landscape

natural landscape

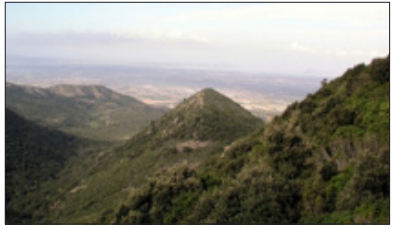
rivers
forests
mountains
ponds
plains
cliffs
seas
lakes

man-made landscape

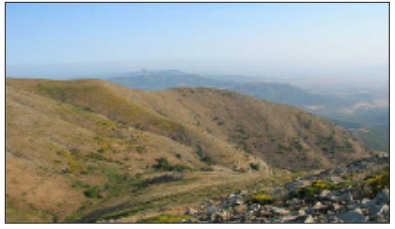
industrial landscape
mining landscape
urban settlements
agricultural landscape
infrastructures
touristic landscape
archaelogical landscape

NATURAL LANDSCAPE

rivers
coghinas river

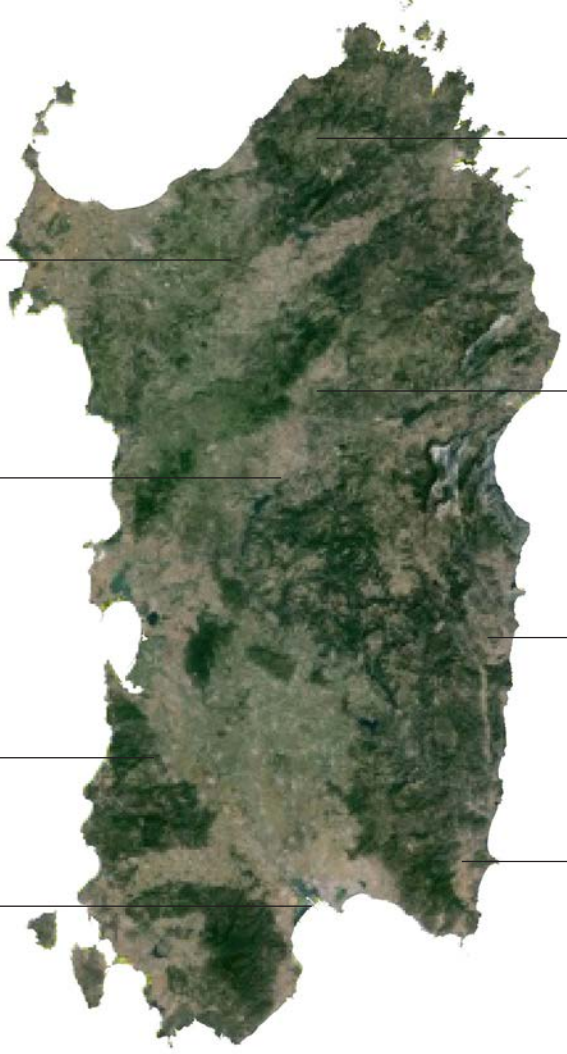


forests
forest of Monte Arci

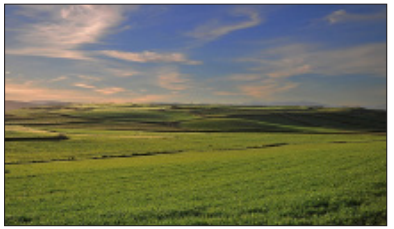


mountains
Monte Linas

ponds
Santa Gilla pond



plains
plain of Campidano



cliffs
San Teodoro cliffs

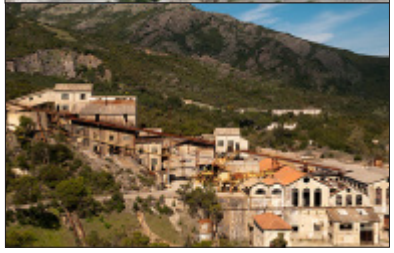
seas
Tyrrhenian sea

lakes
lake of Flumendosa

MAN-MADE LANDSCAPE

industrial landscape
petrochemical station of Porto Torres

mining landscape
Sos Enattos, Nuoro



mining landscape
Montevecchio, Guspini

urban settlements
city of Iglesias

agricultural landscape
atha-ruja vinejard

infrastructures
complementary railways of Sardinia

touristic landscape
Torre di Bari

archeological landscape
roman amphitheatre of Cagliari

sea+ plain + industrial landscape



mountain + plain + agricultural landscape



sea + touristic landscape



mountain + hill + infrastructure



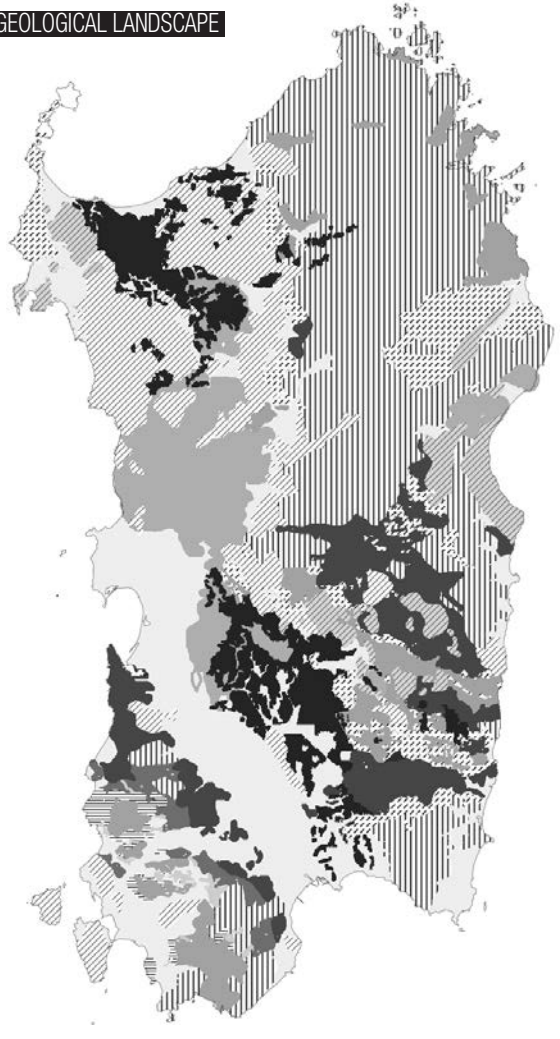
mountain + sea + urban settlements



mountain + hill + mining landscape



GEOLOGICAL LANDSCAPE



QUATERNARY 2,5 - 0 million years ago
- Continental and marine sediments
- Alkaline - Subalkaline volcanics
  Basalts and phonolites

EOCENE-MIOCENE 55 - 5 million years ago
- Marine to continental sediments
- Calcalkaline volcanics and continental sediments
  Andesite to rhyolite

TRIAS 252 - 201 million years ago
- Carbonatic platform sediments
- Leucogranites, monzogranites, granodiorites and tonalites

ORDOVICIAN-DEVONIAN 485 - 359 million years ago
- Phyllites, basic metavolcanics, metarenites, metamorphosed calcareus rocks
- Metamorphics silty rocks
- Amphibolites
- Argillaceous schists, metarenites, metasiltites and metamorphosed calcareous rocks
  Scisti di Cabitza

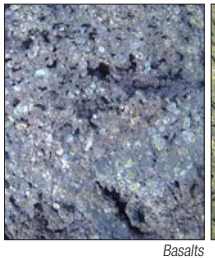
CAMBRIAN-ORDOVICIAN 540 - 444 million years ago
- Metarenites, argillites
- Metarenites, phyllites and metaconglomerates
  Arenarie di S. Vito e Formazione di Solanas

SILURIAN-DEVONIAN 444 - 359 million years ago
- Marbles, metamorphosed calcareus rocks
  Calcari di villasalto a climenie
- Phyllites
  Scisti a graptoliti e liditi
- Metarenites metamorphosed calcareous rocks, metaconglomerates
  Puddinga

LOWER CAMBRIAN 540-485 million years ago
- Dolomites and metamorphosed calcareous rocks
  Dolomie rigate, dolomie grigie e calcare ceroide
- Metarenites, argillaceous schists, metamorphosed calcareous rocks and dolomites

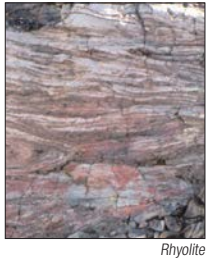

Marine sediments


Marine sediments


Basalts

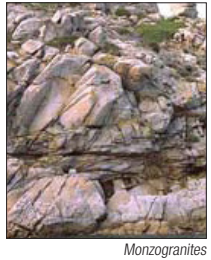

Phonolite


Andesite


Rhyolite

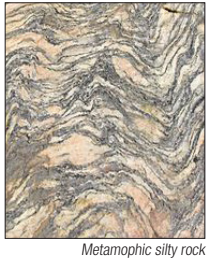

Carbonatic sediments


Leucogranites


Monzogranites


Granodiorite


Phyllites


Metamophic silty rock


Metarenite


Arenarie di S. Vlto


Metaconglomerate


Puddinga

HISTORICAL AND ENVIROMENTAL GEO-MINERAL PARK OF SARDINIA

Sardinia total surface
24 090 km^2

Percentage of territory inside the park
15%

Park total surface
3 771 km^2

Involved municipalities
87

Number of areas
8

Year of establishment
2001

Number of mining sites involved in the park
112

Mining sites total area
18,6 km^2

Open-air excavations
3,8 km^2

Mining dumps
7,3 km^2

Settling basins
2 km^2

Washery residues
5,5 km^2

Surface voids
3,8 km^2
43 million m^3

Mining residuals
7,36 km^2
32 million m^3

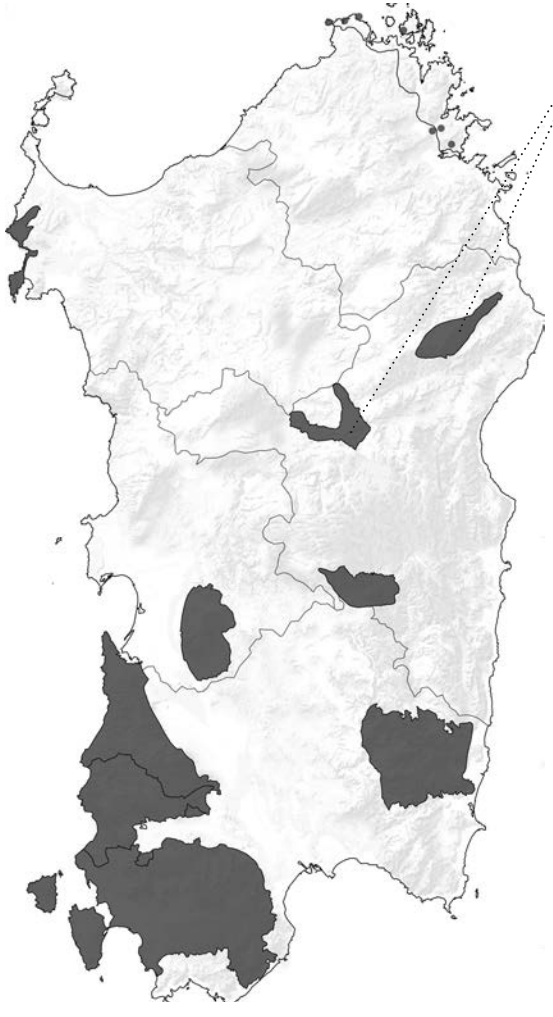
Valle del rio Cixerri, Carbonia-Iglesias

Monte Albo, Nuoro

Punta Cristallo, Alghero

Orani landscape

Talc quarry of Orani



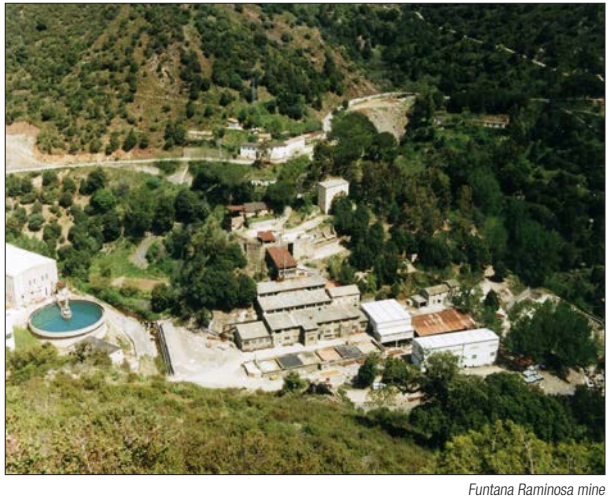
ORANI + GUZZURRA-SOS ENATTOS

SURFACE: 264 km^2 PERCENTAGE : 7%

MINERAL DEPOSITS: talc, feldspar, marble and granite in Orani, lead, silver, zinc in Guzzurra-Sos Enattos

