

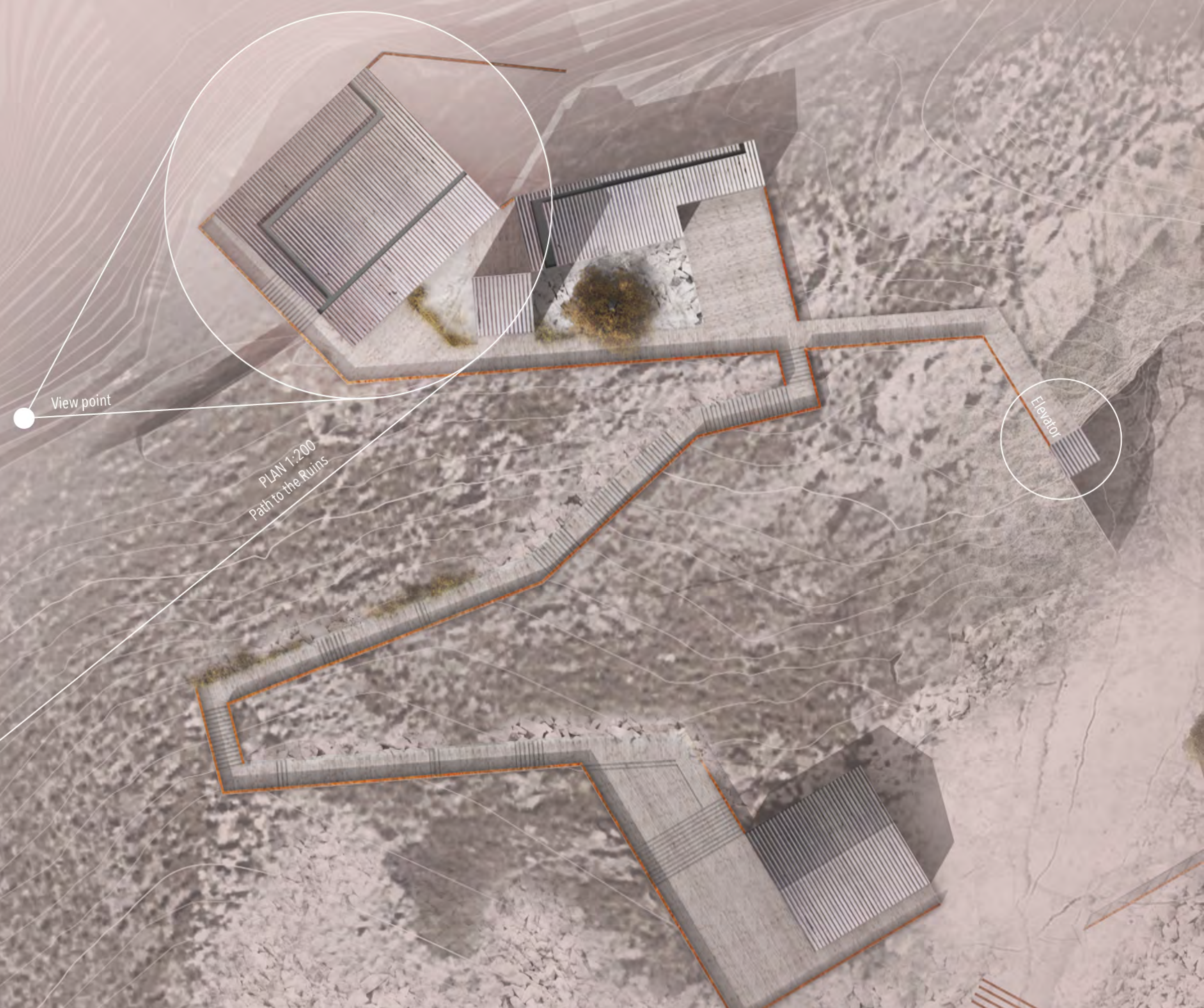
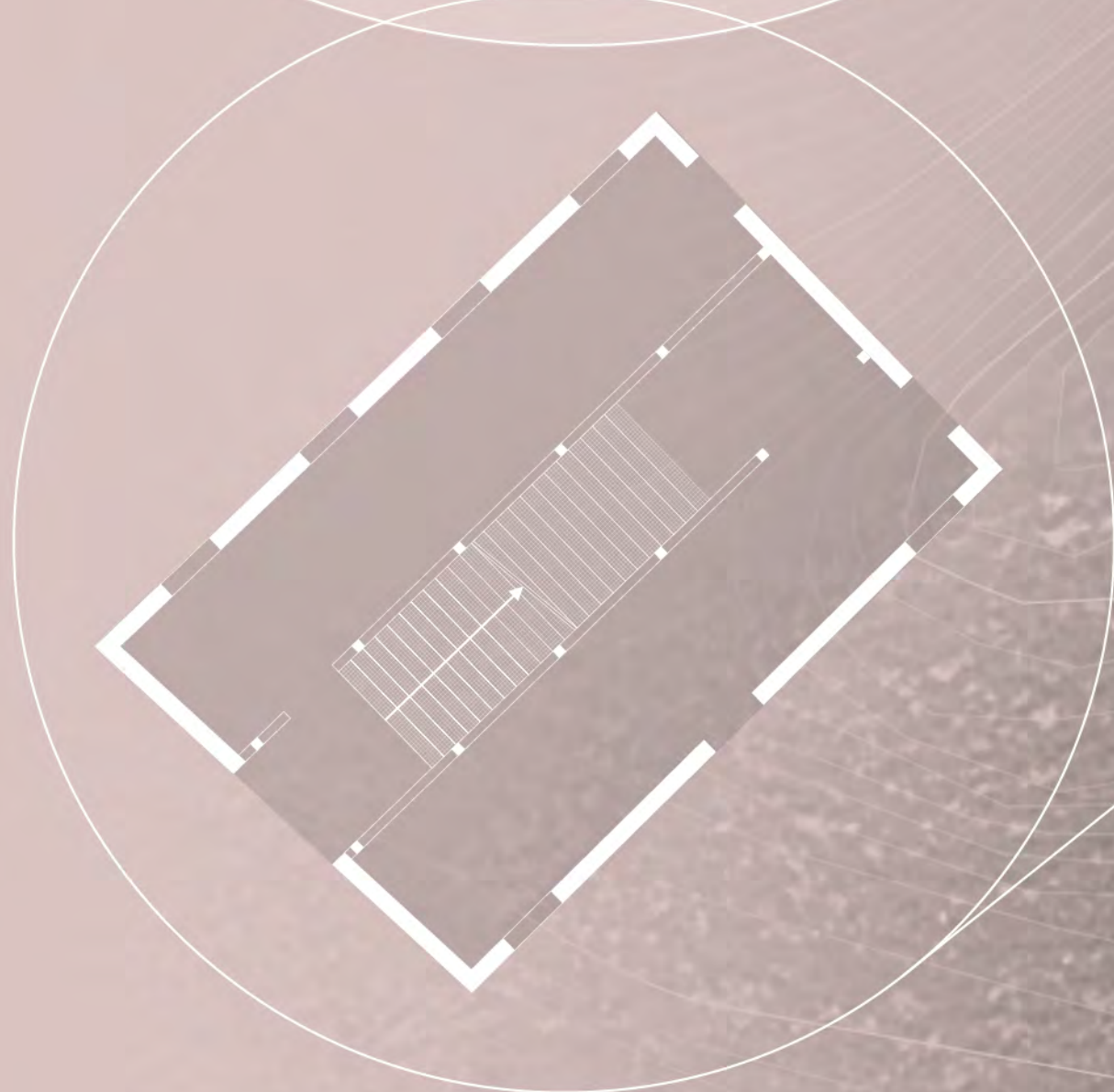
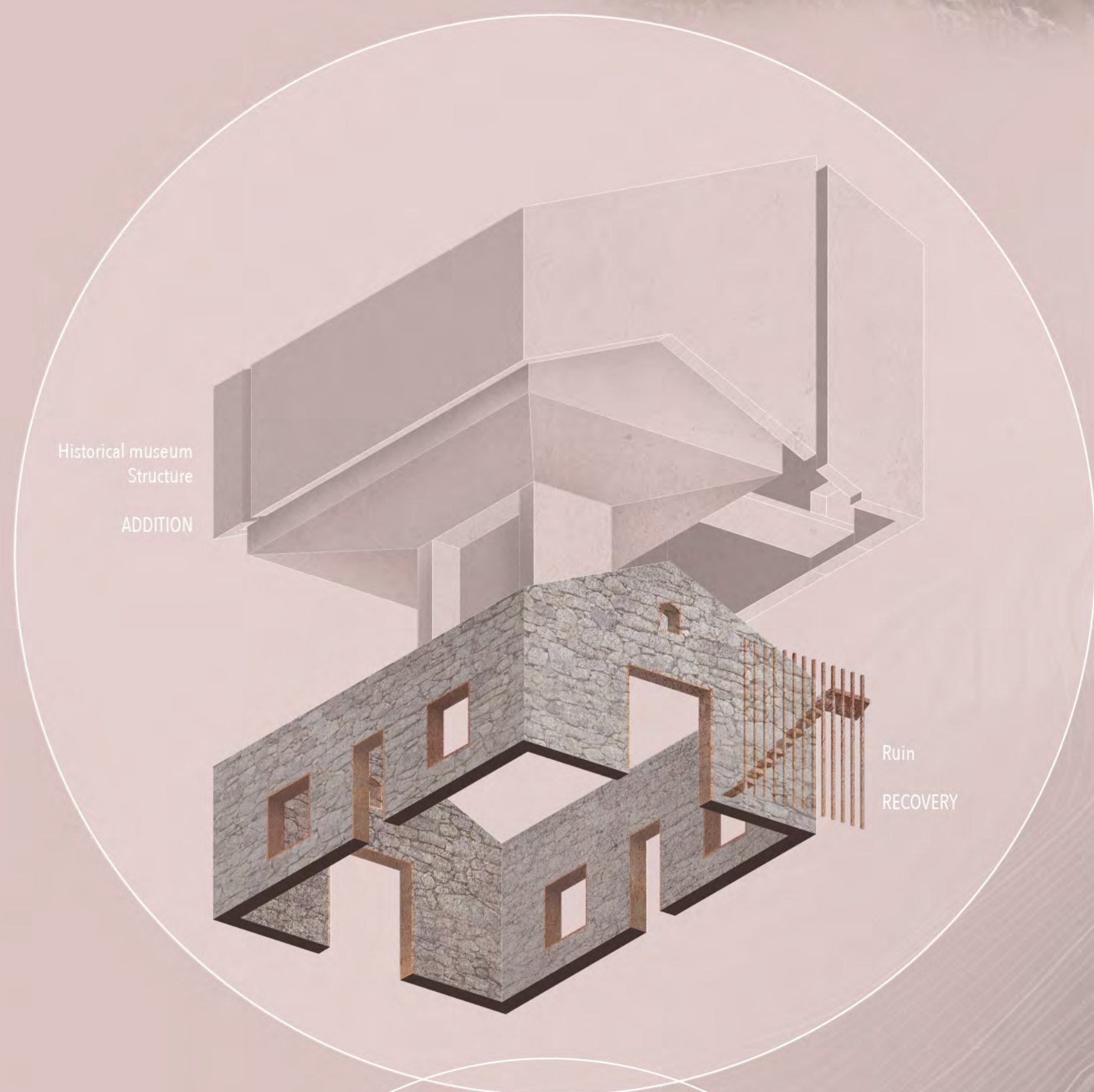


