Huerca Overa, the Monument to Virgen de las Angustias in Ayamonte or the Monument to the Constitution in Madrid, among others.



Figure 69: Hotel Burj Al Arab, Dubai <sup>144</sup>

All this activity has formed an entrenched culture around the marble that is embodied in many traditions and customs.

The stonemason and mason trades were passed down from father to son and they started to work from a very early age.

The rise to the quarry was always made by walking. The older quarrymen who worked in distant quarries went up by donkey. Later on, with the arrival of trucks for transport, workers took advantage of the cargo transportation, unloaded them and climbed to vehicles still running, thereby saving part of the way on foot.

Besides the quarries, small areas called "jabardillos" were exploited by friends and family groups with limited financial resources.

The working tools, because of their weight, were stored in the "farmhouse", small buildings of one room which also included work clothes and food.

<sup>144</sup> Macael Turismo.





Figure 70: Quarry in the beginning of century XX <sup>145</sup>

The food of the quarrymen was sent in baskets with carriers on donkeys and, basically, consisted of a piece of bread and bacon or a sausage for breakfast and lunch. With the replacement of donkeys for ox carts the variety increased and enabled pot meals with bacon and all the accoutrements. In all meals meat was always included, like goatling or pork.

For working the quarrymen used to wear their old and worn clothes. The shoes were those used at the time, made of straw ("esparteñas") or rubber sandals that were much more durable. In the fifties this footwear was replaced by leather shoes and boots. The carriers were the people who carried the marble quarries to factories or other places. They used wooden carts pulled by oxen, in which the masses of marble were loaded and tied with ropes for stability. The wagons were pulled by four oxen, two in front and two in the back, counterbalancing weight to lower the marble slopes.



Figure 71: Stone carriers <sup>146</sup>

<sup>145</sup> Mael Turismo.

<sup>146</sup> Mael Turismo.

The muleteers were young boys and even children responsible for the quarries, carrying jugs with water and food baskets, conveniently prepared by women, to give to the quarrymen. Firstly, transport was made on mules and donkeys and later on by motor vehicles, using three different compartments: food baskets, railings for tools and grids to carry jugs with water.

The blacksmiths were the people who worked in the forges, making or repairing iron tools of the stoncutters, necessary for the extraction and processing of marble, as Almaina, mace, chisel, etc.



Figure 72: Fragüero<sup>147</sup>

The "esparteros" (the esparto grass workers) were engaged in the development of useful esparto grass. They were usually gypsies and used to work in their own homes located in Barrio San Juan. The most characteristic rigs were created for quarry works, as "agüeras", "barjas", baskets, and cords for tying marble.



## 5. Wallonia, Belgium

### a. Geography



Figure 73: Location of Wallonia (the dark green part)

The Wallonia Region in the South of Belgium is naturally rich in stone and offers 17 varieties of fine quality stone. The region is also rich in iron and coal, which have played an important role in its history and let Wallonia rise to one of the most industrialized areas in continental Europe in the 19<sup>th</sup> century.

Belgian Bluestone, also called "Petit Granite" or "Pierre Bleue", is the best known of Wallonia's stones.<sup>148</sup> For more than 125 years, Belgian Bluestone has been extracted from different quarries surrounding the Walloon city of Soignies. Its formation dates back to 345 million years ago. The mineral gave the city its international reputation as European Centre of Bluestone.

<sup>148</sup> Pierres et Marbres de Wallonie asbl. Retrieved from <http://www.stonesandmarbles.be/index.php?id=140&L=4>

Other known stones extracted in Wallonia are: Golzinne black marble, much sought-after on account of its purity and its unique character, Tournai Stone, used in prestigious buildings such as Tournai Cathedral, red, pink and grey marbles, mainly located in different places along a line between Trélon (France) and Hamoir (Belgium) passing through Philippeville, Rance, Givet and Durbuy.

## b. Geology

The overwhelming majority of rocks in Belgium belong to the category of sedimentary rocks. The rocks did not keep the horizontality of their strata. These layers were twice lifted up by powerful mechanical actions. Most of the sedimentary rocks are crowded with fossils, i.e. elements formed by the presence and activity of organisms that lived at the time of sedimentation. However, the flora and fauna underwent successive changes in the course of geological time. Therefore, the animal and plant remains have only a very remote relation to the animal and plant life, which we are familiar with.

The Devonian grounds where we find most of the Belgian marble sorts are deposits of detrital elements of preexisting continental rocks or marine deposits. Those marine deposits, from the Devonian time, were coral reefs built up by corals, animals living in colonies. The coral reefs appeared at the Frasnian stage, in isolated or continuous blocks. The isolated blocks have generally red marble at the base and top and grey marble in the middle. Several limestone domes form the outcrop of the red marble in the region of Rance. The red color is due to the bacteriological activity and can vary in intensity.