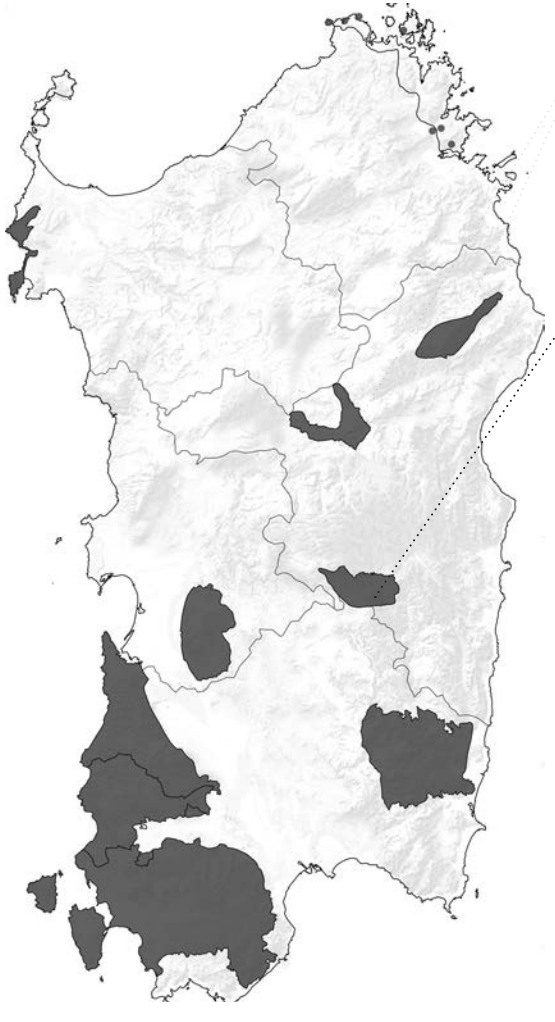
ROCKS: metamorphic rocks with hercynian granite, limestone and dolomite

LANDSCAPE: hilly area with shapes rather gentle, some not so high mountains and some valleys



Funtana Raminosa mine

Funtana Raminosa mine



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FUNTANA RAMINOSA

SURFACE: 146 km^2 PERCENTAGE : 4%

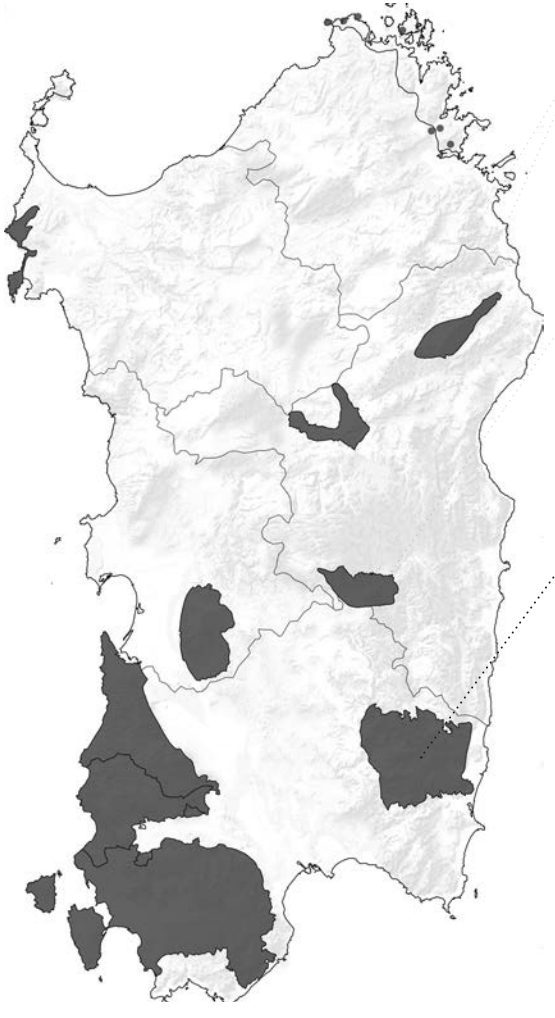
MINERAL DEPOSITS: copper, calcopyrite, galena

ROCKS: calcalkaline volcanic rocks, metarenites phyllites

LANDSCAPE: The natural environment rich in woods, partly still virgins, has allowed the preservation of fauna of extraordinary interest.

Sarrabus Gerrei

Sarrabus Gerrei



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SARRABUS GERREI

SURFACE: 575 km^2 PERCENTAGE : 15%

MINERAL DEPOSITS: lead, zinc, antimony, copper, silver, tin, iron

ROCKS: metamorphic rocks, granite, dolomites, phyllites

LANDSCAPE: the territory has a various morphology, mainly consisting of hills, but there are also some significant mountains not higher than 1000 meters

Rosas mine

Leucogranites in Sulcis

ORANI + GUZZURRA-SOS ENATTOS

SURFACE: 264 km^2 PERCENTAGE : 7%

MINERAL DEPOSITS: talc, feldspar, marble and granite in Orani, lead, silver, zinc in Guzzurra-Sos Enattos

ROCKS: metamorphic rocks with hercynian granite, limestone and dolomite

LANDSCAPE: hilly area with shapes rather gentle, some not so high mountains and some valleys

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LANDSCAPE: the territory has a various morphology, mainly consisting of hills, but there are also some significant mountains not higher than 1000 meters

SULCIS

SURFACE: 1450 km^2 PERCENTAGE : 38,5%

MINERAL DEPOSITS: coal, galena, blenda

ROCKS: leucogranites, argillaceous schists

LANDSCAPE: almost completely surrounded by the sea and the homonymous mountain range, which isolates it from the rest of the region; the coast is mainly characterized by the alluvial plains that alternate with hills

ARGENTIERA-NURRA + GALLURA

SURFACE: 61 km^2 PERCENTAGE: 1,5%

MINERAL DEPOSITS: lead, zinc, silver, iron

ROCKS: calcareous rocks, carbonatic sediments, marine sediments, metamorphic silty rocks, metarenites

LANDSCAPE: long coastal stretches with steep and sometimes overhanging cliffs, sandy shores of characteristic reddish sand, some scattered caves and lush vegetation in the hinterland

Argentiera mine

Capo Caccia, Alghero

ARGENTIERA-NURRA + GALLURA

SURFACE: 61 km^2 PERCENTAGE: 1,5%

MINERAL DEPOSITS: lead, zinc, silver, iron

ROCKS: carbonatic sediments, marine sediments, metamorphic silty rocks, metarenites

LANDSCAPE: long coastal stretches with steep and sometimes overhanging cliffs, sandy shores of characteristic reddish sand, some scattered caves and lush vegetation in the hinterland

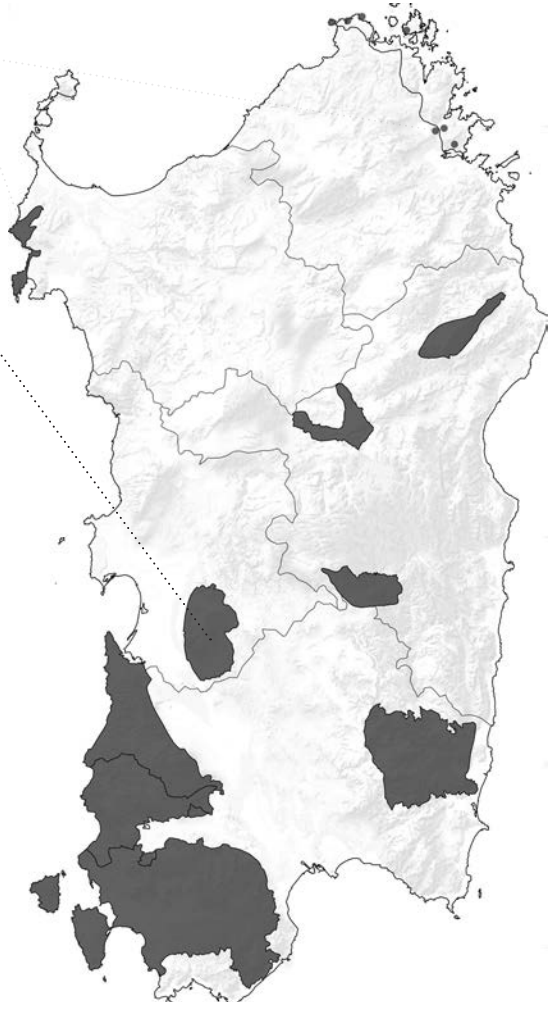
MONTE ARCI

SURFACE: 271 km^2 PERCENTAGE: 7%

MINERAL DEPOSITS: obsidian

ROCKS: continental sediments, rhyolites, volcanic basalts

LANDSCAPE: Monte Arci is an isolated massif in the plain of Uras ant its maximum altitude is 820 meters above sea level.



Monte Arci

Monte Arci

ARGENTIERA-NURRA + GALLURA

SURFACE: 61 km^2 PERCENTAGE: 1,5%

MINERAL DEPOSITS: lead, zinc, silver, iron

ROCKS: carbonatic sediments, marine sediments, metamorphic silty rocks, metarenites

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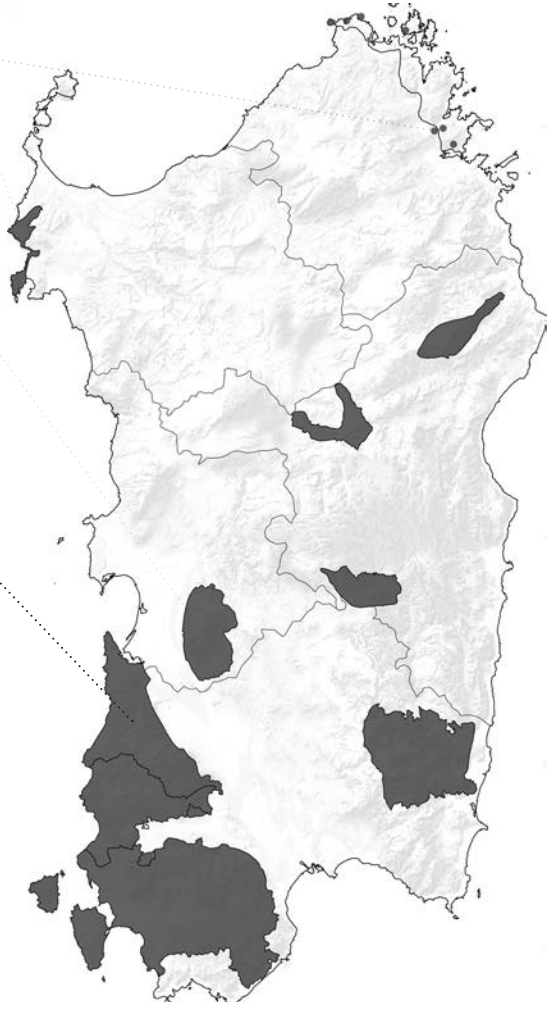
GUSPINESE-ARBURESE

SURFACE: 522 km^2 PERCENTAGE: 14%

MINERAL DEPOSITS: lead, zinc

ROCKS: metamorphic rocks, metarenites, argillites, granites

LANDSCAPE: the various morphology in this area is characterized by rugged mountains in the hinterland and long coastal stretches alternating seashores, wide dune fields (Piscinas) and steep cliffs.



Dune fields of Piscinas

Montevecchio mine

ARGENTIERA-NURRA + GALLURA

SURFACE: 61 km² PERCENTAGE: 1,5%

MINERAL DEPOSITS: lead, zinc, silver, iron

ROCKS: carbonatic sediments, marine sediments, metamorphic silty rocks, metarenites

LANDSCAPE: long coastal stretches with steep and sometimes overhanging cliffs, sandy shores of characteristic reddish sand, some scattered caves and lush vegetation in the hinterland

MONTE ARCI

SURFACE: 271 km² PERCENTAGE: 7%

MINERAL DEPOSITS: obsidian

ROCKS: continental sediments, rhyolites, volcanic basalts

LANDSCAPE: Monte Arci is an isolated massif in the plain of Uras ant its maximum altitude is 820 meters above sea level.