COMUNE DI MASSA
PROVINCIA DI MASSA-CARRARA

**PIANI DI BACINO DI INIZIATIVA
PUBBLICA DEI BACINI ESTRATTIVI
NEL COMUNE DI MASSA**

Allegato 9

**SIM_BIO_SYS -
CAVA VALSORA**

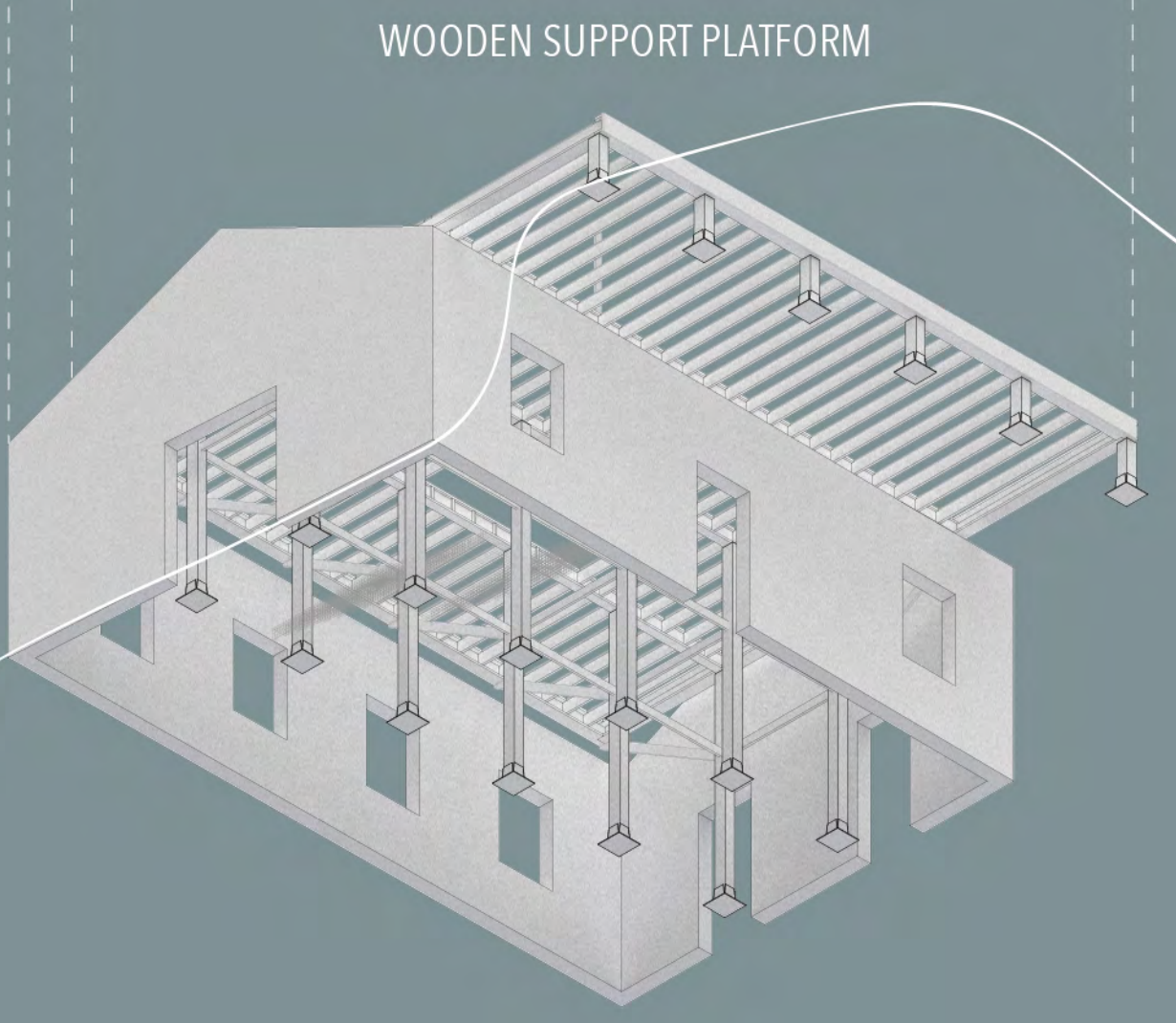
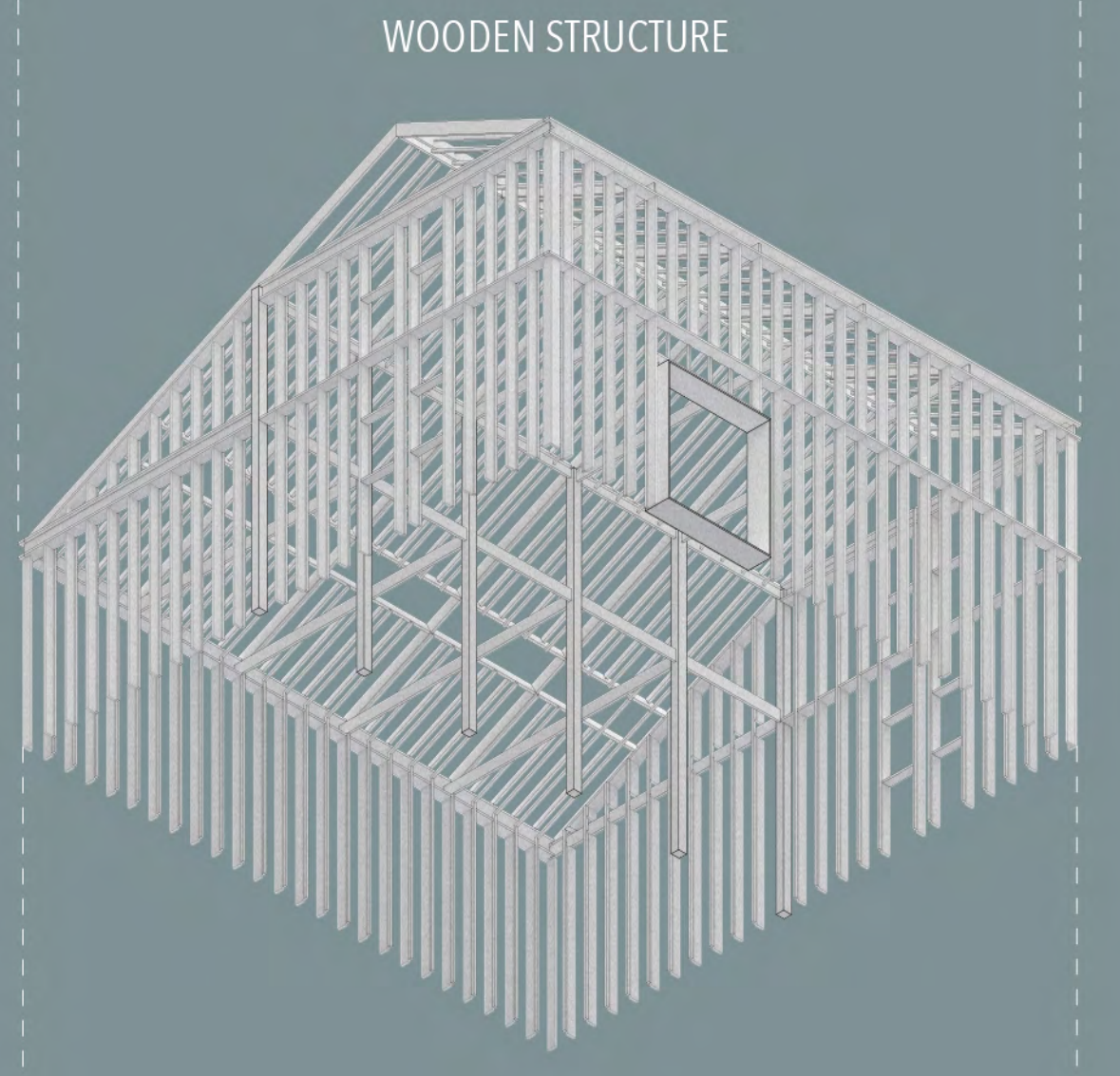
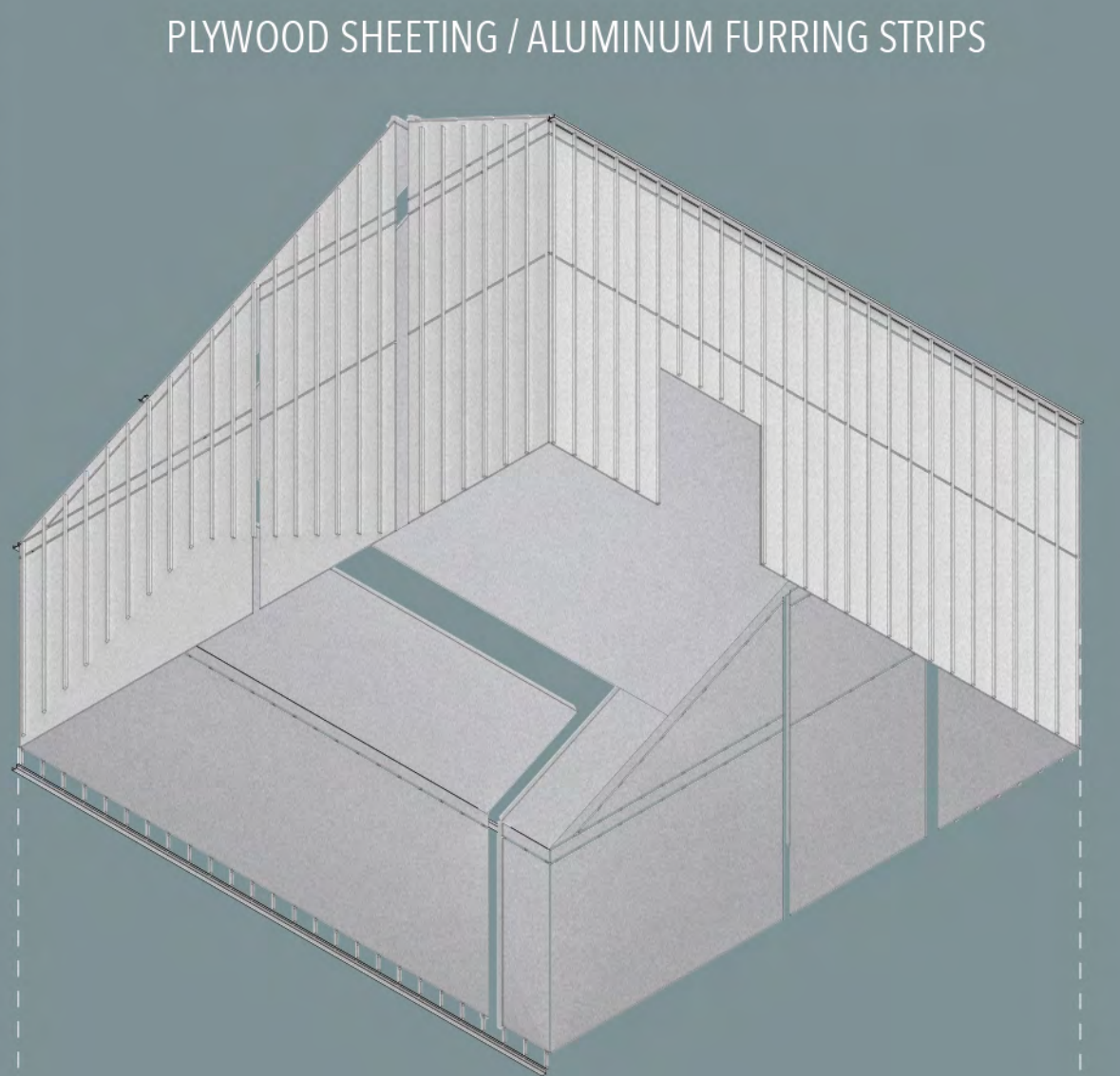
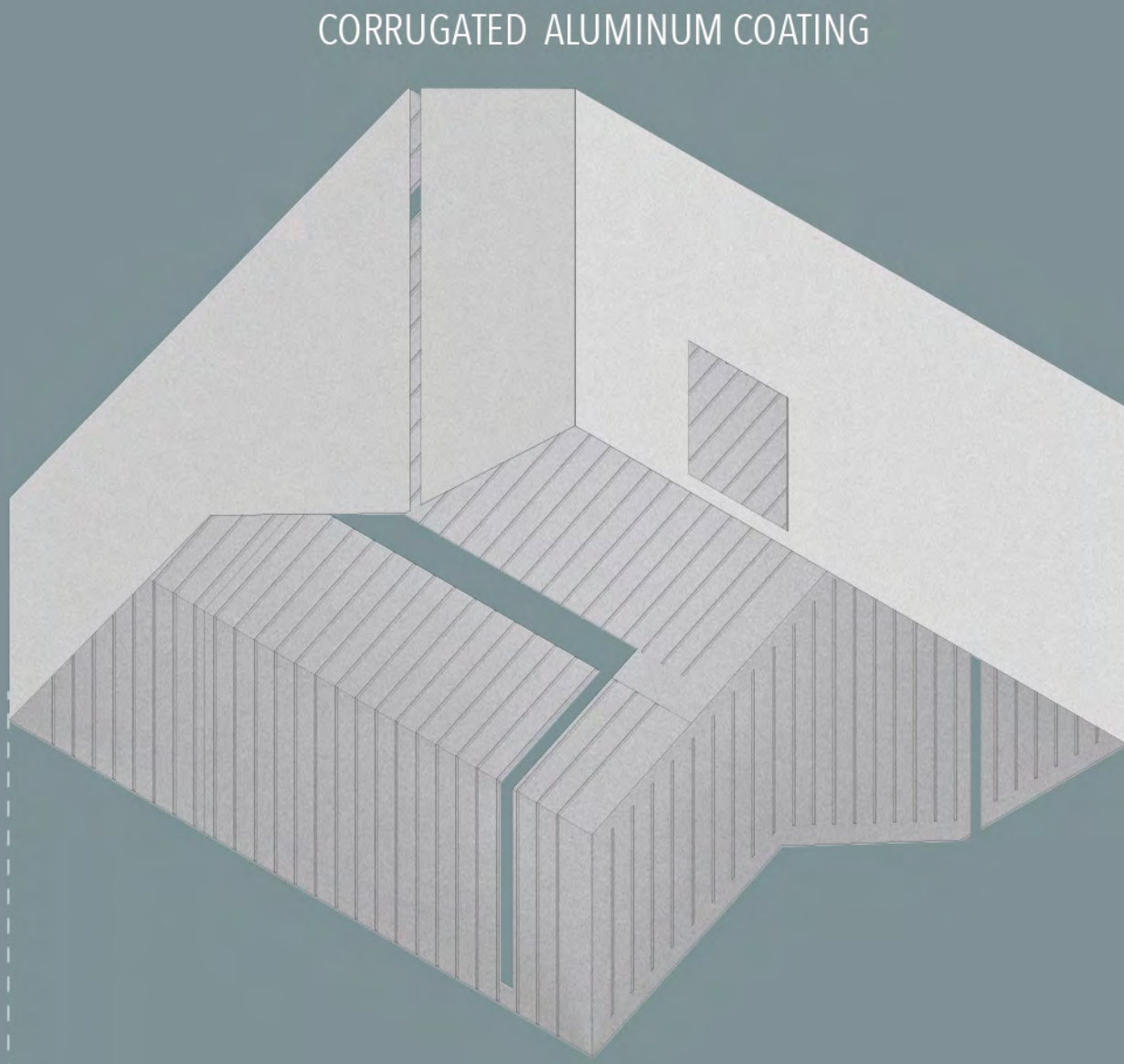


2.5 THE RUIN PLAN ADDITION STRATEGY 1:200 1:100

Scuola di Architettura Urbanistica Ingegneria delle costruzioni Thesis in Sustainable Architecture and Landscape Design a.a. 2017-2018
SIM_BIO_SYS: Simultaneity as a strategy for recovery and reactivation in the experimental project on Cava Valsaja

THESIS SUPERVISOR: Shode Hope Ives THESIS CORRELATOR: Matteo Scalfritti
CANDIDATES: Miriam Bianchi 874300 _ Shan Shan 873709





2.6 THE RUIN_SECTION 1:20

Scuola di Architettura Urbanistica Ingegneria delle Costruzioni - Thesis in Sustainable Architecture and Landscape Design - a.a. 2017-2018

SIM_BIO_SYS: Simulacrum as a strategy for recovery and reactivation in the experimental project on Casa Valera

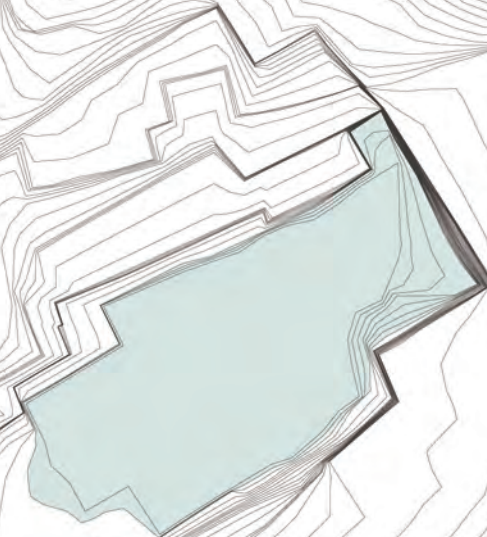
THESIS SUPERVISOR: Studio Hope Inc. THESIS CORRELATOR: Matteo Scalfetti

CANDIDATES: Miriam Bianchi 874300 - Shan Shan 873709



SIM _ BIO _ SYS

*Simultaneity as a strategy for
recovery and reactivation
in the experimental project on
Cava Valsora*



Candidates: Miriam Bianchi, Shan Shan

Supervisor: Hope Ives Strode
Co-Supervisor: Matteo Scaltritti

Politecnico di Milano

This work is the result of a cooperation between different stakeholders.