The Belgian Bluestone was formed in the sea about 320 million years ago, to the time when the regions were covered by oceans. It is a compact limestone whose fossils are cemented by microcrystalline calcite containing carbon grains giving the rock its blue-black appearance. Its technical properties (low porosity, low susceptibility to frost, high compressive strength) and aesthetic diversity make it a material of choice in all areas of construction. The dominant mineral component of Bluestone is Calcite (natural crystal white calcium carbonate to translucent, low hardness, density 2,700 kg / cm<sup>3</sup>). Accessory minerals present in Bluestone: pyrite, marcasite, fluorite, (silica). The ubiquitous crinoid, characteristic of Bluestone, is an echinoderm (symmetry of order 5) that appeared in the Cambrian and still exists today. It is the skeleton of the abundant marine life that has accumulated detritus (made of corrugated products), its stem, its tentacles, its attachment crampons and its chalice. Other encompassed and diverse fossils are witnesses to the massive coral accumulated over millions of years, turned into a dense and homogeneous layer of 30 meters total thickness of Bluestone: coral, solitary and in colonies, brachiopods, cephalopods, sponges, etc.

## The quarries of Hainaut

Since 1888, the quarries of Hainaut (Carrières du Hainaut<sup>®</sup>) extract and manufacture the authentic Bluestone of Hainaut (Pierre Bleue du Hainaut<sup>®</sup>): 125 years of know-how and expertise for a natural product, noble, deriving from the subsoil and appreciated on all continents. All activities of extraction and transformation of the Hainaut quarries are carried out at a single site in Soignies, Belgium – unique for exploiting a large volume of stone (200,000m<sup>3</sup>/year).





Figure 74: Stone quarry in Soignies, Hainaut (province), Belgium<sup>149</sup>

By continuously developing the expertise and know-how of their teams and by constantly perfecting their equipment, the company has become the biggest ornamental limestone quarry in Europe.

The quarries of the Belgian Bluestone are among the leader of extraction, cutting, and shaping of Bluestone in Europe. There are three extraction sites located in the region of Soignies, which produce more than 50,000 m<sup>3</sup> blocs of Belgian Bluestone per year.

79

The three sites are:

- \_ The "historic" quarry of Soignies which is exploiting uninterruptedly since the end of the 17<sup>th</sup> century;
- \_ The quarry of Clypot in Neufvilles opened in 1998 and is one of the most important in Europe in regard to its production;
- \_ The new quarry of Tellier which started exploitation in 2007.

With an annual turnover of 24 million euro, the Belgian Bluestone quarries employ almost 250 people. The stone gives aesthetics to numerous projects: the royal galleries in Brussels, the Place Saint-Lambert in Liege as well as the Palais de Justice in Antwerp and Arlon.

### c. History

The monumental industry began to grow in the middle of the 17<sup>th</sup> century and surpassed very quickly in some areas the local metallurgy that had been, nevertheless, very important. It reached its peak in the 18<sup>th</sup> century. This period was favorable to the master marble-workers whose clients were architects and rich middle-class citizens not only from Belgium but also from France.

<sup>149</sup> <https://en.wikipedia.org/wiki/Quarry>

The city of Rance was a marble-center of good name that quickly imported fine foreign marble from Italy, France and Greece. In the course of centuries, the stone of Rance has been successively used as flagstone and rough stone. The rough stone was used during the Roman period. This affirmation seems to find a first confirmation with the results of excavations. To judge from the pillars and their capitals in churches, the red marble of Rance may have been cut on the spot since the 12<sup>th</sup> or 13<sup>th</sup> century. The stone extracted was used as building stone. It reached a reputation when the polishing technique during the Renaissance made it smooth and bright. The marble of Rance was no longer a rough and dull limestone as before. It was quarried and transported even to remote places such as Denmark and later to Versailles and everywhere in Europe and all over the world. During the 19<sup>th</sup> century, new products appeared and the commercial activity continued to expand. Marble clocks and decoration in all styles invaded the market.



*Figure 75: Clock from red marble, Musée du Marbre Rance*

The beginning of the 20<sup>th</sup> century was difficult for the marble workers and the First World War caused much damage. The crisis of 1930 was a new difficulty in the local economy and finally the Second World War was the end of this "big" market. In Rance, the marble industry closed definitely between 1955 and 1960. Quarries closed and marble workshops disappeared one after the other.

Also in the city of Soignies, Bluestone was until the 18<sup>th</sup> century exploited as rough stone from upper benches, beneath the topsoil or as stones burned in furnaces for manufacturing chalk. For the "good stone" for cutting and widely used in construction, is deep and its operation is facilitated by mechanization. The term "Petite Granite" derives from the similarities between the stone and the crystalline and sparkling look of some granites – rocks with volcanic origin. This now registered designation of origin appears in the first quarter of the 19<sup>th</sup> century, but its expansion in the second half of the 19<sup>th</sup> century is probably related to commercialization on a larger scale of the polished product.