GUSPINESE-ARBURESE

SURFACE: 522 km² PERCENTAGE: 14%

MINERAL DEPOSITS: lead, zinc

ROCKS: metamorphic rocks, metarenites, argillites, granites

LANDSCAPE: the various morphology in this area is characterized by rugged mountains in the hinterland and long coastal stretches alternating seashores, wide dune fields (Piscinas) and steep cliffs.

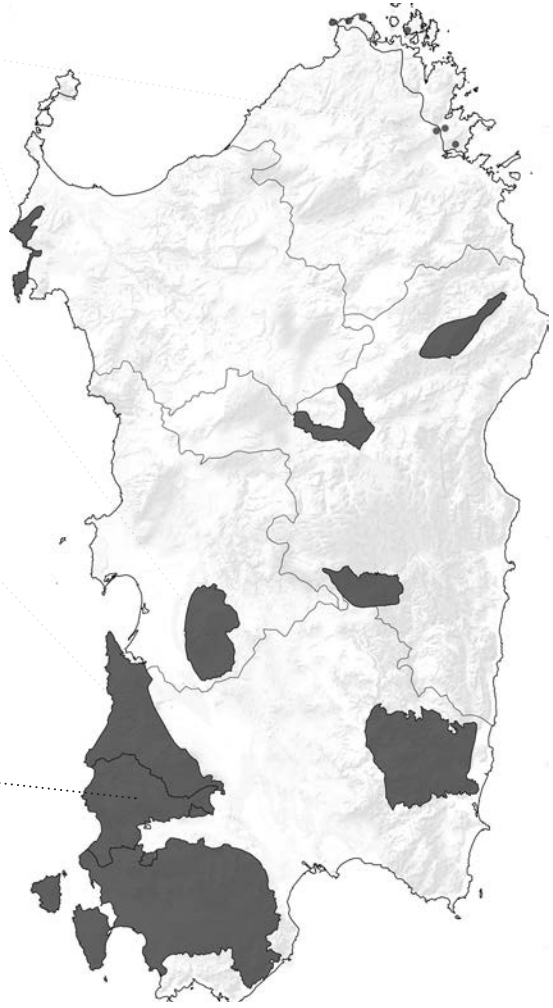
IGLESIENTE

SURFACE: 482 km² PERCENTAGE: 13%

MINERAL DEPOSITS: lead, silver, zinc (from galena, blende, calamine)

ROCKS: metamorphic calcareous rocks, dolomites, argillaceous schists, metarenites

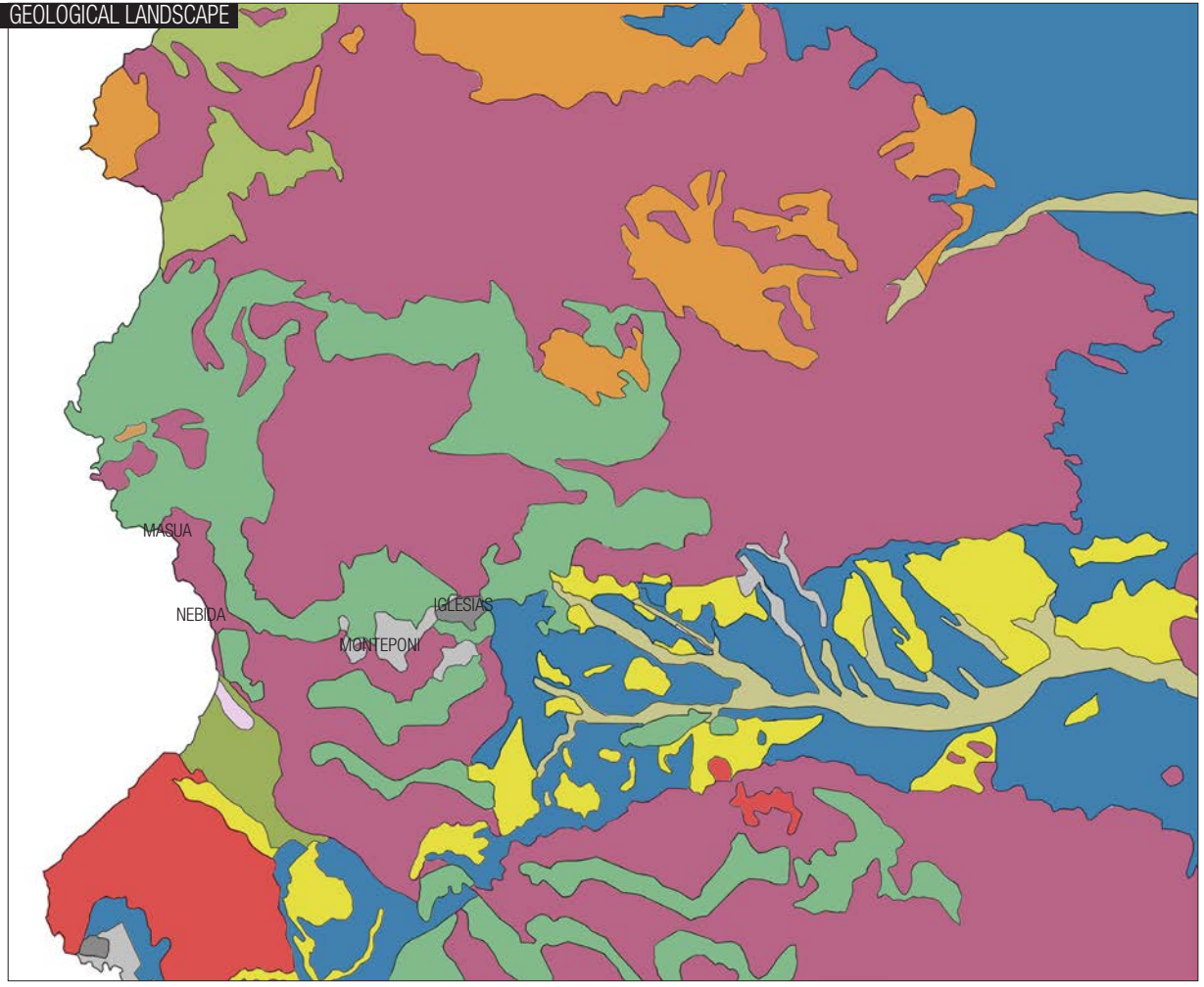
LANDSCAPE: spectacular cliffs of the coast, interrupted by long beaches and beautiful bays, a hinterland often wild and full of endless woods populated by a varied fauna.



Argentiera mine

Puddinga ordoviciana near Lamarmora washery, Nebida

GEOLOGICAL LANDSCAPE



PALEOZOIC 570-230 million years ago

- Landscapes on limestones, dolomites and dolomitic limestones and their slope deposits
  - In general angular with steep stones
  - Very fragile type of landscape
- Landscapes on metamorphic rocks (schists,arenaceus schists, shales etc.) and their slope deposits
  - Sharply sloping outlines/over clayey schists
  - Along the coast, enriched with aromatic plants
  - Loss of soil and fertility due to fires and overgrazing leading to erosion
- Landscapes on intrusive rocks (granits, granodiorits, leucogranites, etc.) and their slope deposits
  - Varies from steep slopes to flat terrains
  - Generally displays on granites than other types of rocks
  - Threatened by erosion owing to fires and inadequate forestation

CENOZOIC 65-2 milion years ago

- Landscapes on acid effusive rocks (andesits,rhyolits) and intermediate (phonolites) and their slope and colluvial deposits
  - Hilly forms with high slopes
  - Plateaux flanked by rough slopes
  - Sloping plateaux-'cuestas landscapes' formed
  - Mountains and hills-seminatural vegetation and pasture
  - Foot of the higher ground: intensive agriculture

MIOCENE EOCENE 65-2 mln yrs ago

- Landscapes on claystones, sandstones and conglomerates (Cixerri and Usanna formations)
  - Rounded hills with gentle slopes with slightly inclined level areas

PLEISTOCENE 2.5 million - 11.700 yrs ago

- Landscapes on alluvial deposits and eolian sandstones
  - Monotonous forms of plainland
  - Seminatural vegetation: scarce
  - Pasture and intensive agriculture: zones of vineyards

HOLOCENE 11.700 years ago

- Landscapes on alluvial deposits and conglomerates,eolian deposits,calcareous crusts
  - Exclusively intensive form: agriculture
  - Fertility of soil
- Landscapes on eolian sand
  - Sandy shores and stretches of dunes
- Landscapes on littoral sediments (marshy areas,lagoons etc.)
  - Flat and sporadically below sea levels
  - Littoral vegetation

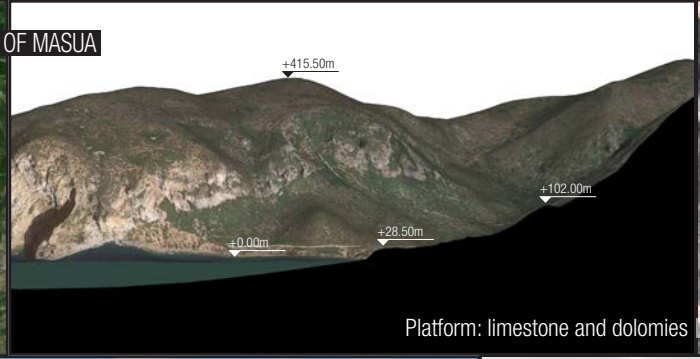
Top view

Coast and mine of Masua

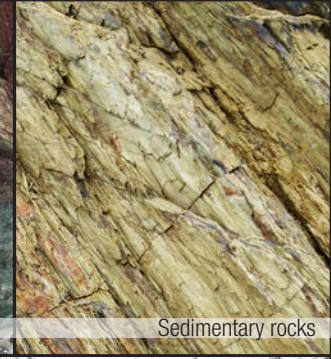
Coast of Nebida

Monteponi mine

SECTION OVER THE COAST OF MASUA



Platform: limestone and dolomies

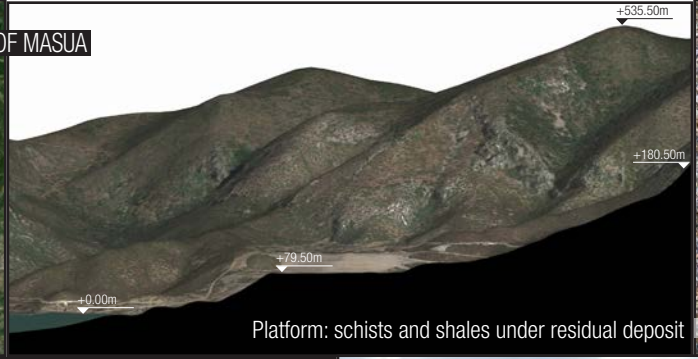


Sedimentary rocks

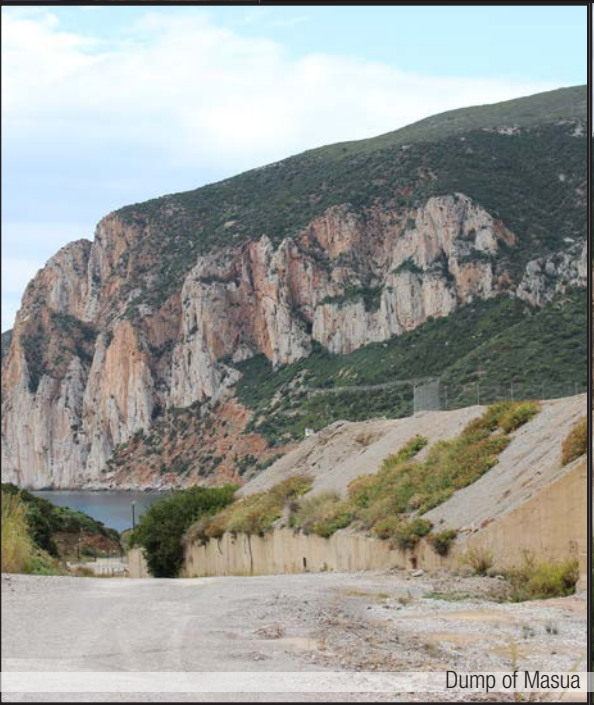
Coast of Masua

Pan di Zucchero and Porto Flavia

Diagonal sedimentary rocks above the coast



Deposit over metamorphic and sedimentary rocks



Dump of Masua

Residual material and shalestones in Masua

Schists formation in Masua

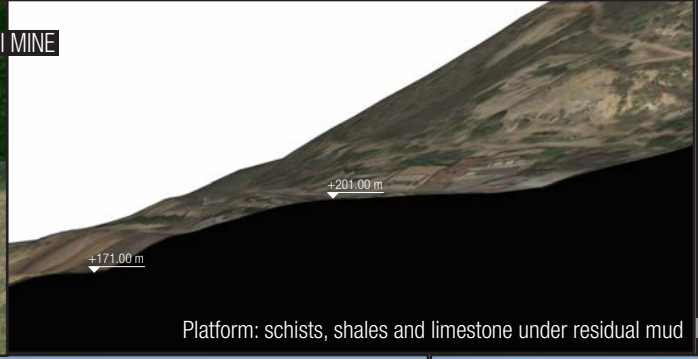

SECTION OVER NEBIDA'S COAST
NEBIDA
+158.50 m
+60.00 m
+0.00 m
Platform: ordovician "puddinga"