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Giacomo del Nero, Engineer

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Alberto Dazzi, Agronomist

Michele Ceccarelli, landscape architect

Laura and Giovani Angeloni, Owners of the
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In memory of “*babbo*” Giuliano Angeloni

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Form parasitism to symbiosis





INTRODUCTION

1.1 _ SYMBIOSIS: ETYMOLOGY



(ancient greek)

sumbiōsis:

(a) living together

syn - "together"

bios - "life"

(modern)

symbiosis:

(ecology) A close, prolonged association between two or more organisms of different species that normally benefits both members. An interspecies coöperation.

An organism is in symbiosis when the relationship between two or more organisms of two or more species benefits at least one member.

A persistent mutualism would only represent relationships that are positive for both organisms involved in the symbiosis, whereas the in latter option, parasitism, would include a relationship which is harmful to one of the organisms.

1.2 _ THE CAUSE

CRONACA

17/1/2015

Il tritone delle Apuane

Massa, 17 gennaio 2015 - Il tritone apuano che ha colonizzato un laghetto nella cava Valsora, sulle Alpi Apuane, deve essere tutelato. Lo dice anche il Parco

Quotidiano.net

CRONACA

29/12/2014

Un'oasi per salvare il tritone apuano: "Portebbe turismo ambientale"

La proposta di Andrea Ribolini: "Nella Cava Valsora si è formato un laghetto colonizzato da Ichthyosaura alpestris apuana. Questa specie va protetta" / IL

Quotidiano.net

CRONACA

17/1/2015

Come Davide contro Golia: il piccolo tritone mette in ginocchio la cava

La colonia di anfibì che si è insediata in un laghetto della Valsora va tutelata. Diktat del Parco delle Alpi Apuane / UN'OASI PER SALVARE IL TRITONE APUANO

Quotidiano.net

I NODI DELL'AMBIENTE

Cave e natura possono convivere? Ora ci prova il Politecnico di Milano

Un gruppo di ricercatori di scena a Cava Valsora sulle tracce dei tritoni

CAVE e ambiente possono convivere? Insomma, può esistere un'attività estrattiva sostenibile? L'equilibrio è talmente delicato che la risposta "naturale" sembra ovviamente negativa. Eppure la sfida è l'anima stessa della ricerca scientifica ed è con questo spirito che un team di ricercatori e studenti si è addentrato fino nel cuore delle Alpi Apuane alla ricerca di un nuovo concetto di sviluppo sostenibile, coordinato a una progettazione consapevole in un ecosistema fragile come è quello delle montagne carsiche che si affacciano sull'alto Tirreno. Oggetto dello studio l'ormai famosa Cava Valsora, quella dove all'interno di un piccolo "lago artificiale" pieno di acqua piovana si è formata una rara colonia di 100 tritoni alpestri apuani: proprio per tutelare quella colonia di anfibii il consiglio comunale di Massa aveva impegnato l'amministrazione a fondare l'oasi del "tritone apuano". Eppure quel "laghetto" si era formato proprio a causa (o grazie) alle attività di escavazione del bianco marmo delle Apuane. Insomma, in un contesto complesso come quello delineato dal rapporto tra intervento umano e natura, risulta di particolare importanza lo studio dell'identità di un luogo - passata, presente e futura - nonché la sua crescita socio-economica. Il concetto di sviluppo sostenibile ha un ruolo decisivo se applicato in sistemi o ecosistemi fragili nell'ambito della riqualificazione ambientale. Queste le tematiche trattate nel corso di studi in laurea magistrale, Sustainable Architecture and Landscape Design - Architettura Sostenibile e Proget-



ARNI Il gruppo di ricercatori e studenti del Politecnico di Milano all'opera a Cava Valsora

L'OBIETTIVO
E' lo sviluppo equilibrato dell'attività estrattiva e la tutela di specie protette

to del Paesaggio, al Politecnico di Milano al Polo Territoriale di Piacenza. Un percorso educativo volto a sensibilizzare i giovani rispetto alle opportunità di un luogo, alle sue debolezze e alle ridefinizioni qualitative-funzionali, che ne possono derivare. In tale ambito, lo scorso semestre durante il laboratorio di Landscape Design

Studio, tenuto dai docenti Storde Hope Ives, Flavia Pergalani e Matteo Scaltritti, gli studenti dell'ultimo anno sono stati chiamati a confrontarsi sul settore cave. Una sfida d'impronta interculturale in cui tra le tredici aree estrattive (italiane e non), individuate dagli studenti per lo studio, la comprensione e conseguente reinterpretazione progettuale, ha suscitato l'interesse di un gruppo il caso di Cava Valsora ad Arni. Il lavoro di ricerca, svolto dalle studentesse Miriam Bianchi, Yanfei Ling e Shan Shan, ha portato alla definizione di un progetto in cui le tracce, la memoria storica del si-



STUDIO PILOTA
Tracciare le linee su cui lavorare in futuro per tutelare le risorse naturali e garantire il lavoro

to, si mescolano all'attuale situazione ambientale. "Obiettivo del progetto è lo sviluppo equilibrato di due sistemi coesistenti ed opposti: l'attività estrattiva e la tutela di specie protette - sottolinea il vice sindaco Uilian Berti -, che può essere raggiunto mediante la progettazione sostenibile dell'area. Questa, destinata a generare rela-

zioni a lungo termine rispetto ai bisogni ambientali e sociali, è richiesta non solo dal punto di vista progettuale, ma anche in riferimento all'aspetto economico, nel rispetto dei valori culturali e ideologici del luogo". La definizione di questo iter progettuale è stata possibile grazie alla collaborazione diretta tra professionisti del settore, committenza, entità comunale e mondo universitario. Tra gli esperti coinvolti Massimiliano Lucchi, sviluppo sostenibile e chief project manager, Chiara Taponcico, geologa tecnico del progetto, Giacomo Del Nero, ingegnere tecnico del progetto, Mara Salvini, naturalista esperta biodiversità specie protette, Ceccarelli Michele, architetto paesaggista, Mancini Sergio, geologo senior, Gian Luca Mazzoni, ingegnere idraulico, Laura Angeloni, imprenditrice titolare Cava Valsora, Michele Ceccarelli, architetto paesaggista, Sergio Mancini, geologo senior, e Stefano Pucci, responsabile dell'ufficio cave del comune di Massa, che sono stati ospiti durante la presentazione finale del corso a dicembre al Polo universitario di Piacenza. L'esperimento ha permesso di trovare un punto di incontro tra il mondo del lavoro e della ricerca accademica con l'obiettivo di trovare anche il difficile punto di equilibrio fra industria e ambiente. "E' uno studio pilota - conclude il vice sindaco - che traccia delle linee su cui lavorare per il futuro nella convivenza che dobbiamo tutelare le nostre risorse naturali e garantire al tempo stesso le garanzie occupazionali nel rispetto della legge".



1.3 _ WHY PROJECT CAVA VALSORA



By doing the survey of the area, we believe in a solution to the contradiction by considering both interests of the quarry and the park:

The objective of the project is the balanced development of two coexisting systems: mining activity and protection of local species, which can be achieved by a sustainable design.

In order to generate long-term relationships between environmental and social needs, the

cultural and ideological values of the place are required to be re-examined and respected, not only from the project planning point of view, but also in reference to the economic aspect.





MARBLE BASINS IN MASSA-CARRARA

2.1 _ GEOGRAPHY BACKGROUND

1.1.1 FORMATION OF THE MOUNTAIN AND MARBLE

*It was, Michelangelo wrote,
"of compact grain, homogeneous, crystalline,
reminiscent of sugar"
when the Renaissance master climbed
Mount Altissimo in Tuscany
and found the marble of his dreams.[1]*



The series of isolated mountain blocks on the western side of the peninsula of Italy are the Apennine Mountains. Locating a few kilometres east of the Ligurian Sea, is the Apuan Alps, a limestone, marble, and dolomite massif with summits 1500-1950 m asl, characterized by the sharp crests, and deep narrow valleys. [2]

The mountain chain occupying an elliptical area of about 55 km in length and 25 km in width with a main axis oriented NW-SE, is adjacent to the

Tuscan Apennines but distinctly separated from it. [3]

Also, the Apuan Alps stand out for the harshness of the peaks compared to the nearby mountains, considering that they rise almost directly from the sea.[4] Landscape of this this area of Tuscany is rich and diverse, from coastal cities to valleys embellished by small towns, and goes up until the steep cliffs with large areas of 'ravaneti' left by the marble quarries.

The force of nature has been creating this impressive mountain chain since middle Triassic period, even earlier than the the rest of the Apennines.

The Apuan Alps, also on a rather different geological structure from the Apennines, has the metamorphic complex as one of the deepest structural levels in the internal portions. It is made up of two tectonic-metamorphic units: the 'Unità di Massa' and the 'Autoctono'. Dolomites

("Grezzoni"), dolomitic marbles and marbles (worldwide known as "Carrara marbles") are typical stones included in the metasediments of Liassic carbonate platform of the region, formed during the Upper Triassic. [5]

Both of the two units are conformed by an alpine metamorphism, with paragenesis of green schist facies, under high pressure and temperature conditions. Respectively, between 0,6-0,8 GPa and 420-500 ° C for 'Unità di Massa' and between

0,4-0,6 GPa and 350- 450 ° C for 'Autoctono'.[6]
The 'sugar like' marble has been attracting the artists and customers both in Italy and abroad for thousands of years, and it is fundamentally thanks to the vast evolution of nature.

[1] Alessandro Bianchi:

Michelangelo's unrealized marble dream comes true in Italian quarry

[2] Joyce A. Quinn, Susan L. Woodward:

Earth's Landscape: An Encyclopedia of the World's Geographic Features, p.45

[3] Fabio Garbari, Gianni Bedini:

Willdenowia Bd. 36, April 20, 2006, p.149-155

The flora of the Apuan Apls (Tuscay, Italy): survey of biosystematics investigations

[4] Erminio Ferrarini, Dino Marchetti:

Prodomo alla flora della regione apuana, First Part. 1994

[5] Claudio Vanneschi n, Riccardo Salvini, Giovanni Massa, Silvia Riccucci, Angelo Borsani:

*Computers & Geosciences 69 (2014) p.41 - 54
Geological 3D modeling for excavation activity in an underground marble quarry in the Apuan Alps (Italy)*

[6] Carmignani L., Conti P., Fantozzi P., Mancini S., Massa G., Molli G., Vaselli L.:

*Geotitali 21, 2007, p.19-30,
I marmi delle Alpi Apuane*

1.1.2 MARBLE STONE QUALITY AND QUANTITY

*"There is enough here to extract until Judgment Day,"
he wrote to a contemporary.[1]*



There are 14 informal lithostratigraphic units which represent the different merchandise varieties in the Apuan Alps marble basin. And these product categories have been divided, according to their general characteristics, into 5 groups: White Marbles, Gray and Veined Marbles, Brecciated Marbles, Cipollini Marbles and Historical Marbles.

In the Apuan Alps, the marble outcrops reach a total extension of over 71 km². The 5 groups

of marble mentioned above occupy about 66% of the area. The remaining 34% are basically constituted by inaccessible marble outcrops or by materials that do not present any interest from a product point of view. [2]

Due to the long and incessant formation process, the marble stone, as many of the nonrenewable resources, has a limited quantity. Over the years, the marble industry has given rise to 765 quarries. And today, the number of active quarries in the

main mining areas (Carrara, Massa, Lunigiana, Garfagnana and Versilia) is 143, of which 100 are concentrated in the Carrara basin and about seventy are inside the region of the Apuan Alps Park.

The total production in blocks and pieces is around 1,400,000 tons / year. [3] However, the waste material deriving from the mining activity represents about 2/3 of the excavated quantity that leads to the typical element of

the Apuan Alps landscape, as said before, the 'Ravaneti', which are the huge areas of debris as the consequence of the intense and prolonged extraction activity.

The mass mining and the immense degree of the waste are causing not only the landscape changing but also an unsustainable development of the whole area, regarding to both the aspects of economy and ecology.

The words of Michelangelo turned to be wrong with the rapid speed of excavation approved by the developing technique. 'There are still marble materials(here) to be cultivated for another 500 years, and after that...we are all gone then.'said one of the manager of the quarry museum 'Fantiscritti' which is set in the heart of marble quarries in Carrara.