Since the 19<sup>th</sup> century, Soignies' Bluestone is used in many public and private buildings in Belgium, in bridges and shipping locks, flood protection, urban development, etc., due to its various possibilities of use (e.g. triumphal arch and metro station 'Comte de Flandres' in Brussels, Grand'Place in Béziers, France). Its excellent technical characteristics – hardness,

resistance to frost, crushing and chemical agents, remarkable cuttability – make it one of the best stones in Europe.

The diversity and beauty of surface treatments also led sculptors of the 20<sup>th</sup> century became interested in this material. A symposium is now organized every two years by the city of Soignies.

#### d. Heritage and Culture

In Soignies, Bluestone is being honored at some shows such as during events organized as part of "Mons 2015 – European Capital of Culture 2015": exhibitions, street art and theater creation in order to provide a unique perspective on this long history that binds a people to its land and to the material that gives it its identity.

The Belgian Bluestone is to be found everywhere in Soignies – in historical buildings or more modern architectural elements. Bluestone has emerged from the late Middle Ages as building stone par excellence: homogeneous, weather and wear resistant. Especially its frost resistance make it the ideal stone for all works, large and small, including a hydraulic dimension.

The historical center of Soignies is, at first glance, its majestic college. But a closer look offers streets and alleys that contain many heritage treasures that testify to the use of Bluestone. Here and there, extraordinary vintage facades that reflect the rich history of the city of Saint-Vincent become visible. With these traces often marked in stone, different stages in the history of civil architecture of Soignies are waiting to be discovered.

An example of these extraordinary facades not to miss is the "Modern Hôtel" which is a remarkable Horta style building "whose architectural audacity is a veritable manifesto of Art Nouveau". An industrialist who demanded that the Bluestone plays an important role commissioned the Modern Hôtel in 1902. The presence of this building is due to the heyday that gripped the granite industry around 1900 and by the presence of the station and the industrial district.



Figure 76: "Modern Hôtel" in Soignies



The most monumental stone and most surprising that one can see in the “Great Quarry” is a monolith with eight meters in height, 2,53 meters in width and 18 centimeters thick. It is placed vertically against the pinion of the office door with rich ornamentation. This stone, extracted, cut and decorated especially for this occasion, was used to represent the industrial plant of Pierre-Joseph Wincqz at the Universal Exposition held in Paris in 1855.



Figure 77:: Monolith in Soignies

The cultural center “Victor Jara” radiates largely on the city and is one of the key achievements in modern Bluestone awarded by several architectural awards. The project is dressed in rough stone crust and its form resembles a rock emerging from the ground, telling the original link of the city with its stone. In addition, its external configuration (ambulatory and outdoor bleachers) allows the public to make use of the building even when it is closed.



Figure 78: Cultural center  
"Victor Jara" in Soignies

Also in the city of Rance, the link between marble industry and heritage is clear. Rance is called a "village street" which means that houses are not built around the church but in line above it. This specificity is due to the marble industry. The first quarry opened near the church, in the lower village and the first factories started to work not far from the quarry but not near the quarry that needed space for extraction. Houses in the main street of the village are, almost all of them, old marble factories. This marble activity left traces in the village, in Belgium and abroad. Today few houses keep the souvenir of this industry of the past. Today, the only witness of this fabulous industry is the museum of marble in Rance and the guides who tell the public this fabulous story of the "Red of Rance"!

The mission of the Museum of Marble in Rance<sup>150</sup> is to diffuse, to present and to preserve the cultural heritage of the red marble. The museum offers guided tours in the village to discover "obsolete" manufacturing and its stories (what they manufactured – period – the use in Belgium and abroad etc.). Today, there are no active marble factories in this region. The museum has also the role of promoting the Belgian stone industry.



Figure 79: Outside Museum of  
Marble in Rance

<sup>150</sup> Website of Museum of Marble: [www.museedumarbre.com](http://www.museedumarbre.com)





Figure 80: Inside the Museum of Marble in Rance



## **IV. MARBLE: HERITAGE AND TOURISM**



## 1. Identity, Culture and Heritage

«Identity is formed at the unstable point where the 'unspeakable' stories of subjectivity meet the narratives of history, of a culture».<sup>151</sup>

Cultural heritage refers to the set of goods that are identified by a particular society as bearers of the community's own cultural values. They are tangible and intangible assets that have a high symbolic content, which makes them worthy of special protection not only related to its conservation but also with its use<sup>152</sup>.