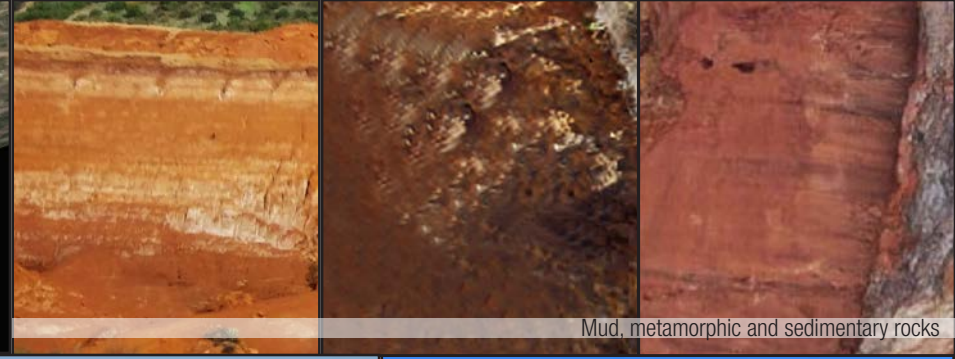

Metamorphic and sedimentary rocks


La Marmora washery in Nebida

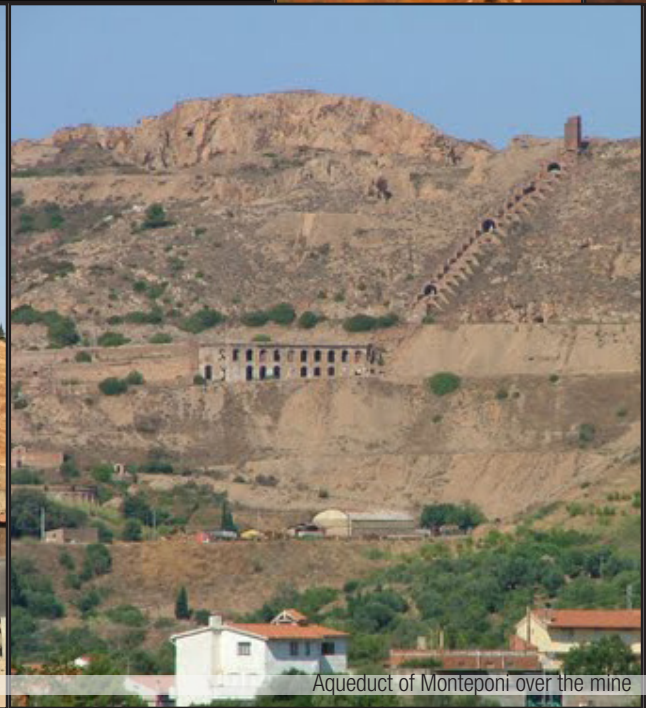

Purple coast of Nebida

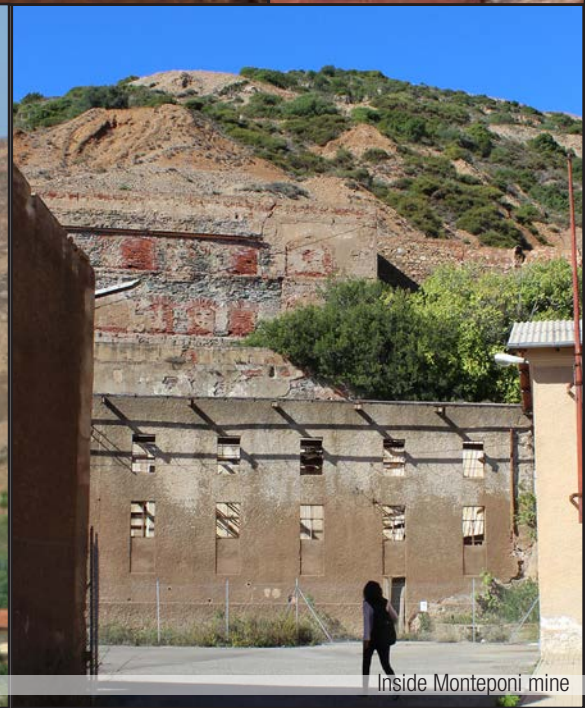

SECTION OVER MONTEPONI MINE
IGLESIAS
MONTEPONI

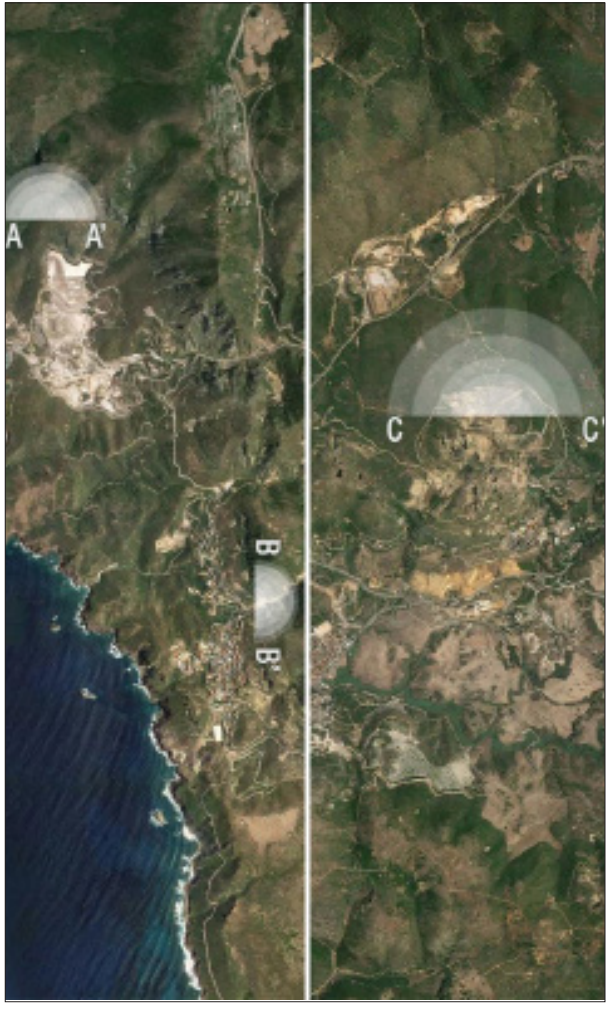

+201.00 m
+171.00 m
Platform: schists, shales and limestone under residual mud

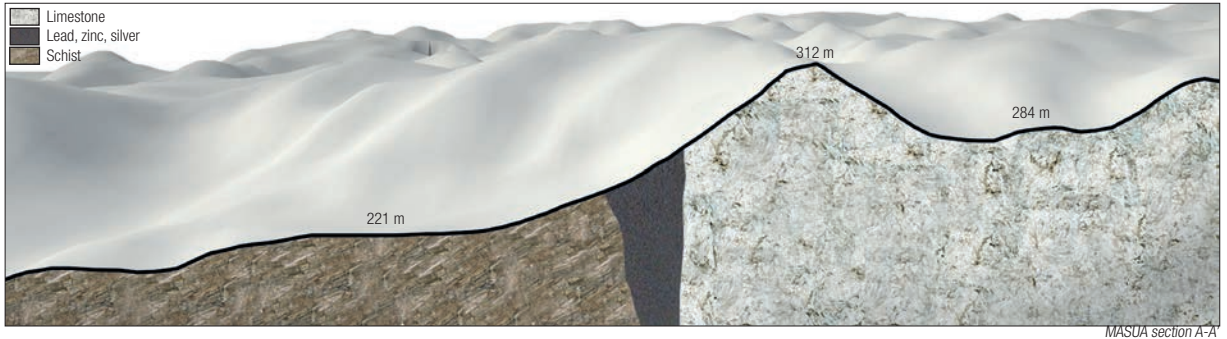

Mud, metamorphic and sedimentary rocks


Monteponi mine over “Red Mud”

