DANIELA PITTALUGA

FABIO FRATINI

(édité par/by)

CONSERVATION ET MISE EN VALEUR DU PATRIMOINE ARCHITECTURAL ET PAYSAGÉ DES SITES CÔTIERS MÉDITERRANÉENS

CONSERVATION AND PROMOTION OF ARCHITECTURAL AND LANDSCAPE HERITAGE OF THE MEDITERRANEAN COASTAL SITES

ripam 7

Gênes, 20-22 Septembre 2017

Genoa, September 20th-22nd 2017

FrancoAngeli

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Ce livre est un ouvrage collectif, dont les contributions ont été élaborées à partir de la conférence RIPAM 7, organisée à Gênes du 20 au 22 septembre 2017 par le DAD - Département d'architecture et de design (Université de Gênes) en partenariat avec le CNR-ICVBC Institut national de recherche, Institut pour la conservation et la mise en valeur du patrimoine culturel de Florence).

This book is a collective work, with contributions developed starting from RIPAM 7 conference, organized in Genoa, 20 to 22 September 2017 by the DAD - Department of Architecture and Design (University of Genoa) in collaboration with the CNR-ICVBC (National Research Council, Institute for Cultural Heritage Conservation and Valorization, Florence).

Daniela Pittaluga et Fabio Fratini ont travaillé ensemble sur les textes initiaux (comprenant les sections “Qu’est-ce que le RIPAM?” et “Conférence RIPAM 7”, les remerciements et les index) et sur les descriptions des thèmes et sous-thèmes (sections A et B et sous-parties). Cependant, Daniela Pittaluga a écrit les parties en français et Fabio Fratini a écrit les parties en anglais, ils sont auteurs de certains articles et les editeurs de la partie restante.

Daniela Pittaluga and Fabio Fratini worked together on the initial textes (including sections “What is RIPAM?” and “RIPAM 7 Conference”, aknowledgemnts and indexes) and on the descriptions of the themes et subthemes (section A and B and subparties). However, Daniela Pittaluga wrote the parts in French, and Fabio Fratini wrote the parts in English. They are authors of some articles and editors of the remaining part.

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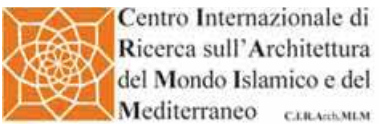

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translata, could be resized due to the Gallic origins of the ancient author, would certainly have a less hyperbolic nuance the famous words that Pliny the old of the first century AD: *Italia verius quam provincia* "Italy more than a province" [41].

[41] Cfr. Plinio *Naturalis Historia* 3, 4, 31.

Porto Flavia: an "iconic" engineering work in the mine machine-landscape

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Summary."*The new triumph arising from National industry*". These were the words with which Porto Flavia was presented in the magazine "La Miniera Italiana" [The Italian Mine] in 1926, an extremely modern structure overlooking the sea that revolutionised the ore transportation system from the coasts of the Sulcis-Iglesiente (an historical region in Sardinia). The project was designed by Cesare Vecelli in 1921 with the aim of creating a single embarkation point for the mines that were acquired by the *Société des Mines et Fonderies de Zinc de la Vieille-Montagne*, while the inauguration dates back to 1924. Porto Flavia is therefore the gateway to the sea of a dense and complex infrastructure network that allowed the transportation of ore from the innermost deposits to the coastal ones in Masua, along roads, railway routes and extremely long inclined planes served by modern funicular structures. The original idea was prompted by a rock spur overlooking the sea, inside which two tunnels were dug out: the top one with the mouth upstream and the bottom one with the outlet onto the sea. The two tunnels were separated by a difference in height of 20 metres where nine large storage silos were dug. During the loading operation, a mechanical cantilever arm poured the ore directly over the sea inside the hold of steamships. Porto Flavia is today one of the most significant and iconic mining-archaeology landscape structures on the coast of the Sulcis-Iglesiente: a neoclassical façade, almost metaphysical, embedded in the cliff which frames the mechanical arm and conceals the ingenious internal gear, while the plastered surface hides a skilful blend of natural materials and elements derived from the mining production, such as reinforced concrete and the rails of the track. The recovery of this abandoned architecture could become the occasion for repairing, with new paradigms, the rich fabric of relations between the landscapes of the mining archaeology and those of the coastline, with an integrated model capable of creating a new development based on cultural and tourist uses.
Keywords: Porto Flavia, Vieille Montagne, mining infrastructure, Masua, Cala Domestica, Acquaresi, Sulcis Iglesiente.