In Pereiro's words «it is through the heritage that we communicate to the world our identity, our culture, our memory (...). Cultural goods, represented by the objects and artefacts, are the embodiment of our culture. (...) It is as if the objects possess a "soul" that externalizes cultural traits of a particular community. »<sup>153</sup>

Accordingly, Silva emphasizes that the meaning and the importance of heritage goes far beyond its materiality and that the value of heritage is symbolic. Represented by abstract values, collectively produced, heritage gives to the communities memory and a sense of belonging.<sup>154</sup>

«In view of the foregoing, when the local community begins the process of identification, enhancement, protection and revitalization of their assets, thus is created a tool that will allow the local development: Patrimonialization».<sup>155</sup>



Figure 81: A detail of the Portuguese "calçada", in Estremoz, Alentejo <sup>156</sup>

<sup>151</sup>Hall, 1993 cited by Paasi, 2003.

<sup>152</sup> González, 2009, p. 238.

<sup>153</sup> Pereiro, 2006.

<sup>154</sup> Silva, 2012, p. 172.

<sup>155</sup> Silva, 2012, p. 175.

<sup>156</sup> Eurídice Cristo.

## 2. Patrimonialization

The notion of heritage is very recent, along with cultural preservation policies. The right to memory is part of the social recognition and identity of a group and to make this possible it is necessary to impose heritage protection measures.<sup>157</sup>

Pereiro states that this sensitivity to transform cultural assets in heritage, protected by conservation and protection measures, and with potential for tourism, arises only in the second half of the 20<sup>th</sup> century.<sup>158</sup>

In the last two decades there was a large increase in patrimonialization and museification initiatives aimed to UNESCO recognition.<sup>159</sup> The current importance of this process has led to some authors speak in "Patrimonialization Hysteria"<sup>160</sup>, to express this global trend.<sup>161</sup>



Figure 82: UNESCO Flag<sup>162</sup>

According to Martine Segalen<sup>163</sup>, cultural heritage is, at present, a debate about social values, and patrimonialization is a process of assigning new uses, values and meanings to objects and forms, ways of life and social knowledge. Segalen argues that patrimonialization is also an assertion mechanism and the legitimacy of the identity of a group, which is not free from struggle, dialectics and negotiations. The patrimonialization can also be understood as a process of activating memories always connected to the forgetting process.<sup>164</sup>

There is a link between the process of patrimonialization and cultural tourism, to strengthen the diversity of cultural identities and the conservation and preservation of cultural goods.<sup>165</sup> Monuments and heritage acquire dual function – knowledge and pleasure, made available to all; but also cultural products, manufactured, packaged and distributed for consumption.<sup>166</sup>

Silva underlines that «The patrimonialization contributes to the local culture be not forgotten. With the revitalization of cultural property, collective memory is reaffirmed. Patrimonialized, the goods are for consumption and serve as source of local recognition.»<sup>167</sup>

<sup>157</sup> Silva, 2012, p. 158.

<sup>158</sup> Pereiro, 2006.

<sup>159</sup> Jacques, 2008 cited by Silva, 2012, p. 162.

<sup>160</sup> Peixoto, 1998.

<sup>161</sup> Pereiro, 2006.

<sup>162</sup> Wikipedia.

<sup>163</sup> Martine Segalen, 2003 cited by Pereiro, 2006.

<sup>164</sup> Pereiro, 2006.

<sup>165</sup> Idem.

<sup>166</sup> Choay, 2006, cited by Silva, 2012, p. 163.

<sup>167</sup> Silva, 2012, p. 177.



### 3. Cultural Tourism

Cultural tourism is recognized as one of the most important phenomena of contemporary and distinctive tourism<sup>168</sup> in which heritage has unquestionably a central importance.

Richards points out that heritage has contributed decisively to the development of tourism in Europe. It is estimated that cultural tourism, which predominantly relies on different forms of heritage, currently contributes around 40% of all international tourism.<sup>169</sup>

Therefore, it is not surprising that many destinations have placed heritage and cultural tourism in the center of its development programs. Recently, in addition to the tangible cultural heritage also the intangible assets (such as popular culture and traditional cuisine) have been recognized as extremely important for a successful tourism development.<sup>170</sup>

Pereiro points out three ways for cultural heritage to be considered a tourist resource: 1. Cultural heritage as an autonomous tourism product, per se. Ex.: Pyramids of Egypt. 2. The associated cultural heritage in a tourist package: Travel, entertainment attractions, the heritage elements visits. Ex.: Paris, Barcelona ... 3. Cultural heritage as the appreciation of tourist destinations. "Quality Tourism", "diversification of the tourism product."<sup>171</sup>

Linking to the subject of the current study, marble, as a valuable resource for sustainable tourism in the involved territories, can be considered a cultural heritage in the second and in the third ways, a resource that adds value to the studied territories.

The recovery of cultural heritage is required by civil society and increasingly also by the market.<sup>172</sup>

A key element of cultural tourism is the activation of memories and the consumption of places where important historical events took place as battles, revolutions, etc., but also places that recall the lives of artists and intellectuals (ex.: the Salzburg Mozart and the Michelangelo's works in Carrara marble blocks<sup>173</sup>).