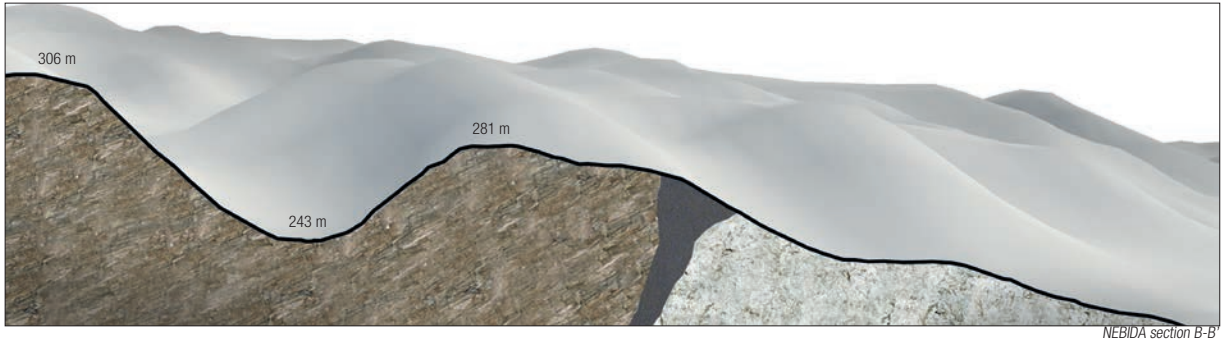

Aqueduct of Monteponi over the mine


Inside Monteponi mine

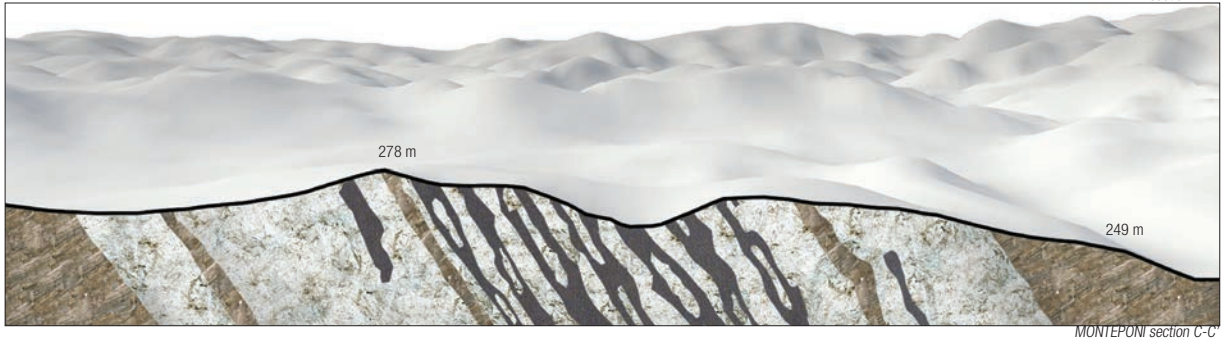




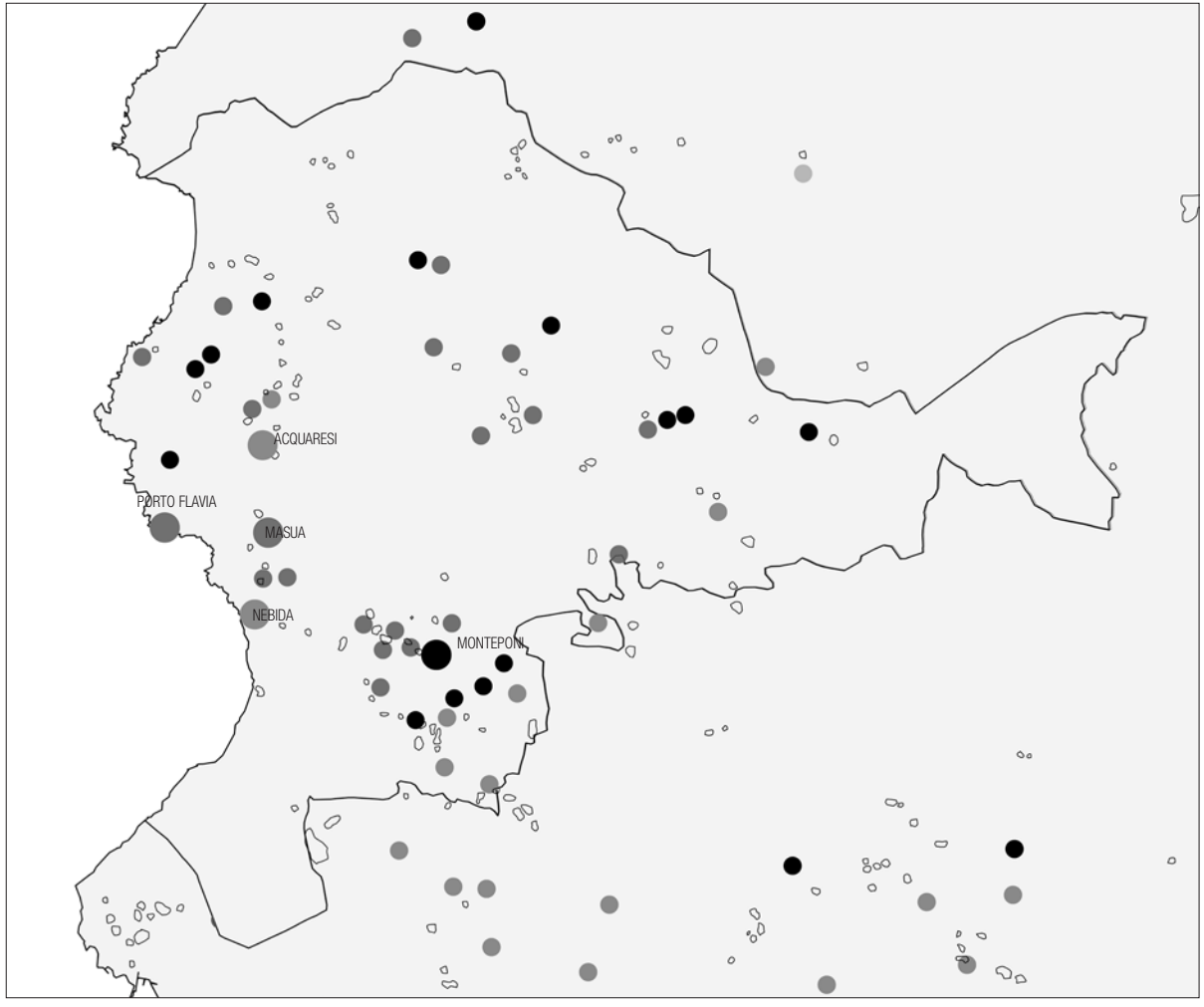
MASUA section A-A'



NEBIDA section B-B'



MONTEPONI section C-C'



SARDINIA MINES

Argentiera, Nurra	3%
Orani, Guzzurra	9%
Sulcis	22%
Guspinese,Arburese	7%
Sarrabus,Gerrei	19%
Funtana Raminosa	2%
Iglesiente	38%

SARDINIA MINERALS

Silvery Galena	28%
Antracite, others	2%
Lead,Zinc,Silver	58%
Lead,Zinc,Silver, Copper	12%

IGLESIENTE MINERALS

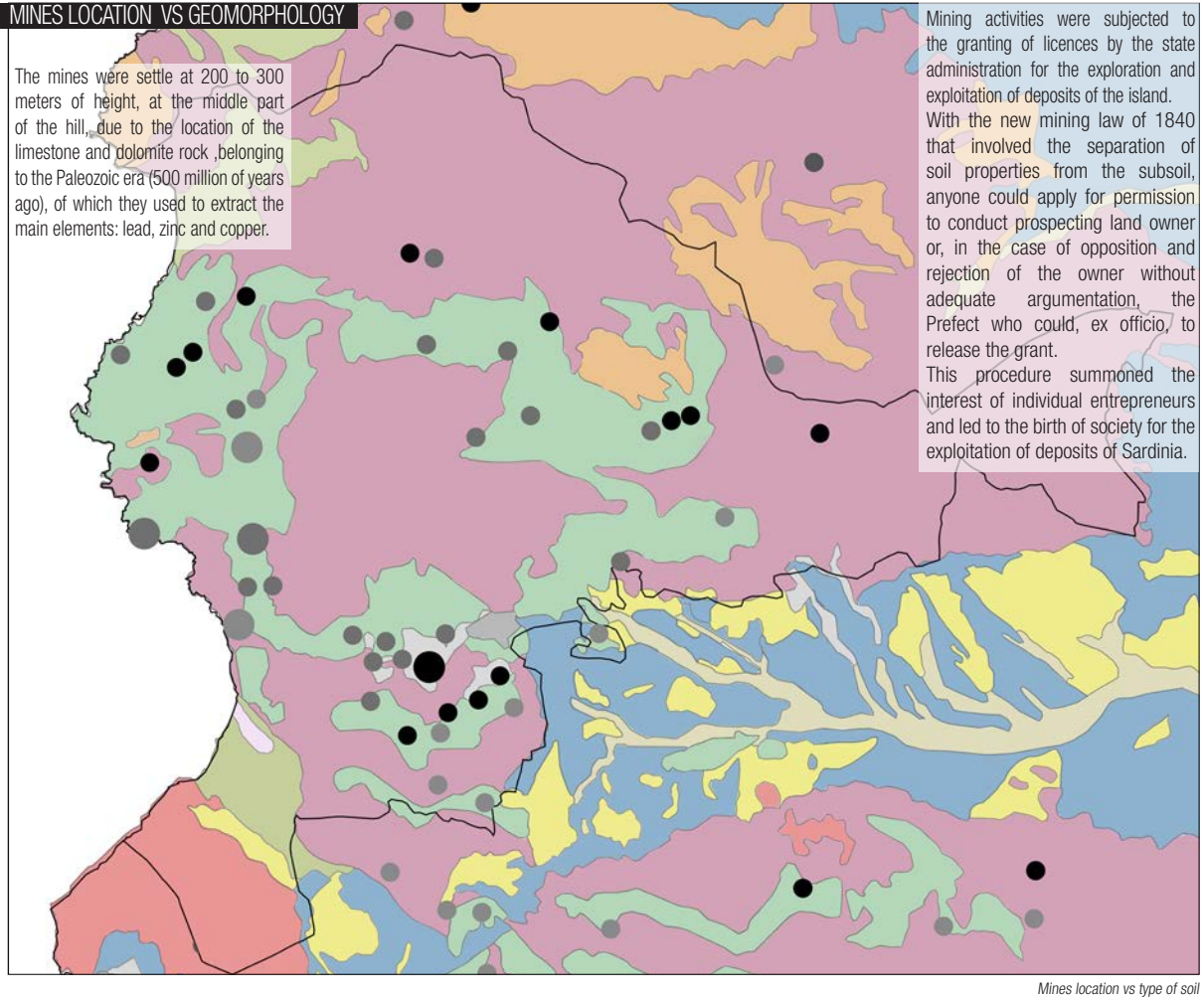
Flourine,Barium	18%
Lead,Zinc,Silver	49%
Lead,Zinc,Silver, Copper	33%

Mines extracting Lead,Zinc,Silver,Copper
Mines extracting Lead,Zinc,Silver
Mines extracting Flourine, Barium
Excavations

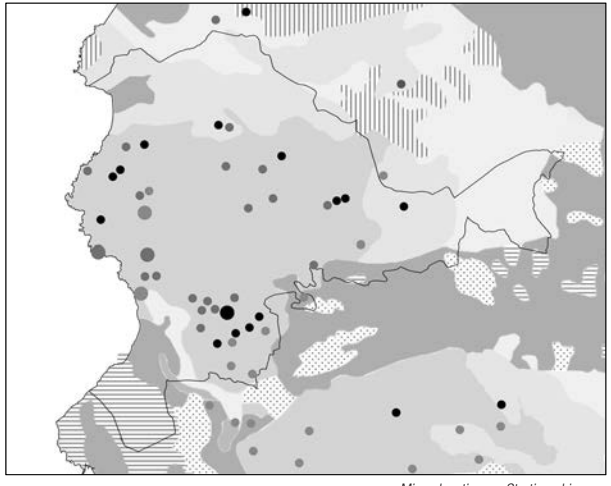
MINES LOCATION VS GEOMORPHOLOGY

The mines were settle at 200 to 300 meters of height, at the middle part of the hill, due to the location of the limestone and dolomite rock ,belonging to the Paleozoic era (500 million of years ago), of which they used to extract the main elements: lead, zinc and copper.

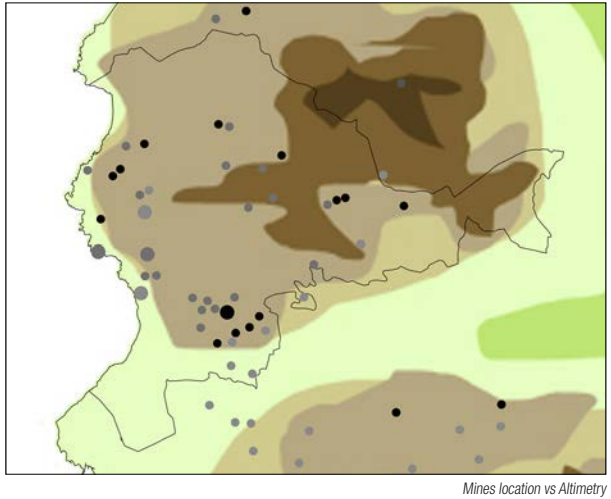
Mining activities were subjected to the granting of licences by the state administration for the exploration and exploitation of deposits of the island.
With the new mining law of 1840 that involved the separation of soil properties from the subsoil, anyone could apply for permission to conduct prospecting land owner or, in the case of opposition and rejection of the owner without adequate argumentation, the Prefect who could, ex officio, to release the grant.
This procedure summoned the interest of individual entrepreneurs and led to the birth of society for the exploitation of deposits of Sardinia.