During these years, a certain amount of quarries (around 50) are called to stop due to landscape

and environmental concerns. And some quarries decided to slow down their speed of cultivation in order to 'leave the treasure for future generations.'[4]

[1] *Alessandro Bianchi*

Michelangelo's unrealized marble dream comes true in Italian quarry

[2] *Carmignani L., Conti P., Fantozzi P., Mancini S., Massa G., Molli G., Vaselli L.:*

*Geoitali 21, 2007, p.19-30,
I marmi delle Alpi Apuane*

[3] https://spettacoliecultura.ilmessaggero.it/primopiano/cronaca/il_marmo_che_divora_le_apuane_via_4_milioni_di_tonnellate_di_montagna_ogni_anno-1670131.html

[4] *Nick Squires:*

Tuscany's Michelangelo quarries facing uncertain future

1.1.3 CLIMATE CONDITION AND KARST

"...in fra essa terra si vede le profonde segature dei fiumi"

"...within this land it is seen the deep sawing of rivers"

Leonardo da Vinci[1]



Due to its geographical position, the Apuan Alps region creates a "barrier effect" for the Atlantic damp air masses, makes it a subatlantic of the temperate montane owing to the sea effect.[2]

The winds generally come from the west and south-west in the hot seasons and from south and south-east in the cold seasons, but both are not particularly strong.[3] The humid ocean winds are lifted by steep mountains and the condensation of the vapor brings the area an

abundant precipitation. This region consequently becomes one of the rainiest area in Italy (more than 3000 mm/year) and is frequently hit by rainstorms[4]. A real dry period does not occur with a concentration of rainfall during autumn and spring. [5]

The erosional processes due to running water have been dominant in shaping the core of the Apuan Alps. It is conspicuous the troughs between the crests which are signs of the glacier

and water paths. However, the past drainage directions are indicated by alluvial deposits that are unrelated to the present-day drainage based on their elevations and locations. Nowadays, the intense rainfall is the main factor of the widespread debris flows.

Due to the steep slopes and the saturation of soil overlying impermeable rocks, landslides in this area have a widespread damage and has caused many casualties. These events are also very

frequent along slopes underlain by quarry waste from the marble extraction (ravaneti).[6]

Several well-developed karst systems, generally hypogean, characterize the region.[6] The underground drainage plays a major role in the karst development and the altitude range of recharge for the chamber is between 900m and 1650m.[7] In terms of growth and density, the chamber is also associated with marble bedrock belonging to the 'Autochthonous' or 'Massa

units'. [6] For example, the chamber of 'Antro del Corchia', a cave located on the slopes of Mount Corchia which belongs to the Apuan Alps, has a constant mean annual temperature of 7.5 °C and receives recharge of 2500–3000 mm/yr over an elevation range of 1200–1400m.[7] This cave became a tourist attraction after the 2001 when it was opened to the public with a walkway path equipped till the innermost area of it.

[1] Mauro Soldati, Mauro Marchetti

Landscapes and Landforms of Italy

[2] Botanischer Garten und Botanisches Museum, Berlin-Dahlem

Willdenowia Bd. 26, H. 1/2 (Nov. 29, 1996),
pp. 183–215

A Survey of the Genus Festuca L. (Poaceae) in Italy. I. The Species of the Summit Flora in the Tuscan-Emilian Apennines and Apuan Alps

[3] Erminio Ferrarini, Dino Marchetti

*Prodromo alla flora della regione apuana,
First Part. 1994*

[4] R. Gianecchini

Natural Hazards and Earth System Science,
2006, 6 (3), p.357-364

Relationship between rainfall and shallow
landslides in the southern Apuan Alps (Italy)

[5] Piccini L., Zanchetta G., Drysdale R.N., Hellstrom J., Isola I.,
Fallick A.E., Leone G., Doveri M., Mussi M., Mantelli F., Molli G.,
Lotti L., Roncioni A., Regattieri E., Meccheri M., Vaselli L.

International Journal of Speleology,

October 2008, 37 (3), p.153-172

The environmental features of the Monte Corchia
cave system (Apuan Alps, central Italy) and
their effects on speleothem growth

[6] Carlo Baroni, Pierluigi Pieruccini, Monica Bini, Mauro
Coltorti, Pier Luigi Fantozzi, Giulia Guidobaldi, Daniele Nannini,
Adriano Ribolini, Maria Cristina Salvatore

Geografia Fisica e Dinamica Quaternaria, Jan 2015

Geomorphological and Neotectonic Map of
the Apuan Alps (Tuscany, Italy)

[7] Russell N. Drysdale, Giovanni Zanchetta, John C. Hellstrom,
Anthony E. Fallick, Jian-xin Zhao, Ilaria Isola, Giuseppe Bruschi

Earth and Planetary Science Letters

227 (2004) p.215 – 229

Palaeoclimatic implications of the growth history
and stable isotope ($\gamma^{18}\text{O}$ and $\gamma^{13}\text{C}$) geochemistry
of a Middle to Late Pleistocene stalagmite from
central-western Italy

1.1.4 FLORA AND FAUNA

"Un poco folli, di forma, e inchiostriati sempre con tinte da fine del mondo, con quei rosa, quelle vampate secche del marmo che trapelano come per caso."

"A little crazy, in shape, and always inked with colors from the end of the world, with those pink, those flashes of marble that leak as if by chance."

Pier Paolo Pasolini



Centaurea arachnoidea

<http://www.escursioniapuane.com>

Although the landscape has extensively been changed by humans, the vegetation belt of Tuscan-Emilian Apennines still extends to the Apuan Alps. [1]

The biological spectrum of the Apuana flora shows a clear prevalence of the hemicryptophytes, typical of the temperate climate environments. The Apuan flora includes a high number of taxa and a total of 1672 floristic units are reported, in which some Arctic-alpine

and orophilous species are of special interest. The role of this territory as a refugial area during glaciations is shown due to these microthermic relics.[2]

Agricultural terraced, thermophilous woods and pine forests dominates the lower part of the mountain range together with the high presence of shrubs and post-fire degradation signs. In the inner mountain areas, however, the extractive basins are vast and conspicuous. The forests

also spread throughout among the higher part of the mountain, with chestnut groves, *Ostrya carpinifolia* and other mixed broad-leaved wood. The rocky mountain tops are covered by the summit prairies and shrubs that has re-colonized on the former cultivation areas. [3] Thanks to the protection offered by the Parco Alpi Apuane, which is established by the 1979, the Apuan wildlife is undergoing a significant increase in recent years. The return of the golden eagle is one of the many tangible signs.

Among the predatory birds, the peregrine falcon, the kestrel and the owl are also widespread. The majestic imperial crow and the alpine chough are among the opportunistic predators tother with the much rarer red-billed chough, which has become a symbol of the park. Mammals are represented by some species of rodents such as squirrel and hare and of predators such as fox and weasel. [4]

The presence of the entomological fauna as well as the amphibians and reptiles has also increased the importance of the area for its biodiversity. [5]

The Alpine Apennine newt and the spectacled salamander are both particularly noteworthy in addition to the spotted salamander. And the *Nebria apuana*, which is distributed in a restricted geographical area, is also one of the rarities represent in the area.[4]

However, the main factors of interference with biodiversity are the uncontrolled tourist activities, the development of road networks and the marble mining activities.[5]

Woodland degradation is a serious problem reflected in the predigestion of the mosaic map of the land use, as the sequence of the rapid abandonment of agro-forestry-pastoral environments, with loss of grassland and pasture habitats, terraced mountain agro-ecosystems

and reduction of fruit chestnut groves. A study of the rapid decline of bird nests also shows clear this trend of deterioration.[6]

The excavation and sawmill activities, especially those along the water courses with important faunal presences (in particular amphibians), have almost made the area devoid of the riparian vegetation near them due to the deriving of the discharges and the damage of the soil surface.[3]

Among the Lista Rossa Regionale Toscana, 7 threatened entities are found in the area of Apuan Alps, and 4 of them are threatened by the mining activities. In which especially regarding to the *Centaurea arachnoidea*, an endemic Apuan species found also in the area of project 'Valsora', and most of their habitats are located on the edge of active quarries. And it is probably the result of a successful reduction of the mining area.[7]

- [1] Botanischer Garten und Botanisches Museum, Berlin-Dahlem:
Willdenowia Bd. 26, H. 1/2 (Nov. 29, 1996),
pp. 183 - 215
A Survey of the Genus *Festuca* L. (Poaceae) in
Italy. I. The Species of the Summit Flora in
the Tuscan-Emilian Apennines and Apuan Alps
- [2] G. Bedini, M. Ansaldo, F. Garbari:
Boccone 21, 2007, p. 27 - 44
Mapping and demography of endangered plants in
the Apuan Alps, NW Tuscany, Italy
- [3] Piano paesaggistico, REGIONE TOSCANA, livello d'ambito:
Versilia e costa apuana
- [4] [Http://www.parcapuane.it/vetrina/vetrina_fauna.asp](http://www.parcapuane.it/vetrina/vetrina_fauna.asp)
- [5] Fabrizio Bulgarini, Corrado Teofili, Stefano Petrella,
Programma Conservazione Ecoregione
Mediterraneo Centrale
WWF Italia - ONG ONLUS,
La Conservazione della Biodiversità
nell'Ecoregione Mediterraneo Centrale
Contributi al Piano Nazionale per la Biodiversità
- [6] Philip W. Rundel, Gloria Montenegro, Fabian M. Jaksic:
Landscape Disturbance and Biodiversity in
Mediterranean-Type Ecosystems
Bird Diversity in a Changing Landscape
(Tuscany, Italy)
- [7] R. Vaira, M. Ansaldo, G. Bedini, F. Garbari:
Demografia, Distribuzione e Aspetti
Conservazionistici di Specie Minacciate della
Flora Apuana



2.2 _ LANDSCAPE AND SOCIAL TRANSFORMATION

2.1.1 HISTORY OF THE MARBLE EXCAVATION

*"Le montagne la natura le aveva fatte per sé, come una
sorta di scheletro
che doveva consolidare le viscere della terra e fermare
l'impeto dei fiumi.*

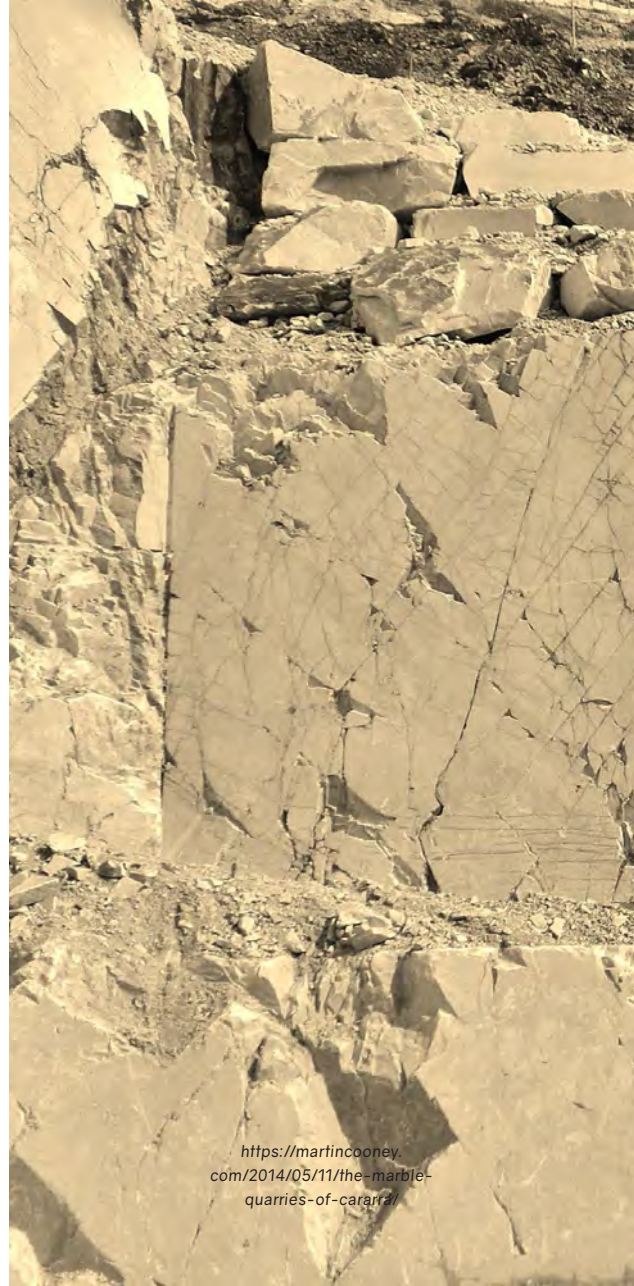
*Noi invece le tagliamo a pezzi e le trasciniamo via per
stare su pavimenti variopinti"*

*"The mountains, created by Nature for itself, are like a
kind of skeleton*

*that had to consolidate the bowels of the earth and
nurture the impetus of the rivers.*

*Instead, we cut them into pieces and drag them away to
stand on colored stone floors"*

Plinio il Vecchio (23- 79 d. C.)



The marbles of the Apuan Alps represent the most famous stone materials in the world. The mining activity in this region is characterized by a centuries-old history, which contains the production and processing of a large variety of marbles. The archaeological findings in the territory of Versilia, as well as the dating from Carbon 14 of a level of Paleosol inside a Ravaneto in Carbonera, places the exploitation of local marbles since the VI and II century BC.

The extraction techniques introduced by the Etruscans and the Ligurian Apuans were replaced by those adopted by the Romans from the first century BC. C. In the Imperial period, the quarrying plan of the Lunensi quarries was divided into phases: the blocks were subject to a preliminary quarry processing whose waste materials were collected and used for the construction of the Vie di Lizza, the ancient paths destined to transport the stone material to the downstream.

By exploiting the main fracture lines present in the marble, the cut of the materials took place manually. The oldest technique was that of "tagliata". This is provided by using chisels along cracks and pre-existing fractures, obtaining a V-shaped cutting line that was then forced to be separated with iron wedges.