Figure 83: Alchemist and the tale of the wooden cotton reel', a Peter Schipperheyn work, in Carrara<sup>174</sup>

<sup>168</sup> OMT, 2013.

<sup>169</sup> Richards, 2007 cited by Richards, 2014.

<sup>170</sup> Du Cros, 2013 cited by Richards, 2014.

<sup>171</sup> Pereiro, 2006.

<sup>172</sup> Idem.

<sup>173</sup> The second example is a writer's note.

<sup>174</sup> Blog Peter Schipperheyn's Blog, my journey's in Italy, available in <https://peterschipperheynsculptor.files.wordpress.com/2012/05/alchemist-e1398413889872.jpg>

These memory places attract tourists for its historical value, artistic or experience, constituting a social practice that Candau<sup>175</sup> has defined as "memory tourism", a tourism that has used culture and heritage to create an image-product that is marketed to see and visit. In this way, cultural heritage can help places to turn into tourist destinations<sup>176</sup>, especially if one has in mind that cultural heritage is the lifeblood of tourism.<sup>177</sup> In some cases, tourism has served to preserve cultural heritage and traditions – always invented and/or reinvented. Other times, tourism has served to invent new cultural practices (without historical tradition) that are quickly converted and defined as "traditions" for better marketing of tourism products.<sup>178</sup>

*"The rapid growth of tourism and the dizzying diversification of tourism products are added to increase the value of culture in the social imaginary. These factors have a direct consequence on the objects of cultural heritage that have become tourist resources considered by both the tourism sector, and by citizens themselves. It is certainly an opportunity to improve the social status of these resources, renewing a social use that, in most cases, was lost and also raise funds to improve their conservation and management."*

González, M.<sup>179</sup>

## 4. New trends in Tourism

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### a. The Quest for Authenticity

*«...people feel they themselves are much more authentic and more freely self-expressed than in everyday life, not because they find the toured objects are authentic but simply because they are engaging in non-ordinary activities, free from the constraints of the daily.»*

Wang<sup>180</sup>

Authenticity is a requirement for inscription in the UNESCO World Heritage List and this is expressed through «form and design; materials and substance; use and function; traditions and techniques; location and setting; spirit and feeling; and other external factors».<sup>181</sup>

One of the notions of authenticity is the compliance with the community's values, attitudes and traditions. In this sense to be considered authentic a product should express the true identity of the host community and should be meaningful to be properly appreciated by tourists.<sup>182</sup> Authenticity may also be attributed to the host community:

175 2002, cited by Pereiro, 2006.

176 Kirshenblatt-Gimblett, 2001, cited by Pereiro, 2006.

177 Boniface and Fowler, 1993, cited by Pereiro, 2006.

178 Pereiro, 2006.

179 2009, p. 251.

180 1999, P. 351-2, cited by McCabe, 2005, p. 90.

181 Larsen, 1995, cited by Terziyska, 2012.

182 Terziyska, 2012.

«hosts are authentic in their involvement in tourism activities as long as they are acting sincerely».<sup>183</sup>

### b. The Staged Authenticity

Regarding this quest for authenticity MacCannell developed the concept of 'staged authenticity' in tourism. Borrowing the terms from Goffman's dramaturgic sociology MacCannell coined the concepts of "frontstage" and "backstage" meaning, respectively the areas, prepared especially for tourists, and the "true" local areas, where the hosts live and to which tourist usually have no access.

*«Being "one of them, or at one with "them", means, in part, being permitted to share back regions with "them". This is a sharing which allows one to see behind the others's mere performances, to perceive and accept the others for what they really are. »*

MacCannell<sup>184</sup>

According to MacCannell there are six stages and a continuum between the two extremes can be created, in the following way:<sup>185</sup>

Stage 1: Is the Goffman's front region, "the meeting place of hosts and guests". Tourist often try to go beyond it;

Stage 2: Front region that has been manipulated to resemble a back region, changes are mostly 'cosmetic', only some of the elements of the back region are imbedded to create "authentic atmosphere";

Stage 3: Front region that has been changed in such a way that it totally looks like a back region;

Stage 4: Back region which is opened for tourists;

Stage 5: Back region, slighted altered and occasionally visited by tourists;

Stage 6: The ultimate backstage. Almost never reached by tourists.

MacCannell explains that «The empirical action in tourist settings is mainly confined to movement between areas that are decorated to look like back regions, and back regions into which tourists are allowed to peek.»<sup>186</sup>

Frontstages have been considered primordial by tourism and most tourists are content with what the front stages offers, mainly because they feel safer there. However, backstage is becoming more and more important in tourism. They provide mystery and sense of intimacy, which create the feeling of the "real". Being aware of this, tourism operators often produce false backstages areas to imitate authenticity.<sup>187</sup>

«It is in the backstage where authenticity actually resides».<sup>188</sup>

<sup>183</sup> Tailor, 2001, cited by Terziyska, 2012.