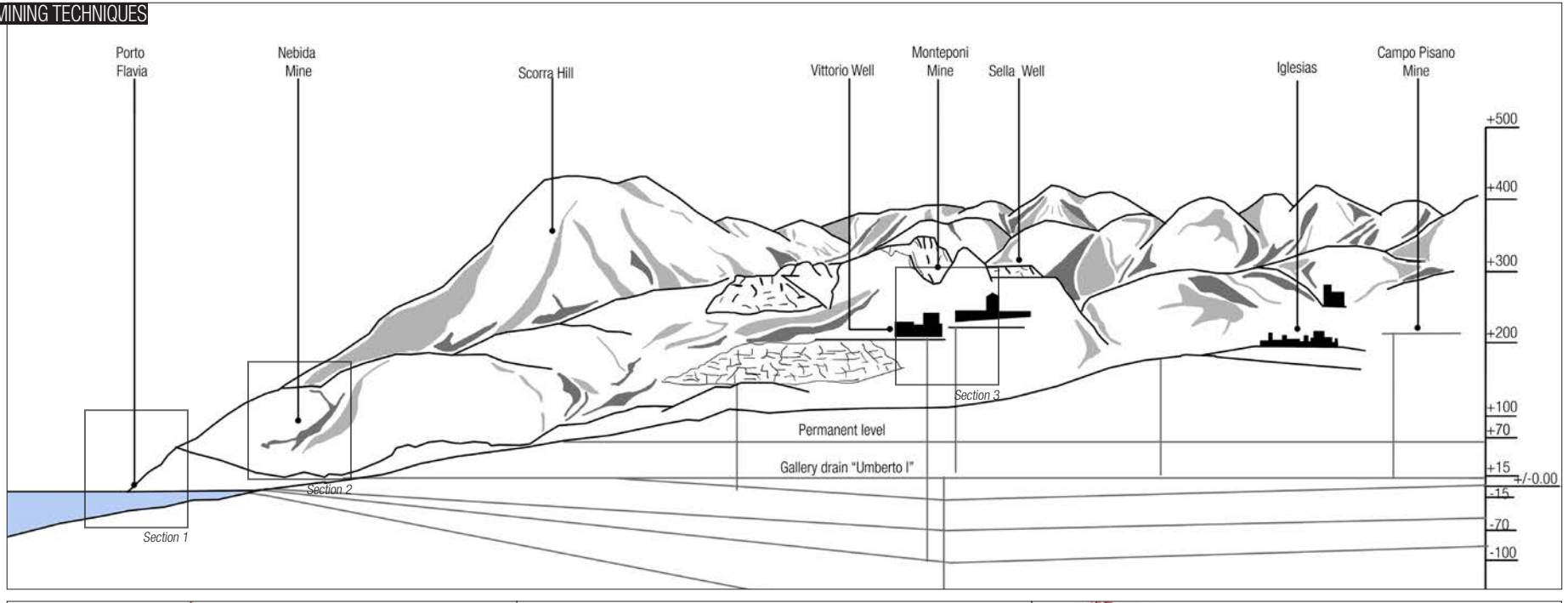
Mines location vs type of soil

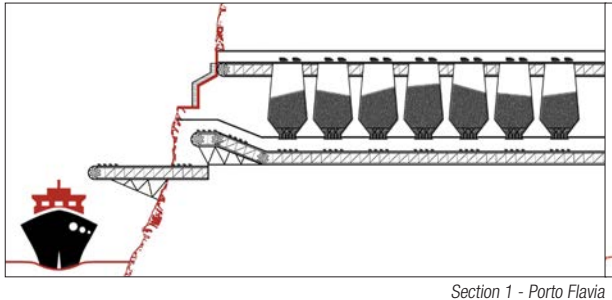


Mines location vs Stratigraphic map

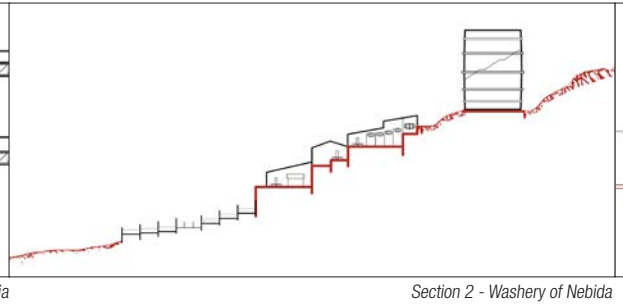


Mines location vs Altimetry

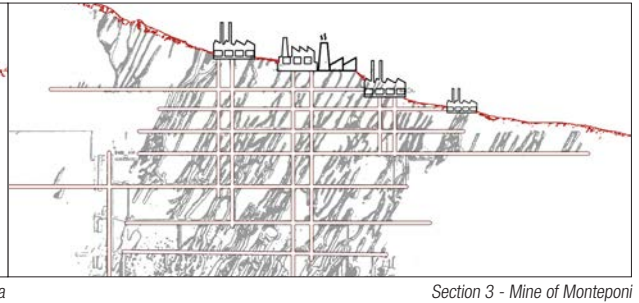




Section 1 - Porto Flavia



Section 2 - Washery of Nebida



Section 3 - Mine of Monteponi

DUMPS OF RESIDUAL MATERIALS

Mining dumps are mostly made up of coarse materials which have not undergone any transformation after the extraction process. The deposits of slag and sludge derived from industrial processes (mineralurgical and metallurgical) constitute dangerous sources of pollution for the surrounding territories, first for the waters, both superficial and deep, but also for soils and, indirectly, for agricultural activities and pastoral.

These heaps of materials are breaking the natural vegetation along entire mountainsides. The substrate instability contribute, with the presence of pollutants, to make the development of vegetation and the evolution of the soil extremely difficult.

Residual materials in the mine of Masua

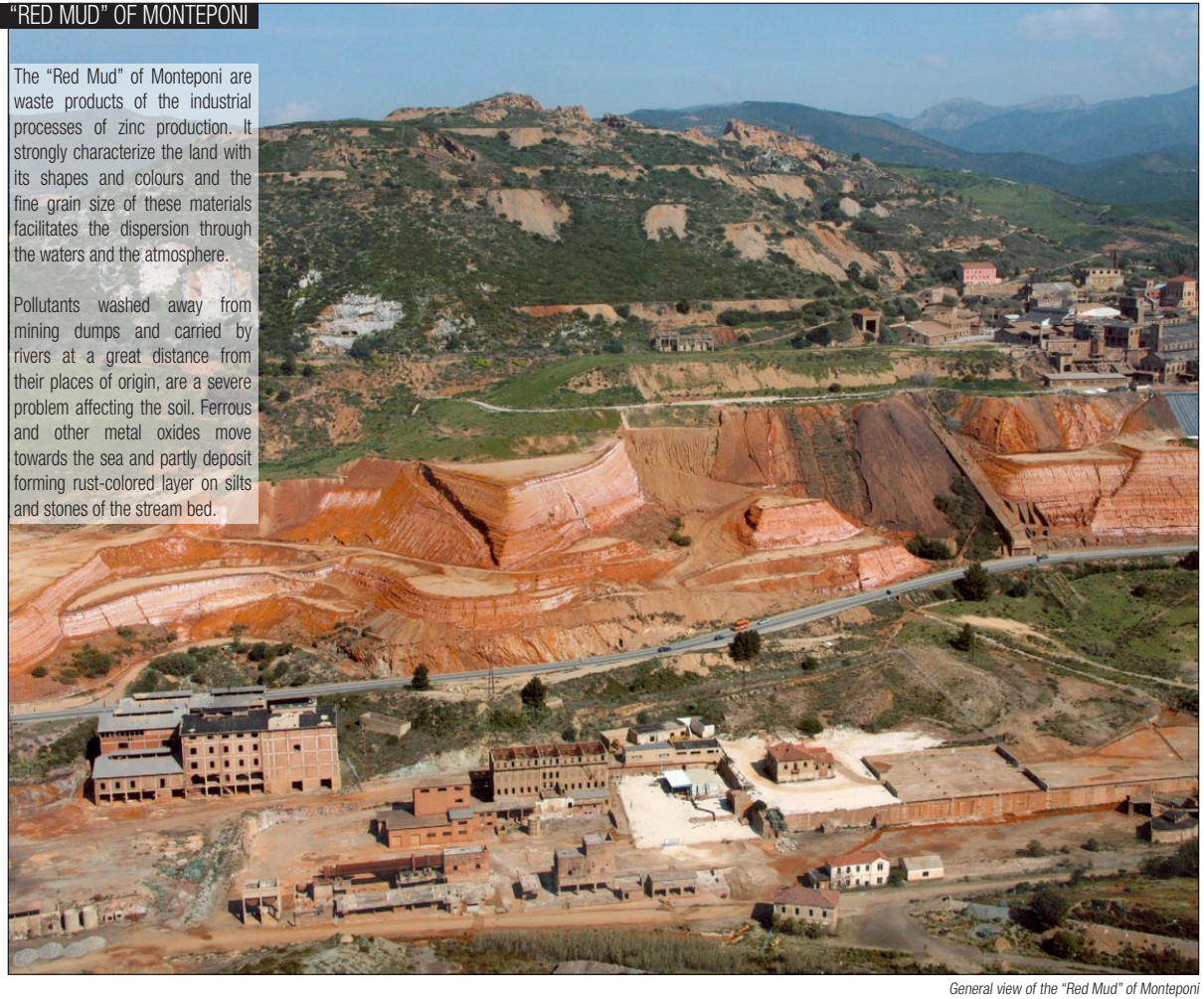
Residual sterile materials of mining activities

Residual sterile materials of mining activitiy in Monte Scorra (Iglesias) above which vegetation is growing again

"RED MUD" OF MONTEPONI

The "Red Mud" of Monteponi are waste products of the industrial processes of zinc production. It strongly characterize the land with its shapes and colours and the fine grain size of these materials facilitates the dispersion through the waters and the atmosphere.

Pollutants washed away from mining dumps and carried by rivers at a great distance from their places of origin, are a severe problem affecting the soil. Ferrous and other metal oxides move towards the sea and partly deposit forming rust-colored layer on silts and stones of the stream bed.



General view of the "Red Mud" of Monteponi

Polluting substances that are washed away from mining dumps

The "Red Mud" of Monteponi

COLLAPSES OF THE LAND

The weakening of the soil due to centuries of deep excavations in the subsoil for the extraction of minerals, has sometimes caused the collapse of the ground determining these large voids in the territory.

Collapse occured at the mine of Masua due to the weakening of the soil because of mining activity

Mine of San Giorgio

Hole opened in 2009 in the Paleozoic hills of Narcao along a steep slope near a tectonic discontinuity

OPEN-AIR EXCAVATIONS

Open-air excavations are on the slopes and on the tops of many mountains. In the photos it is obvious that in many cases the topography of the area has been deeply transformed by mining exploitations.

Mining site of Cungiaus at Monteponi

Eroded areas due to excavations over Monteponi

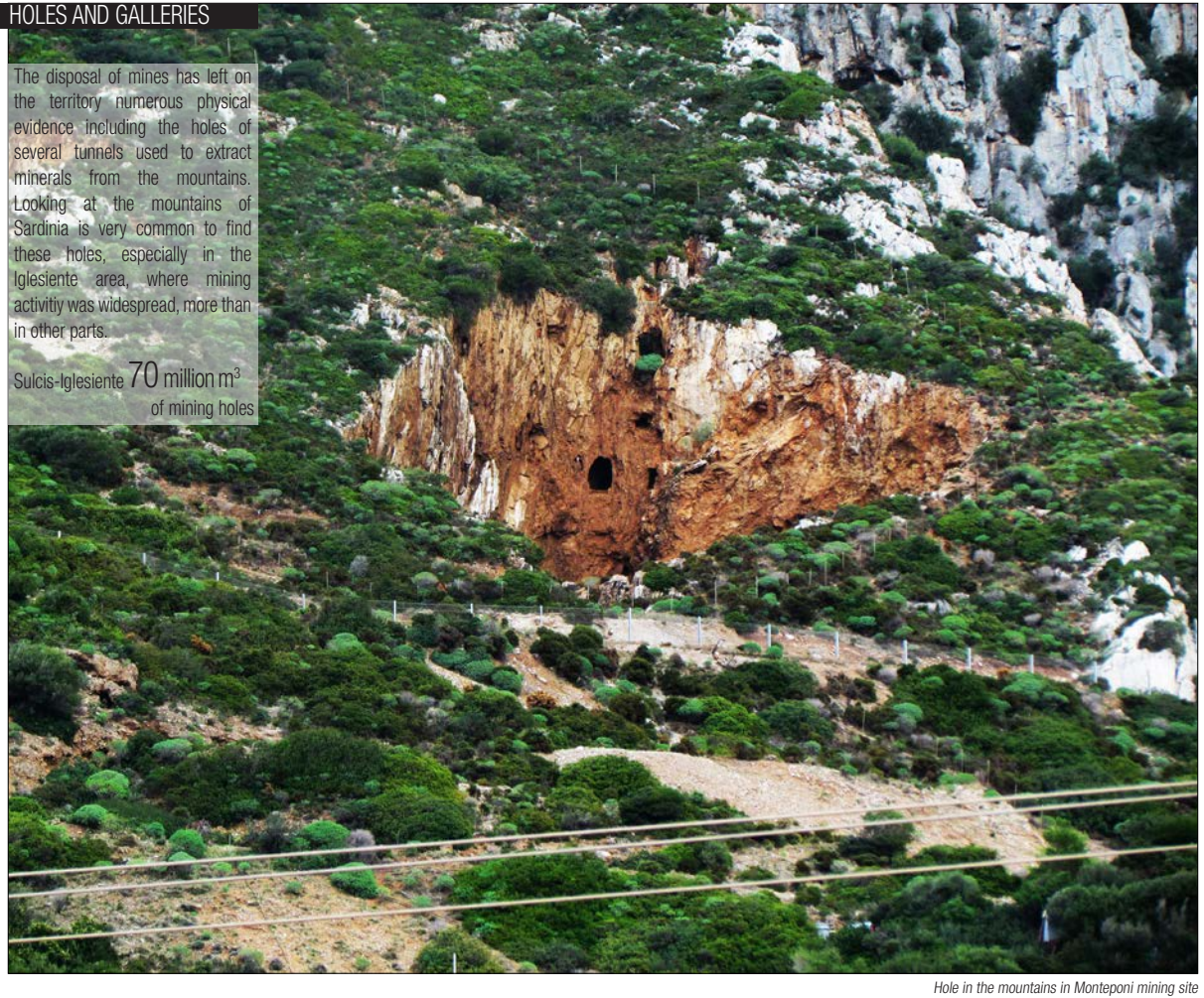
Ilario extracting site at Sa Marchesa Mine

Open air excavation at Santa Lucia mine

HOLES AND GALLERIES

The disposal of mines has left on the territory numerous physical evidence including the holes of several tunnels used to extract minerals from the mountains. Looking at the mountains of Sardinia is very common to find these holes, especially in the Iglesiente area, where mining activitiy was widespread, more than in other parts.