Another technique which is involved in breaking the stone is using the wooden wedges, which were inserted along the same cutting lines, and

were wetted to allow them to be dilated so as to cause the blocks to detach.

With the fall of the Roman Empire and the consequent socio-economic crisis of the Medieval Era, a contraction spread also in the mining sector. From the twelfth century, there is a revival of stone production and processing, which reached its peak with the emergence of the Renaissance. Starting from the second half of the fifteenth century, in fact, the progressive

improvement of the socio-economic panorama of the various Municipalities, led to an extension of mining activity that reached the marble areas of Versilia, where new quarries were opened in areas of Trambiserra, Monte Altissimo, and Ponte Stazzemese. In this period, new materials that were not present in the marble basins of Carrara were discovered, such as polychrome breccias and flowering bardiglio.

The search for precious marbles undertaken

by Michelangelo Buonarroti in 1518-1520, for the construction of architectural and sculptural works commissioned by Pope Leone X Medici, allowed the development of the cultivation of marble in these lands, as well as the use of "colored" stones in the renovation and decoration of religious buildings and palaces of the era.

The extraction techniques remain almost unchanged until the eighteenth century when the introduction of the Megavarata is witnessed.

Through the use of explosive material, the digging operations are speeded up, the volumes of extracted material increase, while the production of waste debris too. These waste were poured along the slopes adjacent to the quarry areas and began to cover potentially exploitable areas and woodlands. These open dumps called "ravaneti" progressively initiated a landscape change of the entire mountain complex.

From this moment, the more and more territory

assumption and the connotations of resources to be exploited to the fullest has delineated an increasingly intense and unequal Man-Nature relationship. The process of industrialization of the marble comes to involve also the territory of the Garfagnana, which in the second half of the nineteenth century was in conjunction with the improvement of the infrastructural connections.

The request of both domestic and foreign market combined with technological development led

to a continuous and constant increase in the quantity and quality of the materials produced in this area. In 1872 the production of blocks of marble was equal to 150,000 tons per year. During the years before the Second World War, for political reasons, there was a halt in the extraction activity, which however came back to intensify by the expanding of the world economy and the political equilibrium.

With the introduction in the last thirty years of

modern cutting techniques, based on the use of powerful machines operating coils of cables and diamond chains, it is capable to work the marble not only on the plane and but also according to pre-established angles.

The work in the quarry was also the protagonist of the revolution. Analyzing the extraction of marble from an occupational point of view, it is possible to notice how it went from being a mass activity to a more restricted activity: if at

the beginning of the 20th century the number of employees was estimated at 9000 workers, today they are close to only 1000.

However, the production of marble has increased dramatically: at the beginning of the 80s it was exceeded 1,000,000 tons/year and in the mid-90s arrived 1,500,000 tons/year. The increase in productivity is even more marked, having gone from 70 tons / year for post-war workers to over 1000 tons / year for current workers.

Today the number of quarries active in the main mining areas (Carrara, Massa, Lunigiana, Garfagnana and Versilia) is 143, of which 100 are concentrated in the Carrara basin. Total production in terms of blocks and informal materials are around 1,200,000 tons/year.

[1] *Convenzione Regione Toscana- Università di Siena_
CARTA GIACIMENTOLOGICA DEI MARMI DELLE
ALPI APUANE A SCALA 1:10.000 E SUA
INFORMATIZZAZIONE*

[2] *Studio Rasenna, Sustainable landscape development
Studio impatto ambientale- Valsora, 2015*



Postcard

2.1.2 THE FOUNDATION OF THE CITY

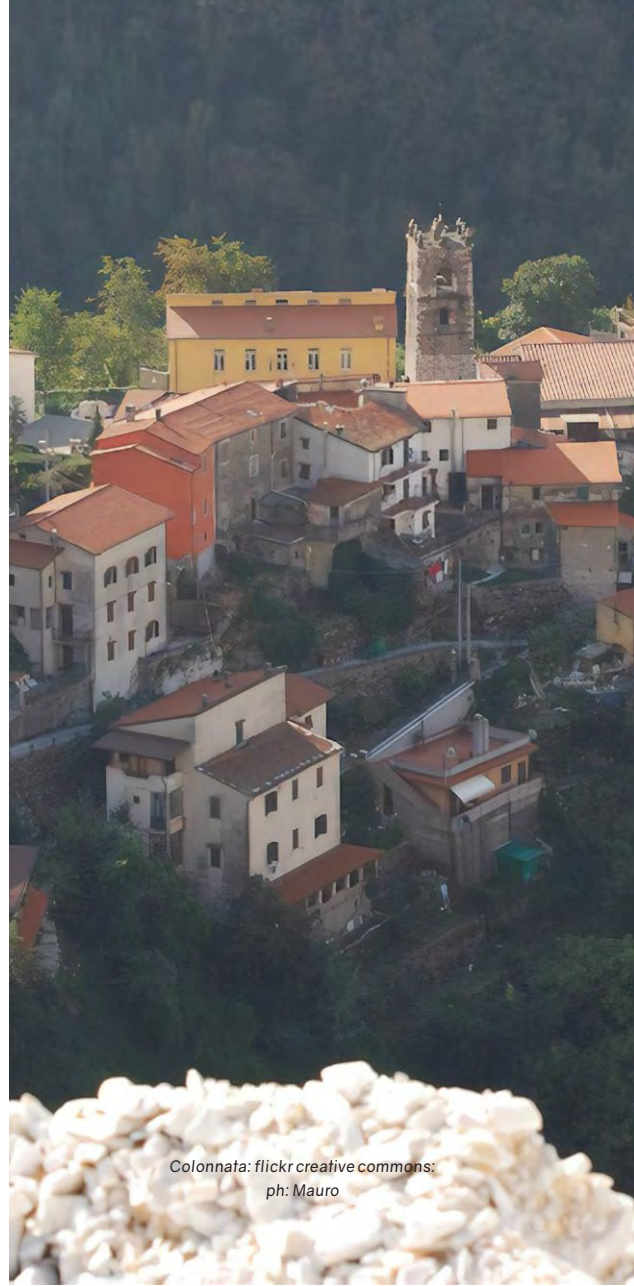
*"Le montagne la natura le aveva fatte per sé, come una
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Plinio il Vecchio (23- 79 d. C.)



Colonnata: flickr creative commons:
ph: Mauro

When tackling the history and the present of a territory, it requires an awareness of the abstract from the simple illustrative description, which can tell the historical structures of a complex and often discontinuous humanization activity. The landscapes that make up the province of Massa and Carrara faithfully present the traces of their history.

The area of Versilia and Costa Apuana consists of a mosaic of landscapes shaped over time as a

result of the dynamical formation of the northern Apennines. The first settlements attested in the area date back to the Mousterian period, with the presence of semi-nomadic populations that periodically exploited the caves and natural shelters offered by the geological conformation of the local mountains. In the Upper Palaeolithic, there is a shift towards the coastal zone, that is, in areas characterized by a milder climate than those of the backwaters. The economy of the people settled used to concern in the

exploitation of natural resources (in particular mining). When migrated to the areas of coast and plains, emerged an intensification of commercial activities that developed southward. The final outcome of this long aggregative process of cultural elements from the northern Po Valley area outlined the development of a local culture in Versilia from the 8th century B.C., which was completed with the arrival of Etruscan populations from the south.

In response to the attack on the Ligurians in the city of Pisa (Roman ally) in the early 2nd century B.C., the progress of Rome led to an era of economic growth and development. The factors on which the land was established in Rome were the road conditions, especially the Aurelia consular road which has raised and prospered the establishment of trading companies, in the Apuan, and also the mining of all the above mentioned marble quarries.

For many empire-time districts, what has experienced is a period of prosperity, thanks to commercial and handicraft activities and the vitality of agriculture, as the colonies of Lucca (180 BC) and Luni (177 BC) set up a breakthrough. This period was also the basis of Massa, till then was an original settlement site near the Fido river, functioned as stops for the passengers named by the Tavola Peutingeriana as "Tabernas Frigidas". The real development of the city took place in the early Middle Ages when

a written test of a village called "Massa prope Frigidum" appeared in 882.

For centuries, due to its strategic position, the city has been the protagonist of a vibrant political competition. For about a thousand years, under the rule of Obertanji, the first defensive tower was built on the hill that dominated the city. Since the 12th century, Massa has been ruled by several communes and lords: from Pisa to Florence and then to the Republic of Lucca.

In 1442, the Marquis of Fosdinovo, Alberico I Malaspina, entered the city. His son James I inherited him, and later his nephew Alberico II completely separated from the cover of Fosdinovo. The city then fell under the rule of Malaspina (Massa del Marchese) and passed through the marriage, to the Cybo (Massa Cybea), then Este and finally to Asburgo-Este.

For the modern Principality dating back to the mid-16th century, emerge important urban

projects, such as the new Massa village and the expansion of nearby Carrara. Their surrounded center became the capital of small towns and small countries. The coast has also experienced a period of growth. In 1580, the Duke of Alberic began a series of important projects to rebuild the plains to plant the area in the hands of the mountain farmers, who were then obliged to plant fruit trees and small vineyards.

However, it was 'road and rail' revolution in the eight-nineteenth century that represented a factor of economic development for the countryside and inhabited areas of the area.

The new railway lines played a decisive role in determining the processes and directions for the expansion of the agglomerations. The railway development coincided with the road: the opening of the first Tuscan trans-Appennine road, the via Vandelli (around 1750), an important

public work passing from Massa to Modena through the high Garfagnana and the San Pellegrino in Alpe.

In the eighteenth century, the most evolved organizational practices of the territory involved the Grand-Ducal and Lucchese Versilia and the Apuan area. In the northernmost coastal sector, between 1735 and 1781, a process of gradual agrarian and demographic recovery was initiated, through sales, concessions, usurpations or

abusive occupations of the ancient areas of collective pasture.

The serious agrarian crisis, which struck the mountain area from the '70s and '80s of the eighteenth century, forced thousands of small farmers to move to the major centers of the low hills and foothills, in the plains and gradually in the developing marinas. This situation was exacerbated in 1836 when the Grand Duke Leopold II ceded to private individuals who did not have the necessary capital for the

modernization of the plants of iron and steel industry: shortly they were almost all closed or turned into marble sawmills.

In 1859 Massa joined the Kingdom of Sardinia and therefore became part of the United Italy. Thus the province of Massa-Carrara was established, with a decree by Carlo Farini [2], divided administratively into two districts: Massa (historical Este dominions of the Duchy of Modena) and Pontremoli (ancient territories

of the Grand Duchy of Tuscany up to ten years before), [3] substantially continuing the former Estense province in the Territorial Compartment of Modena, Reggio and Massa. With the creation of a single Emilian compartment, from 1871 the province of Massa was included in the territorial compartment of Tuscany, after it was joined the district of Castelnuovo di Garfagnana in 1861.

The province of Massa-Carrara waited for a compensation and territorial reorganization,

which provided for the formation of a so-called marble province in which the mining and manufacturing activities should have extended to the coast area to include the municipalities of Versilia. At the end of the nineteenth century with the construction of the railway Pisa-La Spezia and Lucca-Viareggio, important symptoms of a new social and political dynamism appeared on the coast. And between 1861 and 1901 the two industrial poles of Massa and Carrara emerged as a result of the enlargement and intensification

of marble production. Even slowly, the villages of Carrara and Massa were also forming to be hamlets.

The gradual tourist-urbanization of the Apuan coast was joined (by the coastal road built immediately after the Great War) with that of Ronchi-Cinquale-Forte Dei Marmi. It has been witnessing the diffusion of a real economy of seaside tourism from Viareggio pushing towards the north, with the many marinas of

regular conformation, multi-family houses, villas, gardens and pine woods: a real "chained" system constituted from Marina di Carrara, Marina di Massa, Forte Dei Marmi, Marina di Pietrasanta (with Fiumetto, Tonfano, Motrone, Focette), Lido di Camaiore and Viareggio with Torre del Lago.

The territorial reorganization of the province, started in the twenties, seemed to have met the end with a different administrative restructuring, so as to be more functional to the

whole Apuo-Versilia area both for: economic interests (manufacturing and tourism), social services (marine colonies), infrastructure (coastal roads). In 1938 the fascist government constituted the industrial zone of Apuania on about 800ha between the marinas of Massa and Carrara and the homonymous capital city (which with Montignoso were merged until 1946 in the Municipality of Apuania [4]); but only in the post-war period the area would have attracted numerous industrial plants related to

the workings of marble, metal, and mechanical manufacturing.

In 1946 with a lieutenant decree (of Umberto II of Savoia) the new municipality of Apuania was dissolved and the province did not resume its ancient name "Massa and Carrara" but that "Massa-Carrara" [5]: Massa-Carrara or Massa di Carrara was instead the name by which the town of Massa was defined from the eighteenth century until the establishment in 1938 of the

municipality of Apuania to distinguish it from other places of the same name. The provincial capital was placed in the reconstituted municipality of Massa, although some offices and structures of a provincial dimension remained in Carrara.

In the last post-war period, despite the agrarian crisis and the depopulation of the countryside, all the municipalities in the area continued to increase their population at least until 1970-80 throughout the flat and low-hill area. The

population rose from around 248,000 in 1951 to almost 303,000 in 1981.

[1] Piano Paesaggistico Regione Toscana
ambito 02 Versilia e Costa apuana

[2] Raccolta ufficiale delle leggi e decreti del
dittatore delle Province Modenesi e Parmensi
9 novembre - 31 dicembre 1859

[3] Decreto 27 dicembre 1859, n. 79

[6]http://www.treccani.it/enciclopedia/massa_res-f9b4da93-e032-11df-9ef0-d5ce3506d72e/

[4] Regio Decreto Legge
16 dicembre 1938, n. 1860, art. 1

[5]Decreto legislativo luogotenenziale
1 marzo 1946,n. 48, articolo 2,
in materia di "Ricostituzione dei comuni
di Massa, Carrara e Montignoso."