<sup>184</sup> MacCannell, 1973, p. 592.

<sup>185</sup> Idem, p. 590.

<sup>186</sup> Idem, p. 598.

<sup>187</sup> Terziyska, 2012.

<sup>188</sup> MacCannell, 1973 cited by Terziyska, 2012.

An empiric application of the MacCannell staged authenticity in tourist settings could be organizing tours to areas that are ordinarily closed to outsiders. Even if we cannot state that what is being shown to tourist is the institutional 'backstage' as Goffman defined the term, it is still a staged back region, a kind of living museum.

Transposing theory into practice and focusing in our marble territories, we can offer to visitors the real experience of exploring marble in our still existent quarries of marble, the backstage they desire to know.

*«...the touristic way of getting in with the natives is to enter into a quest for authentic experiences, perceptions and insights. The quest is marked off in stages in the passage from front to back. Movement from stage to stage corresponds to growing touristic understanding.»*

MacCannell<sup>189</sup>

In accordance to MacCannell approach it is possible to suggest that marble routes should include tourism scenarios at different stages, from shops, museums and other well-prepared front regions but also old marble quarries, being living museums that in fact are the back regions where the real life happened some years ago. In between, a series of scenarios can be considered: stores decorated with stone and marble machines to look like extraction sites (stage 2); old quarries transformed into theaters and auditoriums for musical performances (stage 3); old factories open for tourists (stage 4); quarries that have been adapted to receive tourists (stage 5); and even a mixture of various stages.



Figure 84: "The ultimate backstage" - Marble quarry in Estremoz, Alentejo<sup>190</sup>

<sup>189</sup> MacCannell, 1973, p. 602.

<sup>190</sup> Eurídice Cristo.

## 5. The Emergence of the Experience Economy

Authenticity plays a key role in tourism, especially with the emergence of the experience economy.<sup>191</sup>

Contemporaneous tourists seek not only greater authenticity but also 'real experiences'.

Pine II and Gilmore explain in their book "Welcome to the Experience Economy" that experiences are neither products nor services, but different things with a major economic value in today's modern economy. The authors explain that an experience is not an abstract construct, it is as concrete as a service, a product or a raw material.<sup>192</sup> Experience is a consistent economic offer that should involve the consumer's senses and has to be personal, unique, memorable and sustainable over time. The more senses involved the more effective and memorable the experience becomes.<sup>193</sup>

Unquestionably more and more consumers want to 'experience' and selling experience will be the big challenge for companies. Also in tourism this happens: the tourists are looking for experiences that involve the five senses and provide memories of enjoyable times of the place they visited.<sup>194</sup> Consequently the tourist companies offer "dream", "magic", "paradise", "memorable experiences".

According to Soares<sup>195</sup> Experiential Travel emerges as a reflection of new expectations and pursuits of the postmodern society. The thirst for rational knowledge now gives way to search for sensations, emotions and spirituality in unique experiences. Which is to say that the new tourist wants not only to look to beautiful scenery and recognize their general information, but that he now wants to experience the 'new' and the 'different', feel the subtlety, interact, thrill and experience unforgettable sensations.

In this sense it can be showed that marble is not a stone but a gem, it's touch is soft and silky, it's appearance is elegant and glamorous, it's existence has centuries of history always linked to arts and handcrafts, it's imaginary takes us back to the nobility and the divine. In addition, marble is a natural precious stone with all the intrinsic characteristics of an authentic natural product that puts miles away, any fakery, no matter how sophisticated this can be.

Moreover, marble routes can offer not only cultural heritage and identity but also authentic and unique experiences: going down to the old quarries to have the perception of the magnitude of marble blocks; feeling the touch of its perfect surface; understanding the hard life of workers in marble manufactures; experiencing how artists have carved their artworks; and even pretending to be a prince or a princess lying in a long-chaise in a majestic marble hall, housed in a splendid hotel, just to name a few.

<sup>191</sup> Terziyska, 2012.

<sup>192</sup> Pine II and Gilmore, 1998, p. 98.

<sup>193</sup> Idem.

<sup>194</sup> Santos, 2012.

<sup>195</sup> Soares, 2009, p. 32.





Figure 85: Portuguese "Calçada", in Vila Viçosa, Alentejo<sup>196</sup>

«To offer authentic experiences is usually a matter of finding the right framework and of creating involving narratives (storytelling)»<sup>197</sup> and marble has that power as well as the territories involved have, as long as we can leverage the resources, uses and customs, the shared identity elements and the distinctive ones, to achieve sustainable development and quality tourism.

According to Palmer, the heritage attractions are businesses operating in a very competitive tourism market, which justifies the recourse to the common sense of marketing – If a good story sells, why not do it?<sup>198</sup>

<sup>196</sup> Eurídice Cristo.