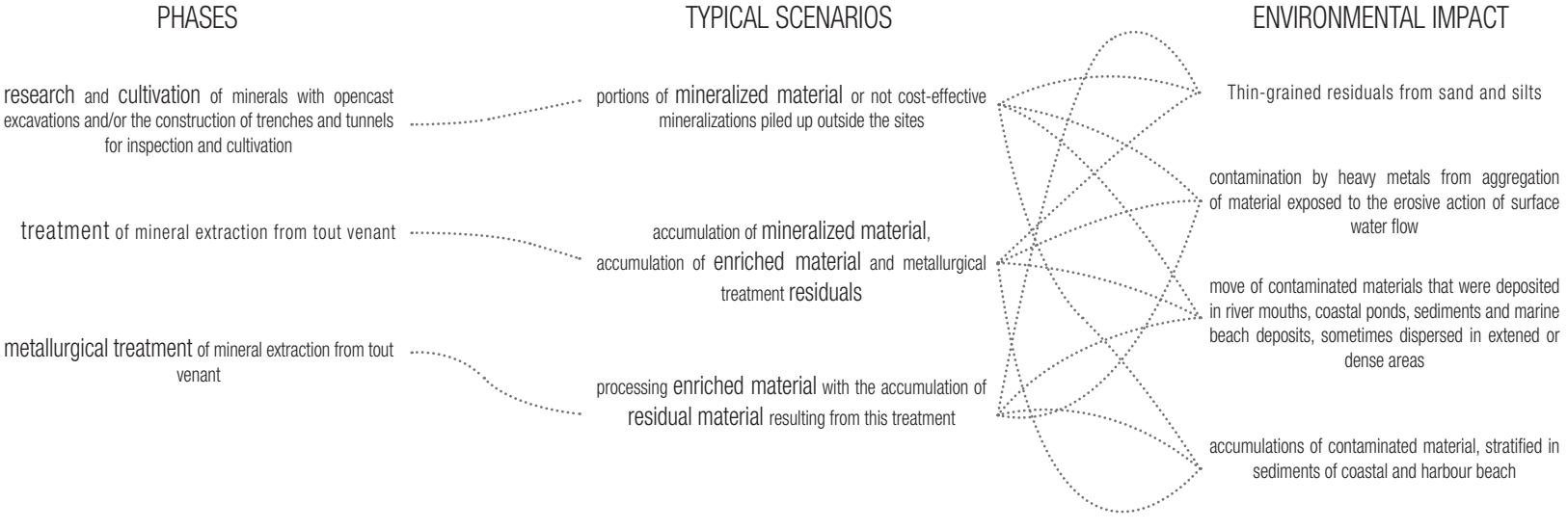
Sulcis-Iglesiente 70 million m^3 of mining holes



Hole in the mountains in Monteponi mining site

Former gallery

Entrance of the mine of Porto Flavia


PHASES
research and cultivation of minerals with opencast excavations and/or the construction of trenches and tunnels for inspection and cultivation
treatment of mineral extraction from tout venant
metallurgical treatment of mineral extraction from tout venant
TYPICAL SCENARIOS
portions of mineralized material or not cost-effective mineralizations piled up outside the sites
accumulation of mineralized material, accumulation of enriched material and metallurgical treatment residuals
processing enriched material with the accumulation of residual material resulting from this treatment
ENVIRONMENTAL IMPACT
Thin-grained residuals from sand and silts
contamination by heavy metals from aggregation of material exposed to the erosive action of surface water flow
move of contaminated materials that were deposited in river mouths, coastal ponds, sediments and marine beach deposits, sometimes dispersed in extened or dense areas
accumulations of contaminated material, stratified in sediments of coastal and harbour beach

Open-air excavations
24.263 m^2

Mining dumps
332.910 m^2

Residual muds
168.300 m^2

Mineral accumulation
3.403 m^2

Major treatment plant located a few meters from the beach
Open-air and underground cultivations surrounding the village

Treatment of the material extracted from the mine of Acquaresi, Nebida and small adjacent deposits

Residuals of treatment discharged directly into the sea; only in the last period of activity, large sterile basins were created near the plant

In the area surrounding the plant, several non-confined accumulations of treated mineral: potential risk to human health and to the quality of the ecosystem

Pollution mainly from the oxidation of sulfides produce a strong acidification of the substrate releasing zinc and lead

RIO SAN GIORGIO - IGLESIAS (MONTEPONI)

Open-air excavations
684.152 m^2

Mining dumps
775.870 m^2

Residual muds
1.209.380 m^2

Mineral accumulation
207.565 m^2

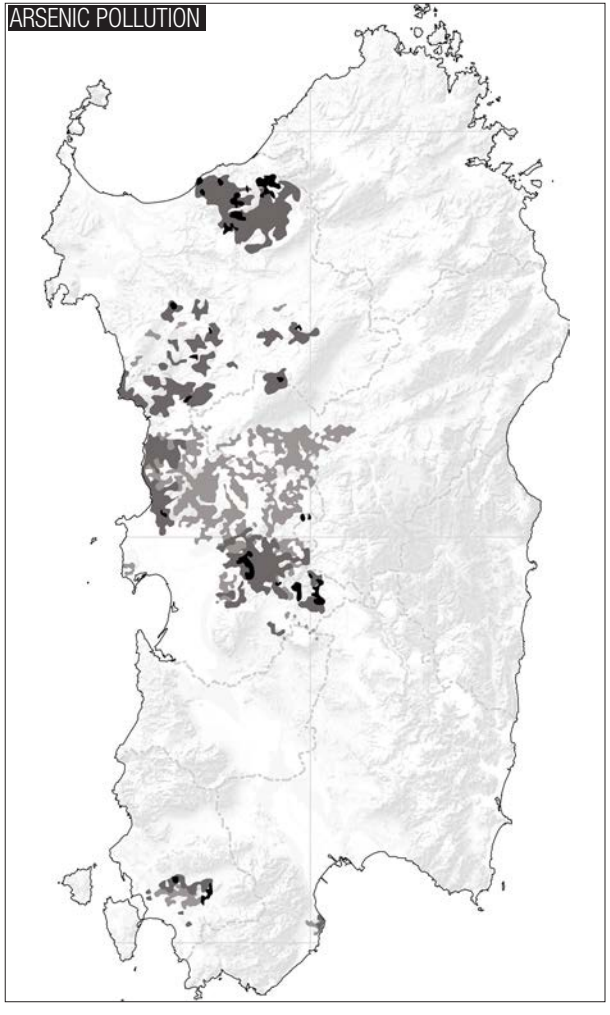
Dispersion of residual material (especially red mud) due the wind and runoff water

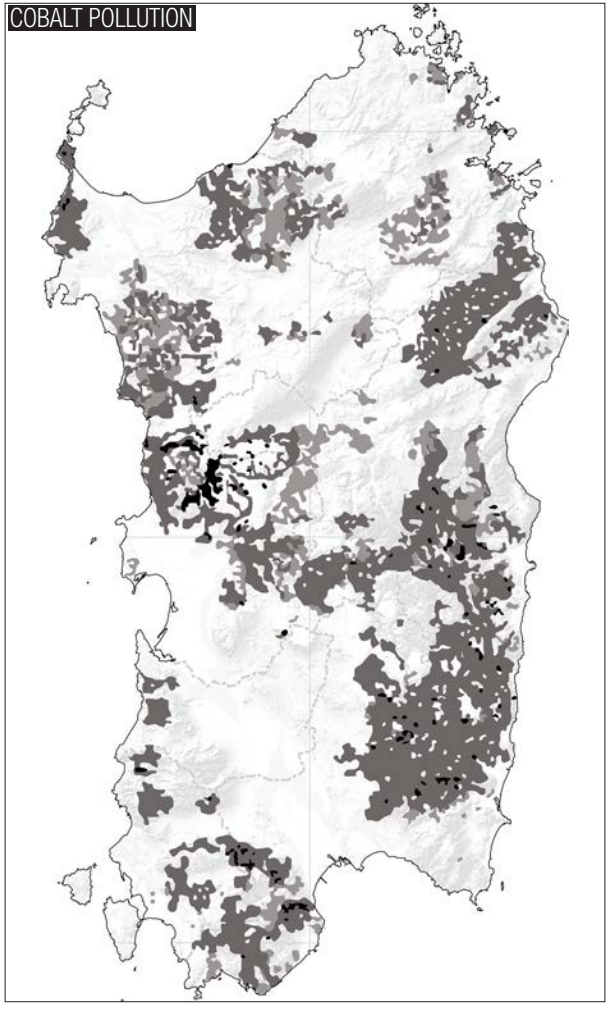
Contamined surface water and sediments with arsenic, cadmium, mercury, lead and zinc

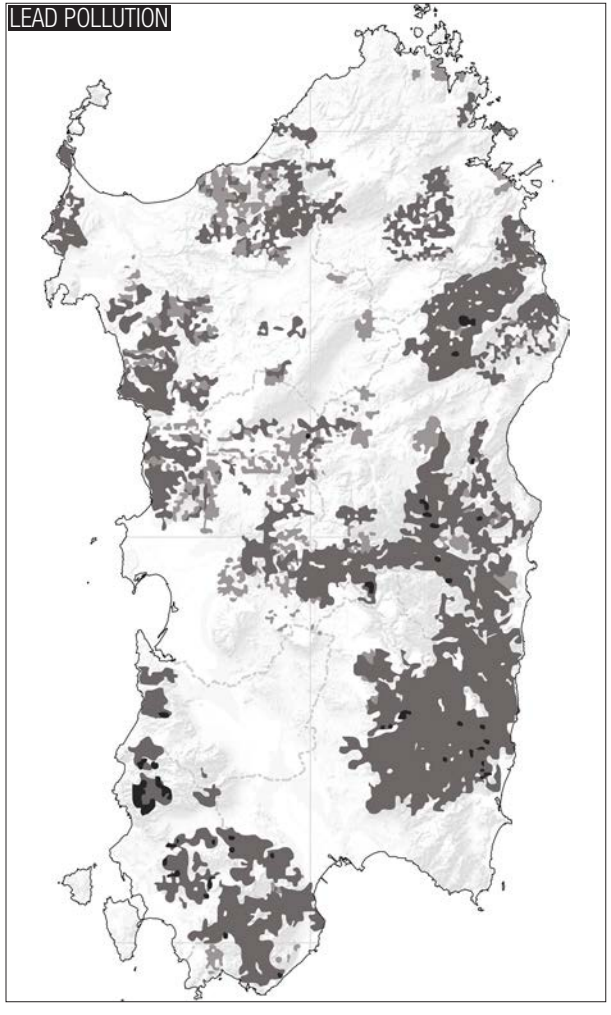
Mineralurgical components, due to contact with atmosphere, surface waters and groundwater, are subject to constant change as a result of oxidation-reduction reactions that alter the species leading to new minerals.