2.1.3 ECONOMIC ASPECT



www.landimarble.it

In recent years, although the economy has suffered the consequences of the housing crisis, the mining of stone, in contrast, have seen record performance. The trade in finished and half-finished products has been in a stage of growth, which is the result of the design and the construction of new machinery as the protagonist of mining and processing.

In 2016, there was a boom for the export value of processed marble in the previous year (-1.73%),

for the first time since 2009, but in terms of a more significant reduction in the total number (-9.4%), despite this material was rediscovered by the architecture and design community.

Following the global economic crisis, the Italian stone industry has in fact been more than a foreign manufacturer of marble, but its export record value has grown strongly (+61%, which has been greatly appreciated in recent years), in 2016 (2009) due to sales to the United States.

This trend reversal can be seen in the data for the first half of 2018, which reveal a decline in all the merchandising categories. By consulting the ISTAT data, it is possible to see that in the first six months of 2018, 641,374 tons of marble in blocks and slabs were sold on international markets, for a value of just over 188 million euros, registering a contraction of 14.9 % in terms of quantity and 5.25% in value compared to the same period of 2017.

But in this regard, it is important to point out also an increase of 11% of the average unit value of the Italian stone material, which goes from € 263.6 / ton of the first six months of 2017 to today's € 293.52 / tonne.

The sharp decline in marble exports in blocks and slabs is mainly due to the contraction in demand from India and China, which have always represented the main markets for Italian exports for this product category. Also in imports from

the United States, there was a percentage drop of more than 15.2% in terms of quantity and 7.4% in terms of value. Although at low levels, it is interesting to highlight the increased interest in Made in Italy marble, by Portugal, which reaches almost 1.6 million euros, registering a + 48%.

Taking into account the general crisis, an element to consider among the causes of the contraction of exports of the processed products is that, even concerning with the competing

natural products, which the lower price has won the attention of countries in times of difficulty, Made in Italy natural stone has however kept prices consistently commensurate with its internationally recognized value.

Rapporto Cave 2017, I numeri e gli impatti economici e ambientali delle attività estrattive nel territorio italiano. Le opportunità e le sfide nella direzione dell'economia circolare.

Stone Sector 2016, Bilancio e prospettive del commercio internazionale dei prodotti lapidei Annual Report and Prospects for the International Stone Trade, A cura di: Manuela Gussoni

<http://www.voceapuana.com/massa-carrara/economia/export-marmo-lavorati-in-calo-aumentano-i-grezzi-nel-primo-semester-12307.aspx>

<https://www.lanazione.it/massa-carrara/economia/l-export-del-marmo-è-in-frenata-l-imm-non-succedeva-dal-2009-1.2999755>

2.1.3 NEGATIVE IMPACT

"Un mare in burrasca istantaneamente pietrificato"

"A stormy sea instantly petrified"

Emanuele Repetti

XIX secolo



In the context of the "Versilia and Costa Apuana" the intense mining activity has historically marked the territorial and landscape structure of the mountain contexts. A balance altered by the opening of numerous and wide quarry fronts, with serious repercussions on the hydrographic network, on the ecosystem components and on the aesthetic-perceptive values of the mountainous landscape.

These activities have caused an intense

consumption of soil, mainly by agricultural activities. It occurred as the fragmentation and isolation of natural or semi-natural area of the plain, and the alteration of water resources. These are subject to the pollution phenomena caused by the presence of the "marmettola", which is the waste material deriving from the leaching of quarry dumps (ravaneti) and from the marble processing activities.

Particularly relevant are the transformations

of the mountain environments of the Carrara and Masseria inland, of the high-altitude ridges (Passo della Focolaccia, Piastramarina, Piastreto), the high valleys of the Turrite Secca (Arni basin), Vezza, Serra (Monte del Monte Altissimo and Cervaiole) and the area of Monte Corchia.

In the last 20 years, the introduction of new technologies has reduced the time of extraction and processing of stone material, leading to a

quantity of marble extracted greater than that excavated in two thousand years of history.

The result of this process is an alteration of the morphology comparable to that occurred in a geological era. It is estimated that for every ton of marble cut into blocks, ten tons of mountain is destroyed. The speed with which the landscape undergoes such transformations determines the partial or total destruction of caves, as well as the decrease of the hydrogeological basins.

The relationship between the excavation and the changing of the landscape has the legacy of an old norm dating back to when the material was extracted with the "invasive" technique: of those 5 million tons of mountain exported from Carrara a year, 80% is the debris that is worked to be reduced to marble dust used in various sectors, from cosmetics to the food industry [2].

The demolition of the mountain scenery, the disruption of the hydrological system with related

high risks downstream, the pollution caused by the "marmettola" and hydrocarbons, are all phenomena that put at risk the reproducibility of the landscape resource.

This area characterizing the Tuscan landscape has a character of absolute uniqueness. For their geological characteristics and for the remarkable geodiversity, the Apuane Alps have been recognized by UNESCO as a geopark.

The primary need of the area is the achievement of a balance between mining and conservation of the landscape. For the current distribution of quarry activities, the safeguards and the regulatory framework have indicated the need for a clear separation between areas accessible to mining and areas for protecting the shape of the landscape and strategic aquifers.

The cultivation of underground quarries represents a technical solution that allows a

rational exploitation of mineral deposits in the face of a reduced impact on the landscape and the surrounding environment [1].

[1] Rapporto Cave

Legambiente Febbraio 2017

[2] <https://www.focus.it/ambiente/ecologia/alpi-apuane-le-montagne-che-scompaiono-per-cavare-il-marmo>







Marble Mine in Carrara Italy
By james_pintar

ABOUT SUSTAINABILITY

3.1 _ HUMAN ATTITUDE TOWARDS NATURE

3.1.1 GENERAL INTRUDUCTION

If it were slightly different in strength, the stars could not shine and life as we know it would be impossible.[1]



Carrara marble. Flickr creative commons:
Ph: Piermarco

Despite the view that human beings are inseparable from nature, or the observation that tend to recognize a broad scope where the human activity is included in nature, we still want to start by discussing the 'Nature' based on human perspectives.

Both literally and connotatively, the humanized 'nature' is as old as our history of civilization. The attitude over nature by modern man, spearheaded with advanced technologies, has

been affecting the balance between them and then reflecting into their own development.

These interpretations of the world in a specific period, which largely depend on human beings themselves, however are the predestined results of multi factors generated by the society of that time. As said by Jeremy Rifkin: "Every age has its own unique view of nature, its own interpretation of what the world is all about. Knowing a civilization's concept of Nature is tantamount to

knowing how a civilization thinks and acts." [2]

This chapter is divided into three parts, discussing from the two different points of view towards nature to the general evolution about landscape theory and ends with 'sustainable development' which is the respectively new branch in landscape architecture. This is trying to demonstrate a clear background for the following statement in the next chapter concerning the project topic.

[1] Timothy Ferris:

Coming of Age in the Milky Way. New York:
Morrow, 1988, p.392

[2] Jeremy Rifkin, Algeny:

A New World - A New World, New York:
Penguin Books, 1983

2.1.2 THE ANTHROPOCENTRIC AND THE BIOCENTRIC WORLDVIEW

*"Man, if we look to final causes, may be regarded as the
centre of the
world...For the whole world works together in the service of
man; and there is
nothing from which he does not derive use and
fruit...insomuch that all things seem
to going about man's business and not their own." [1]*



The 'scala naturae' , one of the early representative branches of anthropocentrism, is an idea developed since ancient Greece. In the eyes of philosophers and theologians, nature was a symbol of order and divinity, and human beings as perfect beings were the standard for measuring other creatures. As Protogoras said, 'man is the measure of all things'. [2]

Nature as a gift from God, in which human beings are allowed to treat it as a resource that can be

consumed. 'Be faithful and multiply, and fill the earth and subdue it, and have domination over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth.' God even said, 'Behold, I Have given you every plant yielding seed which is upon the face of all the earth, and every tree with seed in its fruit; and you shall have them for food.' [3]

Unbalance and chaos are regarded as the betrayal of order and beauty.

Although the sacred origin of nature no longer dominates the human society after the scientific revolution, the subsequent social and scientific developments have been continuing to strengthen the anthropocentric worldview.

Nature was considered as a machine in the 17th century by scientists and this idea was reinforced by the 18th century together with the technology developed. People see the universe as "a vast celestial contrivance set in operation

by an omniscient mechanic mathematician" [4] And with the popularity of large factories, the metaphor for nature has also been changed, from the analogy of intricate watches and clocks to a large workshop. Another view of Nature is to consider it as a storehouse, which points out the characteristic of nature as a raw material for industrial production. [5]

Due to the misuse and abuse of the natural environment by the industry, the divide between

human beings and nature has been intensified, which led to a series of re-thinking about the relationship between human and nature in the field of not only philosophy research but also geological practices.

The anthropocentric worldview was challenged by the **environmental ethics** when it emerged as a new sub-discipline of philosophy in the early 1970s. On the one hand, it questioned the superiority of human beings to members of

other species on earth, and on the other hand raised the discussion about the intrinsic value of a non-human background environment. The utilitarianism has also encouraged the non-anthropocentric thinking, and for having a more effective world, one maybe need to hide his anthropocentrism from others and even from oneself [6]

Another way of looking towards nature is the biocentric worldview which has as long history

as the previous one but contributes also to the recent study of the environmental ethics theory. It represents a partnership model between humans and Nature, it suggests that the human is a member of the web of life rather than its master or even its steward. [7]

[1] Peter Marshall
Nature's Web. Rethinking Our Place On Earth,
New York: Paragon House, 1994, p.184

[2] Peter J. Bowler
The Environmental Sciences. New York:
Norton, 1992

[3] Subbarao, S.
Ethics of Ecology and Environment,
Raj at Publications, New Delhi, 1997, p.4

[4] Carolus Linnaeus
Oeconomie of Nature, 1749

[5] Donald Worster
Nature's Economy. A History of Ecological Ideas
Second Edition, New York,
Cambridge University Press, 1994, p.53

[6] Brennan Andrew, Lo Yeuk-Sze
"Environmental Ethics", *The Stanford Encyclopedia*
of Philosophy, Winter 2016 Edition,
Edward N. Zalta (ed.)

[7] Frans C. Verhagen
Language & Ecology vol. 2 no. 3, 2008
Worldview and Metaphors in the
Human-Nature Relationship:
An Ecological Exploration Through the Ages.

2.1.3 FROM SUSTAINABLE DEVELOPMENT TO STRONG SUSTAINABILITY

Geoethics deals with the ethical, social and cultural implications of geoscience knowledge, education, research, practice and communication, providing a point of intersection for Geosciences, Sociology, Philosophy and Economy.[1]



In the Brundtland Report, the concept of sustainable development is constructed to encourage certain globally coordinated directions and types of economic and social development. The distinction between different arguments in sustainable design emerged from considering the question: what exactly does sustainable development seek to sustain? [2]

When we talk about sustainability, we certainly do not sustain nature "in itself." Rather, we sustain

nature as we humans prefer it. [3] Regarding 'what we humans prefer nature to be', some statements in the article of Butman are much convincing, since he still uses an anthropocentric point of view to insist the importance of industry, that may risk leading to future failure of the developing human society. And strong sustainability theorists may resist the substitution of human for natural capital.

'We maintain stocks of rivers, forests and

biodiverse systems, hence providing maximum options—options in terms of experience, appreciation, values, and ways of life—for the future human inhabitants of the planet.' This is less an anthropocentric view as what is stated in the Brundtland Report, indicated by its statement that "the case for the conservation of nature should not rest only with development goals. It is part of our moral obligation to other living beings and future generations" [4]

Over time, strong sustainability has come to be focused not only on the needs of human and other living things but also on their **rights**. [5] And this is the departure point of our project on the marble quarry, Cava Valsora. The attempt is to maintain the rights both for the natural species and the quarry owner and workers. Thus, we are not looking for an Utopia solution, which is not possible in this case, but a pragmatic attempt based on real-world and site-related issues.

- 1] Silvia Peppoloni, Giuseppe di Capua
Geoethics: ethical, social and cultural implications
in geosciences, *Annals of Geophysics*, 60,
Fast Track 7, 2017
- [2] Brennan, Andrew and Lo, Yeuk-Sze,
"Environmental Ethics", *The Stanford Encyclopedia
of Philosophy* (Winter 2016 Edition),
Edward N. Zalta (ed.)
- [3] Jeremy Butman
Against 'Sustainability'
- [4] UN Documents
Report of the World Commission on Environment
and Development: *Our Common Future*,
chapter 2, paragraph 55
- [5] Michael Redclift,
*Sustainable Development (1987–2005):
An Oxymoron Comes of Age*, 2004





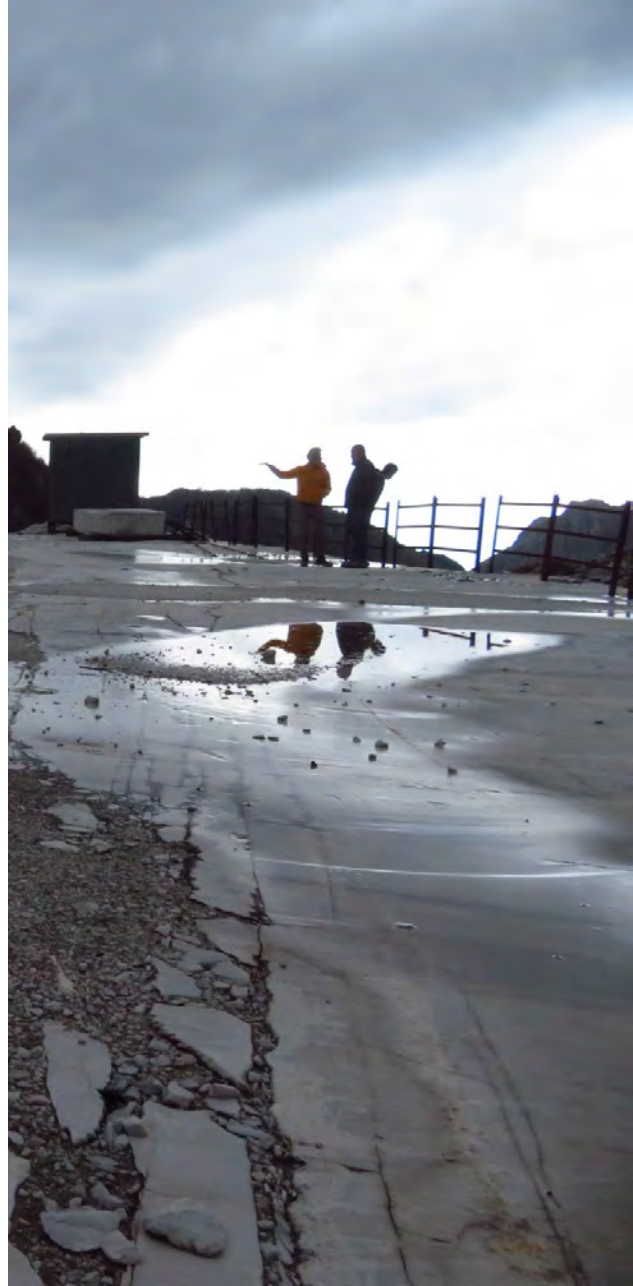
CAVA VALSORA

4.1 _ SITE BACKGROUND

4.1.1 HISTORY

Kublai: - Abbiamo dimostrato che se noi ci fossimo, non ci saremmo.