<sup>197</sup> Palmer, 1999, p. 319.

<sup>198</sup> Idem.

## V. FINAL CONSIDERATIONS

Due to its physical and aesthetic properties, marble has been used from Prehistory until nowadays and symbolized luxury and wealth throughout history. This study reveals how marble was dignified with an aesthetic dimension, which determined its continuous use throughout time. Greeks and Romans were definitely the main inventors of various extraction techniques and also the masters in the art of marble working. Their inventions, the organization of an operational chain from the extraction, trade, production, application of marble pieces and skills in working the stone, perpetuates until the present. The Classical Antiquity initiated a marble phenomenon that perpetuated over the times. Sculpting and building marble is a practice that, in general terms, did not have an interruption, even if in some periods other materials were chosen to be applied in these activities.

Marble has been used by distinct civilizations and countries and it is definitely a stone without borders, a world stone. In Europe, it had and still has a predominant role and it is intrinsically linked to its history and culture. This study presents how marble has an important role and impact in the five European regions involved in the Extra-Expo project.

In Portugal, there is a "marble triangle" in the Alentejo region (Estremoz – Borba – Vila Viçosa) being the marble anticline of Estremoz – the only geologic structure with uninterrupted activity<sup>199</sup> since the Roman Epoch until the present. The extraction grew considerably over the last seventy years. Marble has a big impact in this region and recently a project called "Tons de Mármore" was created to promote and highlight this industrial and cultural heritage.

The surrounding area of Athens, region of Attika, is one of the oldest marble quarrying and processing centers in Greece, but also in the world. The Greek marble sorts are well-known all over the world since they have been associated with the masterpieces of sculpture and architecture of the Ancient Greece. Greece is the country with the biggest collection of white and light coloured marble sorts. The Acropolis of Athens is probably the most famous and most visited monument in the world from the Antiquity times.

<sup>199</sup> Lopes, 2007, p. 6.

Macael is the major producer of marble in Spain and the second in the world, with a variety of marble colours which enables the stone to be applied in several buildings of the world. The extraction area is situated on the northern slope of the Sierra de los Filabres. Macael is strongly linked to the word marble. The quarries upcoming of urban area have been exploited from ancient times, constituting the core of exploitation of ornamental rocks more importantly of the Spanish territory.

In Italy, Tuscan marble has been quarried since the Pre-Roman period in the Apuan Alps. Carrara marble is a brand and a trend thanks to its inner characteristics and quality. It prevails as an icon stone for sculpture, architecture and other purposes. Lucca marble is of the same quality of Carrara one and the territory prevails as an icon place for artists that have developed their ideas and laboratories in Pietrasanta and its surrounding.

The Wallonia Region in the South of Belgium is naturally rich in stone and offers 17 varieties of fine quality stone. Belgian Bluestone, also called "Petit Granite" or "Pierre Bleue", is the best known of Wallonia's stones. Since 1888, the quarries of Hainaut extract and manufacture the authentic Bluestone of Hainaut (Pierre Bleue du Hainaut®). The Belgian Bluestone is to be found everywhere in Soignies – in historical buildings or more modern architectural elements. Also in the city of Rance, the link between marble industry and heritage is clear.

The widespread of marble in many European countries is, undoubtedly, a motive to preserve this stone as cultural heritage. Cultural heritage refers to the set of goods that are identified by a particular society as bearers of the community's own cultural values<sup>200</sup>. The right to memory is part of the social recognition and identity of a group and to make this possible it is necessary to impose heritage protection measures<sup>201</sup>. Effectively, marble carries in its essence the morphology of the territories – natural heritage – and the history and practices of the communities – its cultural heritage. Symbolically, marble represents the materialization of communities' values, perpetuates memory and transmits the sense of belonging. So, the patrimonialization and cultural tourism can be the keys to preserve this cultural good. Since marble extraction, sale and production are ancestral activities, patrimonializing marble is a way of recognizing marble's value and to not forget the people who work the stone.

As mentioned before, heritage has contributed decisively to the development of tourism in Europe. From this point of view, marble territories are privileged places where visitors can step back in time and live experiences linked to the marble that will endure in their memory. Contemporary tourists are demanding and educated people, who appreciate the identity and the authenticity of products and places they visit. They can understand and feel that marble is not a stone but a gem, its texture is soft and silky, its appearance is elegant and glamorous, its existence has centuries of history always linked to arts and handicrafts, its imaginary takes us back to the nobility and to the divine. In addition, marble is a natural precious stone undoubtedly different from fake marble, however sophisticated it is. Contemporary tourists also look for 'real' and unforgettable experiences that give meaning and timelessness and make their travel last in their memories for many years.