The geochemical risk is often amplified by the content in mineral sulphides which, after oxidation induced by exposure to air, causes acidification of water and increase the mobility and bioavailability of potential contaminants in environment

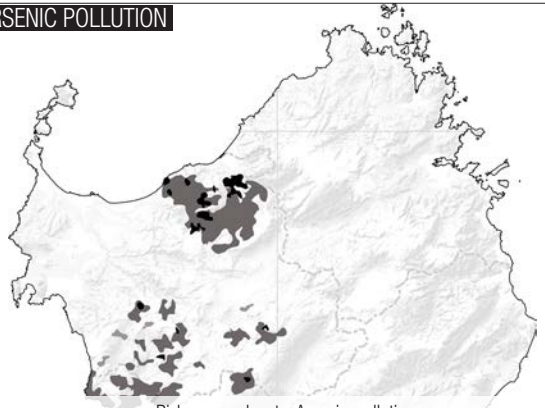
Unfenced excavations, open mining way-in, unstable buildings


ARSENIC POLLUTION


COBALT POLLUTION

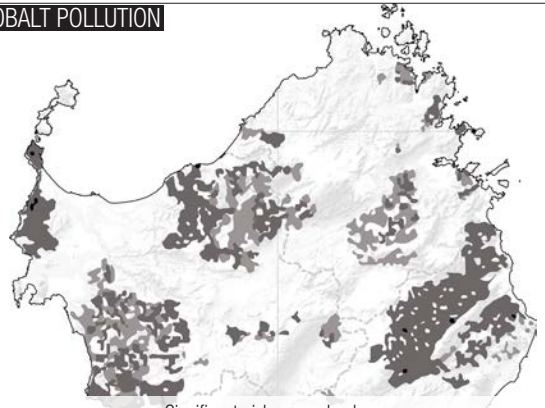

LEAD POLLUTION

ARSENIC POLLUTION

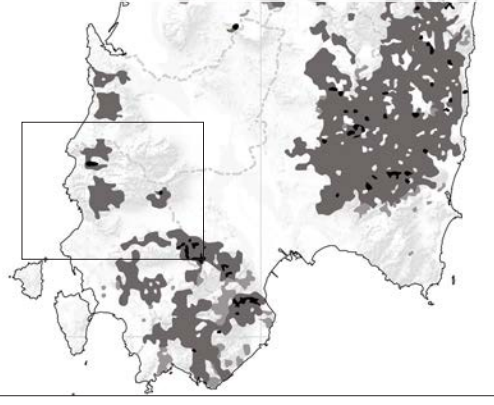


Risk areas due to Arsenic pollution are identified around Laconi, in the southeast of Carbonia and in a significant area between Castelsardo, Tempio Pausania, and Sassari.
All the risk areas are characterized by outcrops of Tertiary calcalkaline andesite–rhyolite volcanics.

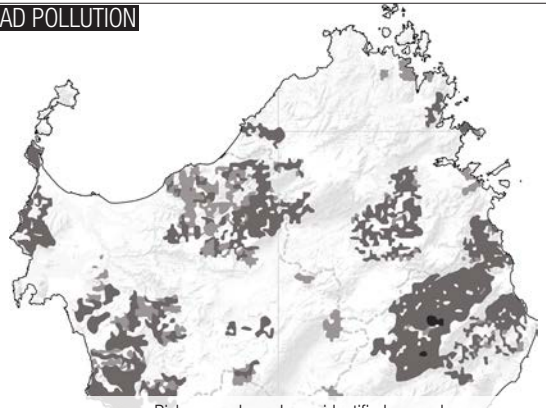
COBALT POLLUTION



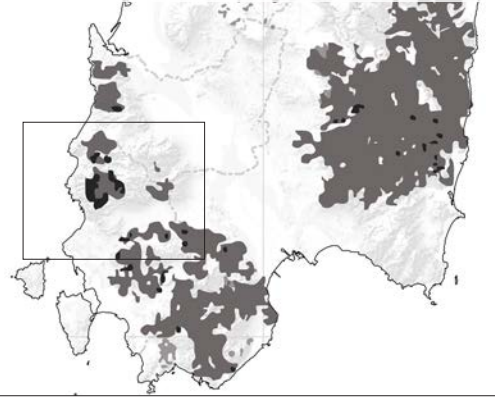
Significant risk areas land use occur between Macomer and Oristano, where Plio–Pleistocene alkaline to subalkaline outcrops are present. Other isolated risk areas, for both the residential and agricultural land uses, are found inthe southeastern and southwestern Sardinia.



LEAD POLLUTION



Risk areas have been identified around the town of Iglesias, with the historic Lead and Zinc mining district and its widespread dumps and tailings. Smaller and scattered risk areas are also seen southeast of Carbonia, in the Villasalto area, east of Laconi, west of Urzulei and between Siniscola and Bitti.



NEW GROWING VEGETATION ON POLLUTED SITES

NEW GROWING VEGETATION ON POLLUTED SITES

The Genista sulcitana endemism can form garrigues and low spots over dumps and flotation basin.

Rumex bucephalophorus L. - annual herb forming extensive colonies on coarse-grained substrates, usually sandy or gravelly soils, particularly in river channels. It fits very well in the dumps, creating a uniform coverage.

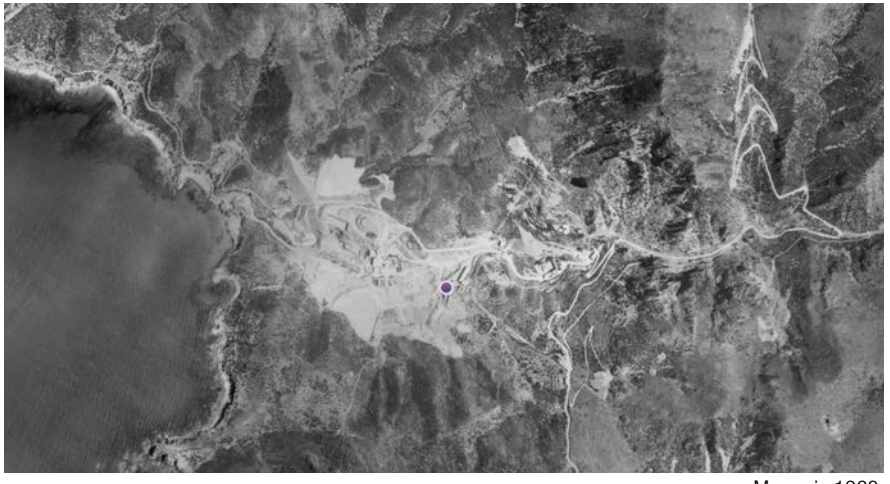
The Resedo-Limonietum merxmuelleri is plant of Iglesias, where it has its greatest development on thin or coarse-grained soils heavily polluting. The photo shows a population on a sludge basin.

Once, with the passage of time, the pioneer vegetation favoured the stabilization of dumps, on these a new soil starts forming and more demanding plants in soil and less tolerant about pollution can take over. On the dumps, then, Cistus start growing.

Casabonae Ptilostemon colonizing a pebbly area on mining dump; suitable to spread out of these materials, poor and inconsistent, due to the high number of seeds produced, the ability of the roots to grow deep stabilizing the substrate and the high tolerance to heavy metals in the soil.

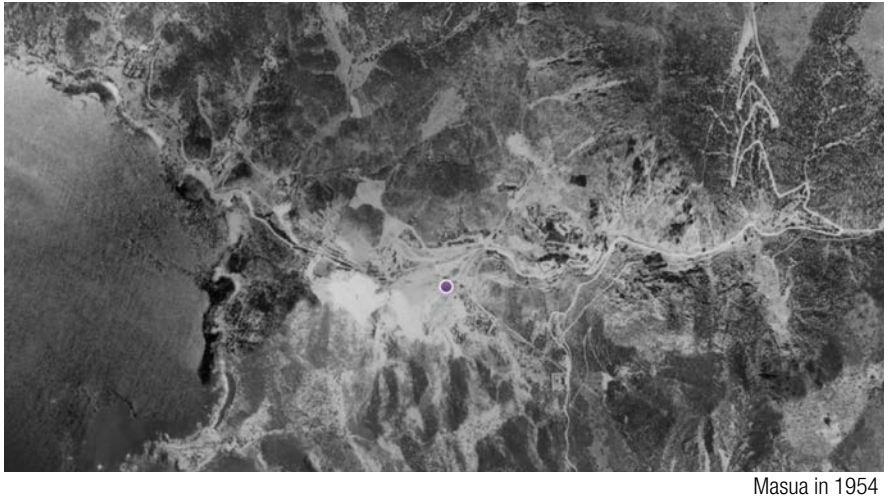
MASUA DEVELOPMENT 1954-2010

Masua in 2010



Masua in 1968

Masua in 1977



Masua in 1954

NEBIDA DEVELOPMENT 1954-2010

Nebida in 2010

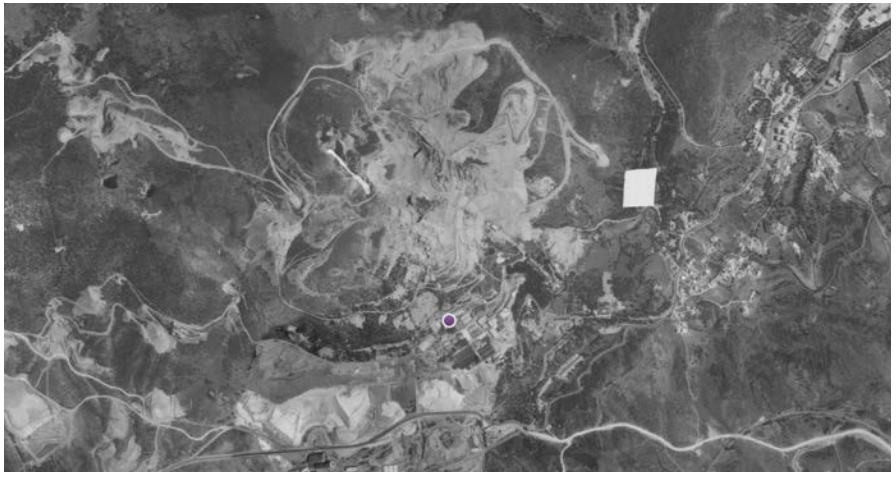
Nebida in 1968

Nebida in 1977

Nebida in 1954

MONTEPONI DEVELOPMENT 1954-2010

Monteponi in 2010



Monteponi in 1968

Monteponi in 1977

Monteponi in 1954

REOPENING | Is the reopening of zinc mines a possibility, on the accountance of periodical floods?

REFILLING | Refilling of the voids would consume 2 millions m^3 of earth. Is it too expensive in terms of economy, management and manpower?

REUSE | Is it possible to reuse residual material with the help of new technologies?

STATUS OF IMPLEMENTATION

Macro-area Masua

Title of Intervention: *Plan of the coastal marine system characterization of Masua*

Typology of activity: Characterization plan

Status of implementation: Plan approved on 11 November 2005

FUTURE PLANS

Steps regarding the safety of mud reservoirs by improving and securing contaminated land, securing permanently i.e removing of mining dump sites that are in great danger. Also, tasks like identification and creation of a site for the materials removed have been taking place. Consolidation or uniting of the underground voids, remediation or removal of pollutants, contaminants and hazardous waste from the underground voids are also being processed.

Total cost: 32.000.000 euro

STATUS OF IMPLEMENTATION

Macro-area Valle of Rio San Giorgio-Iglesias

Title of Intervention: *Securing landfill "red mud" in the Valley of Iglesias*

Typology of activity: Permanent safety risk minimisation measures of pollution resulting from the storage of "red mud" and surrounding areas in the Valley of Iglesias

Status of implementation: Plan approved on 31 May 2005. Works is nearing completion

Title of Intervention: *The Monteponi mining area-San Giovanni mine (safety and environmental rehabilitation of excavation and mining dumps)*

Typology of activity:Emergency safety

Status of implementation: Plan analyzed on 11 November 2005. Works finished

FUTURE PLANS

Interventions relating to the reclamation of areas of Monteponi Red Mud and Pisano are in progress.They are subjected to productive redevelopment projects like removing or securing mineral and waste dumps in the areas in geater danger.Also one or more collection sites are being identified and implimented. Consolidation or uniting of the underground voids,remediation or removal of pollutants,contaminants and hazardous waste from the underground voids are also being processed.

Total cost: 123.000.000 euro

POLITECNICO DI MILANO
School of Architecture and Society
Master in Architecture A.Y. 2015/2016
Town Planning Design Workshop
Ghost Town Laboratory
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Ingrid Noe Colonia
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Daya Vismara
Chaoran Wang

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Sitography

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Documents

PIANO PAESAGGISTICO REGIONALE SCHEDA D'AMBITO N° 7 BACINO METALLIFERO
PIANO ENERGETICO AMBIENTALE REGIONALE DELLA SARDEGNA 2014-2020, STUDIO DI INCIDENZA
STORIA DELLA COSTRUZIONE DEL PARCO GEOMINERARIO STORICO ED AMBIENTALE DELLA SARDEGNA E RUOLO DELL'ASSOCIAZIONE ONLUS PER IL PARCO GEOMINERARIO STORICO ED AMBIENTALE DELLA SARDEGNA
PIANO DI BONIFICA DELLE AREE MINERARIE DISMESSE DEL SULCIS-IGLESIENTE-GUSPINESE