Kublai: - We have shown that if we were there, we would not be there then.[1]



In the area of study, the entrepreneurs include the Count Pietro Guerra started a constant expansion starting from 1850 with the capitals accumulated from the quarries they had managed to open before, practicing also attempts in basins that were still unexplored.

The area that developed most in this phase was certainly the valley of Taneta, together with the overlying deposits of Diacceto, Valsora and Palazzolo. On the western side of the long ridge

that rises sharply towards the relief of Palazzolo, the excavations begin in those years can be seen clearly.

Count Pietro Guerra since 1845 had declared the area of Taneta and Valsora and in October 1850 he stipulated a contract for three quarries in Tante. The marble of these quarries (located between 800 and 900 m of height) came to merge on the bottom of the valley (about 700 m). Pietro Guerra had already set his sights even on

the highest deposits. A road on the side of the ridge of Diacceto, which became a part of the Via di Lizza, was also granted permission to be traced so that the marble of Valsora and Palazzolo could go down to join three other quarries.

In 1854, Andrea Manfredi obtained three quarries located near the Pietro Guerra, Diacceto, Valsora and Palazzolo. The new tenant agreed to share the costs of constructing this important infrastructure with the Guerra,

which had not yet been realized at that time.[1]

The development of the viability of the valley was therefore undoubtedly favored by the unification of all the quarries of Taneta, Palazzolo, Valsora, Zucchi Rossi and Diacceto of relevance of Count Pietro Guerra, Fontana, Quadrella, Bianchi and Manfredi on 19 July 1857 .[2]

The present Valsora Quarry is located at a height of about 900m, near the entrance to the Passo del Vestito. The quarry actually

coincides with the site called Giaccetto near the marble buttress that slopes from Palazzolo to Taneta. It can be reached directly with a road (about 750 meters long) which branches off from the Provincial road Massa-Arni.[3]

The family-owned company that works the quarry does not have the production rhythms typical of the industrial companies. The concession contract was registered in Massa on the 4th of December, 2008. But the company did not

work in the quarry continuously and the average annual production is lower than the expectation in the cultivation plan. For this reason the 5 year planning forecasts are not yet completed. [4]

The mining complex area is around 39,200 m. The southern sector has a good road condition, and the potential for exploitation is(was) good for both open and underground cultivation. The northernmost sector has problems related to morphology for extraction. The contiguous quarry

area can be reduced by about 20% on the basis of a geological study since it includes the areas of the Ravaneti and the uncultivated lithologies. The excavating method was traditional and consists of horizontal and vertical cuts (began in this quarry around the year 2000) made with cutting machines. The removal of blocks was with mechanical handling means and material is loaded on vehicles by wheel loader.

[1] *Italo Calvino:*

La città invisibili

[2] *Enrico Medda:*

*Le cave di Massa, L'escavazione del marmo sulle
Apuane massesi dalle origini all'fine dell'Ottocento.
Comune di Massa*

[3] *Frederick Bradley, Enrico Medda:*

*Le strade dimenticate, Vie di lizza
e discesa del marmo nelle alte valli massesi,
Supp. A Europress n.9 settembre 1995, p. 50*

[4] *Alberto Dazzi, Chiara Taponecco:*

*Monitoraggio idrogeologico della sorgente
di Renata attraverso l'immissione di spore di
Lycopodium clavatum L. nella Cava Valsora*

[5] *Studio Rasenna, Sustainable landscape development*

Studio impatto ambientale - Valsora



4.1.2 Paradoxical condition

*And the apostle took a reed and drew,
measuring the place; and the doors he set toward
the sun - rising, to look toward the light -
and the windows toward the west to the breezes,
and the bakehouse he appointed to be toward the south,
and the aqueduct for the service toward the north.[1]*



The paradoxical condition in this area is mainly created by the presence of a colony of a hundred newts (*Ichthyosaura alpestris*/Tritoni Apuana) in the water pool formed by the excavation activities.

As a species that is very rare and endemic in this area, together with other environmental issues, formed strict requests for the industrial zone. The most important and emergency one is the creation of a barrier that has at least 10 meters length between the water pool and the industrial

area. In these special circumstances, Cava Valsora was stopped years ago (2011) for violating the requirements imposed by the environmental compatibility of the Park, in particular relating to three aspects:

- Extraction activities may effect the landscape of the secondary ridge dominated on the Gonda valley.
- The presence of protected habitats (Tritoni Alpi Apuane).
- A large area of discharge (ravaneti)

is visible from the panoramic road of the Passo della Abbigliamento. The southern limit of the basin is in fact constituted by the panoramic road system, which is facing towards the territory of Massa and the Ligurian Sea.

Between 2015 and 2016, a proposal was made in order to have the quarry activities continue. But the Park and the Municipality had denied the request for the extension of the authorization due to the lack of concern regarding the protected

species. In particular, the proposed project didn't respect the requested limits (10 meters from the working area to the boundary of the Bio-Lake).

[1] John Brinckerhoff Jackson:

Discovering the Vernacular Landscape,
Yale University Press, p.105



4.2 _ CONCEPT

4.2.1 "IN-BETWEEN"

*... la quale non può più rinviare una comprensione
del senso etimologico di Ecologia:
discorso profondo sul modo dell'uomo
di stare sulla terra.
Profondo e improrogabile.*

*... which can no longer be postponed an understanding
of the etymological sense of Ecology:
a profound discourse on the way
of human living on earth.
Deep and urgent.[1]*



In-between is a meeting point of two spatial peripheries, where fusion or confront happen.

Our belief in a solution for the paradoxical condition then appears to become a project of the "in-between". And the stratages mainly deals with three different dimensions:

(FUNCTIONAL)

Nature-Industry: Culture museum

The function that benefits both nature and industry of this area is a museum that acts as a mediation for their relationship.

(SPATIAL)

Open-Solid: Hypogeum space

A hypogeum space inside the mountain solid not only can meet the requirements of

protecting Bio Lake but can also provide special space by introducing the natural light into the tunnel.

(TEMPORALITY)

History-Present: Human experience

In the end what matters is still the human attitude towards nature since we are always the initiative movers. The experience is what the visitors are sensing and learning from the present and the past, and it directly affects the future behaviors of us.

[1] *Andrea Di Franco:*

*Il paesaggio dell'architettura
Architettura e paesaggio, p.99
Scuola di Architettura e società,
Politecnico di Milano*



4.2.2 "SIM _ BIO _ SYS"

*What could be more emblematic of the Renaissance than
this: peace and a discovery of the joy in nature? [1]*

Norman T. Newton:

Design on the Land: The Development of Landscape

Architecture

Belknap Press; Later printing edition (1971)p.66

SYMBIOSIS

(ancient greek) *sumbíōsis*:

(a) living together

(modern) *symbiosis*:

(ecology) A close, prolonged association between two or more organisms of different species that normally benefits both members. An interspecies coöperation.



SIM_BIO_SYS

Simultaneity

History
Present
Future

Biological

Habitat
Vegetation
Human Beings

Systems

Nature
Industry
Culture



Sustainable development **between** human and nature

4.3 _ PROJECT

4.3.1 MASTERPLAN

The main goal of the project is to create a narrative stream that links industry to nature, history to the present, with the smallest impact on the territory.

A certain number of visitors will be organized to visit the site under the guidance of professionals. They will take the bus until the exterior corridor of the museum, which is the 10-meter buffer zone, followed by a hypogeum museum inside the mountain. The exit is connected to the restaurant and followed is a rising road towards a small historical museum. This is a wooden structure installed in the ruins of a stone building. The destination of the tour is a wooden platform by the ecological pond.

Another goal of the project is to repair some of the negative conditions of the site, namely the reinforcement and ecological regeneration of gravel slopes(ranaveti).

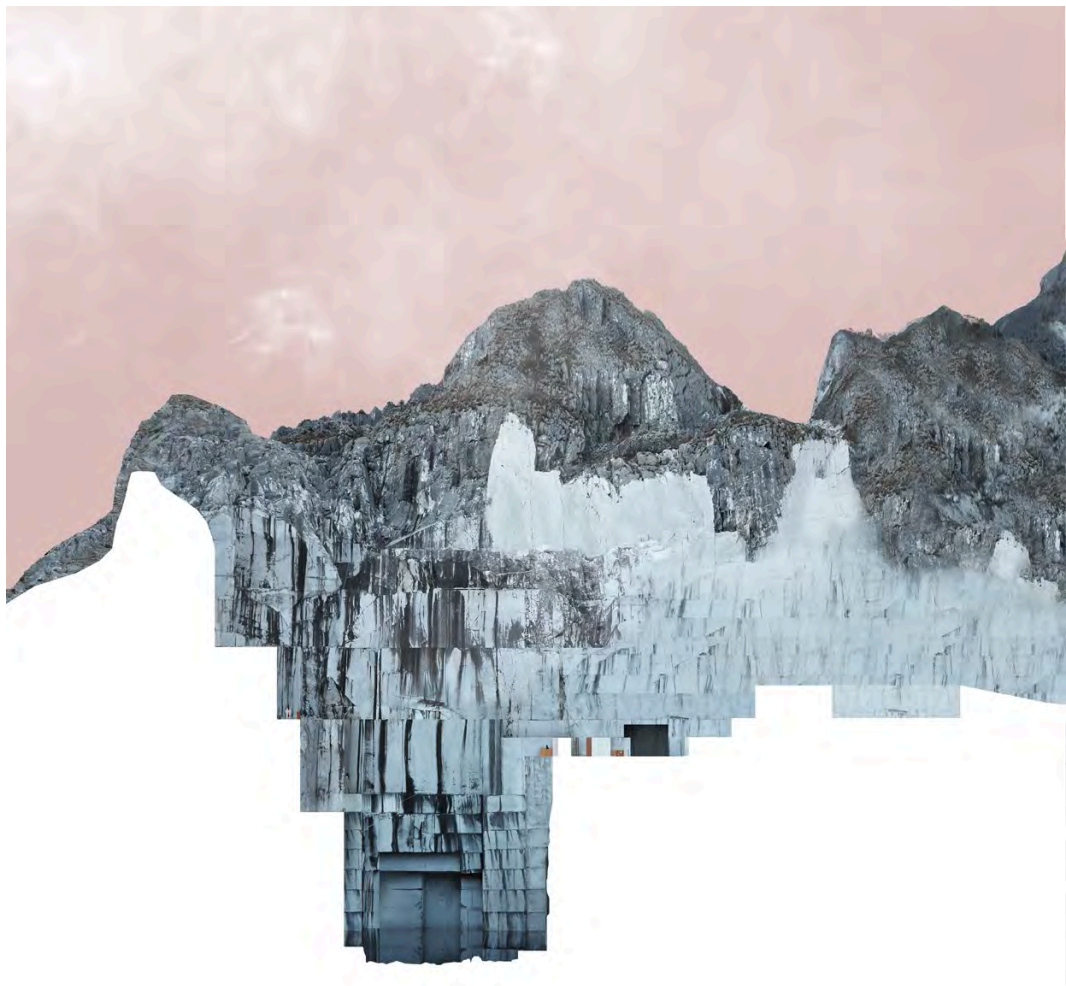


4.3.2 SECTION

The complex terrain and differences in height bring a rich landscape experience.

The entrance and exit of the underground museum are basically at the same level, with a difference of about 4 meters. The historical museum on the top of the mountain is 30 meters higher, and the ecological pool is 40 meters lower than the hypogeum level.

The sense of isolation from these vertical scales and the perception from spatial contact on the horizontal scale enhance the viewer's understanding of the border functions as a protective and communication media.