An intelligent and sustainable management of the studied marble territories will offer to the visitors the possibility of discovering marble backstages and the genuineness of natural products as well as the authenticity of the people who live there. Therefore, marble has the capacity of being a valuable touristic product and marble routes can offer not only cultural heritage and identity but also authentic and unique experiences. The purity of marble and the beauty of the marble art bring us closer to the divine and undoubted value of these territories.

However it is necessary to take into account important aspects that arise when thinking about converting industrial heritage in sustainable tourism products.

<sup>200</sup> González, 2009, p. 238.

<sup>201</sup> Silva, 2012, p. 158.

There are already studies and also some examples of conversion mines in tourism products. These studies and these examples can also be applied to the case of marble quarries. According to Pretes<sup>202</sup> there is a «change of the perception of the resource, from a productive raw material to a consumptive viewing of the past» and meets the called "aesthetics of deindustrialization" or the "aesthetics of scenery decline", as Edwards and Llurdés 1996 termed it.<sup>203</sup> This means that the degraded environment and the scenarios surrounding derelict mining fields or abandoned quarries became distinctive landscapes containing the geological and the environmental remains of mine/quarry operation and related industrial activities. In this respect one cannot forget the devastating impact that the activity of the mines and quarries have on the environment and on the health of workers and residents. Some studies<sup>204</sup> revealed that the most polluted areas of the world are linked with mining industries and this can be extended to the quarries. Another important issue of mining activity is the workers safety. Miners are one of the most endangered workers in the world. Even if modern practices have improved safety in mines, accidents are quite usual and mining workers are among the most exposed to risk.

The transformation of these degraded industrial places and landscape into tourist attractions became perceived as a very serious option for promoting the redevelopment of historical industrial regions and an important strategy for regional restructuring and valorisation.

Nevertheless this process poses a huge challenge for the authorities, technicians, tourism managers, stakeholders and local population. Conesa<sup>205</sup> highlights three main obstacle. In first place these industrial remains are far from beautiful in the sense of a cathedral. Secondly, these areas are characterized by sever degradation or their environments and surroundings. Third, these places often are in peripheral locations in relation to classic tours.

Therefore, first of all, the conversion of industrial remains in tourism attractions has to be done in respect to the preservation of the physical quarries, plants and the environment, under the health and safety factors inherent to opening up these vast polluted sites to the public. Then, a cluster of several tourism activities should be created *in situ*, including educational centres, museum attractions, industrial heritage buildings as tourist accommodation, etc.. Also other small support projects have to arise: souvenirs shops, cafes, restaurants, small shops selling regional products, transport attractions. At last, strong complementarity must be created between the industrial heritage attraction (mines, quarries, plants) and other regional cultural tourism attractions based on the endogenous resources.

The regeneration of industrial areas for tourism purposes is, therefore, a valid way to mitigate the decline of abandoned industrial areas resulting in job losses, depopulation and other harmful social consequences. Well-founded tourism policies could help these areas to get out of economic and social crisis in such areas, while ensuring the preservation of local identities strongly linked to industrial production and its culture. These policies will be more effective if beyond local measures, transnational thematic tourism products and services will be developed.

"Promoting diversification of the supply of tourist services The European Union can contribute to the diversification of supply by encouraging intra-European flows through capitalising on the development of thematic tourism products on a European scale."<sup>206</sup>

According to the EU Commission<sup>207</sup> «Transnational synergies can ensure better promotion and a higher profile for tourism. This may include the full range of heritage:

202 2002, cited by Conesa, 2010

203 Idem.

204 For instance Bianchini, F. Mining industry and his impact on environment and health.

205 Idem.

206 COM(2010) 352 final.

207 Idem

cultural heritage (...) contemporary culture, protected natural sites, health and wellbeing (including spa tourism), educational, wine and food, historical, sport or religious tourism, agri-tourism, rural tourism, or tourism capitalising on the maritime and sub-aquatic cultural heritage, industrial heritage or the economic fabric of a region.»

Cultural routes, the program of the Council of Europe<sup>208</sup>, the UNESCO world heritage sites<sup>209</sup>, cultural itineraries, the Silk Road project of the UNTWO<sup>210</sup> and many other initiatives are examples of transnational examples that can support and leverage the local/regional actions.

Specifically in Extra-Expo project, the transnational component is extremely important. During this period the partners shared experiences and learned together key aspects relating to the marble quarries and the conversion of industrial heritage for tourism purposes. A wide survey of the partner's territories was carried out. Data was collected and uploaded in a digital support tool which enables a comprehensive analysis of the territories and resulted in an Atlas database. In addition, best practices on mining and marble quarries of the partners' regions were collected and compiled in a single document and marble local itineraries are being developed. Moreover, the main output of the project will be a Final Catalogue in an elegant format, in different languages and with professional photos of each territory, presenting EU marble routes. All these outputs and other curiosities will be available in the website [marbleroutes.eu](http://marbleroutes.eu). Please visit us!



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