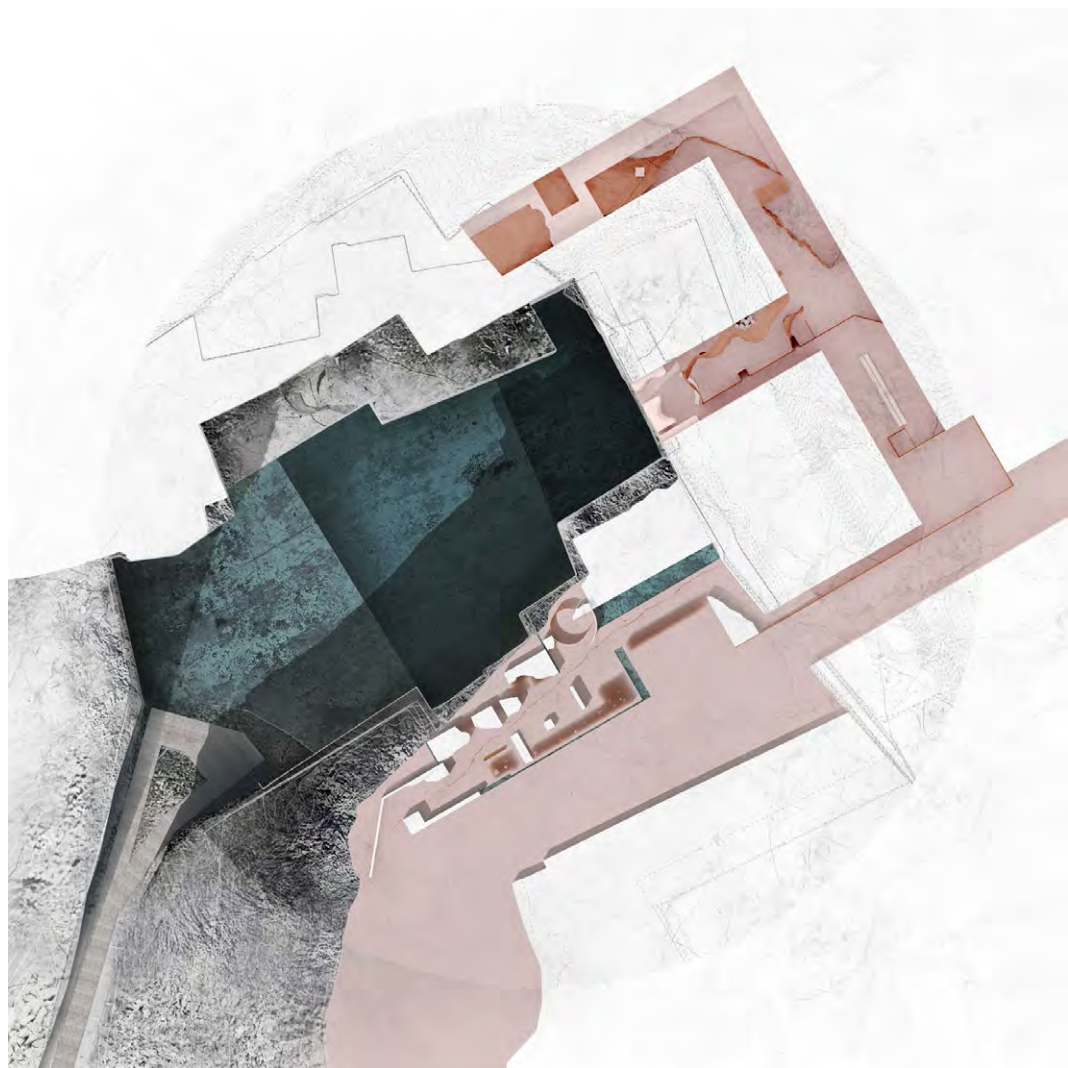


4.3.3 PLAN

The entrance platform is divided into two parts: a mechanical work area and a 10-meter buffer zone, which is defined by abandoned marble blocks, function as the museum's pedestrian entrance.

The interior space of the mountain is also divided into two parts, the deep mining area, and the hypogeum cultural museum, that is placed between the quarry area and the outside lake. The shape of the interior space is determined by the engineer's measurement, from the geological characteristics of the mountain and the structural requirements. And the aspects that the design can influence are limited. With different forms of two materials (marble and Cor-ten), the segmentation of the space will be given specific characters.

The interior space has three tunnels that are connected to the outside world: the entrance, the viewing window, and the exit. Each of them with a particular spatial attribute.



As we have always emphasized, the barrier has a dual attribute because it is also used as a museum pedestrian entrance.

4.3.4 ENTRANCE

Discarded marble blocks lose their commercial value because they contain a lot of mud cracks, and the Cor-ten grids are going to complete their shape for aesthetic and structural aims. The wall created by such wastes not only have isolation function but also symbolize the positive significance of reasonable human activities in interacting with nature since this wall becomes also a protection for both of them.

When visitors pass through the entrance passage, they are actually walking in the middle of nature and human activity. It is possible to observe the simultaneity of two different activities at the same time.



4.3.5 HYPOGEUM

The museum inside the mountain is divided into four exhibition areas.

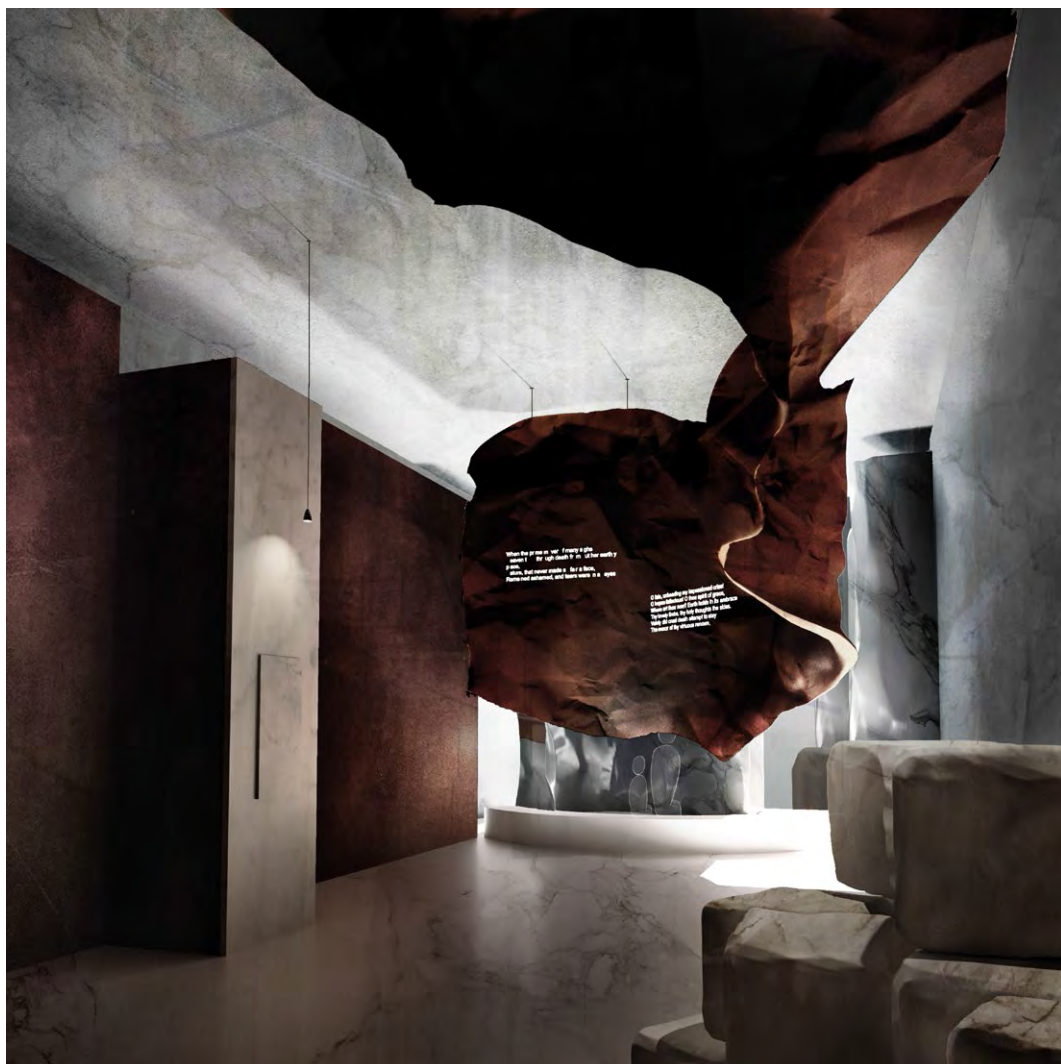
The narrow entrance tunnel introduces visitors into a projection room and then enters the modern industrial exhibition area. This includes a suspended Cor-ten panel and a small mechanical display area.

The second exhibition area is the philosophy education area, which mainly helps visitors to

think about the relationship between human activities and nature, through light and space changes. The windows facing the Bio Lake is at the end of the corridor, together with a special center room which is a meditation space. Cor-ten plates that simulate irregular stone surfaces are hanged in this space. The contrast between brightness and shadow, lightness and gravity bring a unique spatial experience.

The subsequent area is an art exhibition area, which is the crystallization of human wisdom and thought, following the philosophy zone. There will be Tuscany and quarry-themed paintings and small sculptures.

The last exhibition zone is the area where the exit is located. The rising ramp is accompanied by crystal exhibits, and the Cor-ten plate becomes a pavement which is a metaphor of the rugged natural mountain road.



4.3.6 STRUCTURE OVER RUIN

A small historical museum is located on the ridge. The light wooden structure is chosen because there is little space for construction and the site could not be reached by large mechanical vehicles.

Inside the stone building which has lost its original wooden roof, the new structure is placed on three rows of support columns. Two of the rows are under the cliff and are installed inside

the stone building. Other supports are on the ridges of the high cliff.

The entrance is at the height of the cliff that is at the same level as the new structure, and the center of the building is equipped with stairs that connect the ancient buildings below. This allows the visitors to see a legacy device inside the original building before returning to the tour route from the external stairs.

The new structure is not in direct contact with the ancient building and has the same façade position as the ancient one below by attaching the outer aluminum skin.

The intended way of construction is to install a prefabricated wooden platform, which is the floor portion of the new structure, by helicopter. The remaining walls and the roof will then be easier to build.

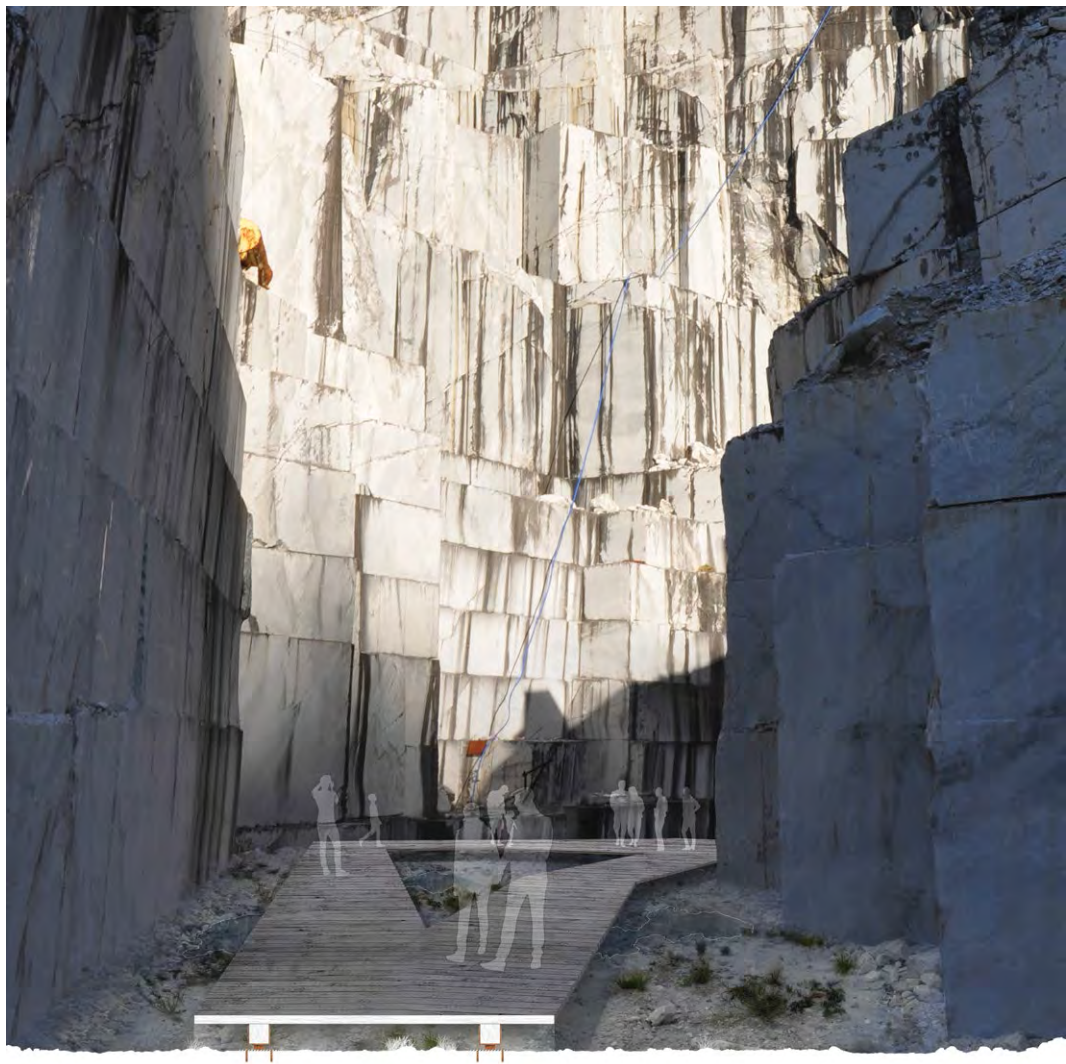


4.3.8 ACCESS BIO LAKE

The suspended wooden platform guides visitors to the end of the journey, the ecological pool.

The elevated platform not only gives space for the growth of vegetation below but also minimizes the impact of human activities on the sensitive area. It also provides an important ecological corridor for the migration of Salamanders twice a year to avoid accidental injuries.

Towering artificially mined façades together with a tranquil water habitat make a meaningful and impressive endpoint.



CONCLUSION

Architecture and landscape are methods of human beings to think and deal with their own relationship with the outside world.

The solution that we are trying to find out in this project is actually based on the reflection of this relationship:

The two interacting forces can achieve sustainable development only in a state of symbiosis rather than parasitism.



SIM_BIO_SYS