Fig. 01 : Loading of the mineral ore onto the steamships using the mechanical swivel arm overhanging the sea, Igea Archive, Iglesias

Introduction. Porto Flavia is the icon and, at the same time, the fulcrum of a significant historical innovation, which over a few decades starting from the 1920s brought significant changes to the centuries-old "mining epic" and modernisation in Sardinia, redesigning the infrastructure of the "metal ocean" in the area of Iglesias. In fact, until then, the structure of the territory for managing minerals after being mined was based on the assumption that the steep cliffs and the shallow seas along the "Coast of Mines" impeded the docking of large cargo ships. Therefore, the entire transport system was divided up and spread between a number of small landing points where the minerals were sent to be loaded manually by the *galanzieri* (term that indicates the sailors in charge of transporting mineral materials) on the *bilancelle* (term used to indicate a particular type of Sardinian boat) with their lateen sails and transported to the only existing port, Carloforte on the nearby island of San Pietro. From one year to the next, this system of operations became completely obsolete due to monumental engineering works based on a simple yet refined concept: bore a hole in the cliff face at a sheltered point that would allow cargo steamships to appoach the coast, and with a large mechanical arm, unload the mineral directly onto the steamships from the enormous silos dug into the rock and fed by a new mechanised transport system, where it had been stored. Porto Flavia, designed in 1921 by the Engineer Cesare Vecelli on behalf of the *Société des Mines et Fonderies de Zinc de la Vieille-Montagne* with headquarters in Liege in Belgium, and inaugurated in 1924 to serve the mine of Masua (and the other associated ones), became the single place overlooking the sea and the symbol of an extremely modern infrastructural network of railways, impressive tramming tunnels, long inclined planes, cableways and funiculars which, with extreme rationality, connected the points where the mineral was

mined with the mineral-processing and boat-loading facilities. It was a modern system from far away full of contradictions, but conditioned at the same time by the geomorphological characteristics of the ground.
The disproportion between the efforts and the magnificence of these works and the absence of a developed residential or productive fabric around them provides them with a metaphysical aspect, a wild and suspended condition that coherently includes them within the sphere of contemporary archaeological assets and turns them today into an extraordinary resource, a quality factor of the territory and of civil development. Structurally and systemically relaunching these contexts, which are today in a critical condition, would mean triggering processes of re-signification for these places and infrastructures in light of the new uses, in which continuity and modification create a new balanced condition within a system based on a new economy of culture and sense of belonging to places.

Porto Flavia and the infrastructural network of the mine of Masua, Acquaresi and Montecani.

Based on the discovery of evidences of workings from the Roman and Punic periods, the Montesanto[1] company from Genoa obtained the first mining concession in 1863 to extract lead and silver in the mine of Masua over an area of nearly 400 acres. The geological map drawn in 1888 by G.Zoppi shows that the deposits were concentrated in the belt of metalliferous limestone which extends North-South from Nebida to Acquaresi, while the facilities used to handle the ore, i.e. the foundry[2], the mechanical washeries and the furnaces were located at the foot of the shale slopes of the Matoppa Valley, closed to the West by the beach of Bega Sa' Canna. The miners' houses, consisting of stone masonry boxes

[1] From 1863 to 1884, the *Società Mineralogica di Montesanto* subcontracted the exploitation of the mine to a company which, in turn, entrusted its technical management to two engineers. According to the figures shown in the tables published by Q. Sella in the Parliamentary Report of 1871, Masua was the only active mine in the Sulcis-Iglesiente area until 1865.

[2] In fact, the presence of silver and zinc in the extracted galena made the mechanical processing of the extracted material extremely difficult and, conversely, smelting *in situ* was decidedly more profitable. The costs were still considerable and in order to amortise them the minerals produced in the nearby mines was also smelted in Masua. Therefore, right from the start the presence of the foundry gave the mine of Masua a role of importance throughout the mining area of the Sulcis-Iglesiente district.

lined up on a single plane along the contour lines or articulated on several floors and roofed with canes and Sardinian tiles, were nested on the slopes and grouped into small districts because of the steepness of the terrain. One of the first actions establishing the site was the construction of the landing place following the northern outline of the coastline, a simple concrete quay 40 metres long, used to load the mineral ore into the holds of small sailing boats with an 8-12 ton capacity, which sailed to the port of Carloforte where the materials were then loaded onto foreign and domestic steamships. In 1889, the warehouse for the ores to be shipped and the materials imported from abroad (such as coking coal or cast iron and iron bars), was built on the rock which sketches out the inner boundary of the beach. The buttresses overlooking the sea were used as hoppers for the ores which were downloaded from the edge of the plateau.

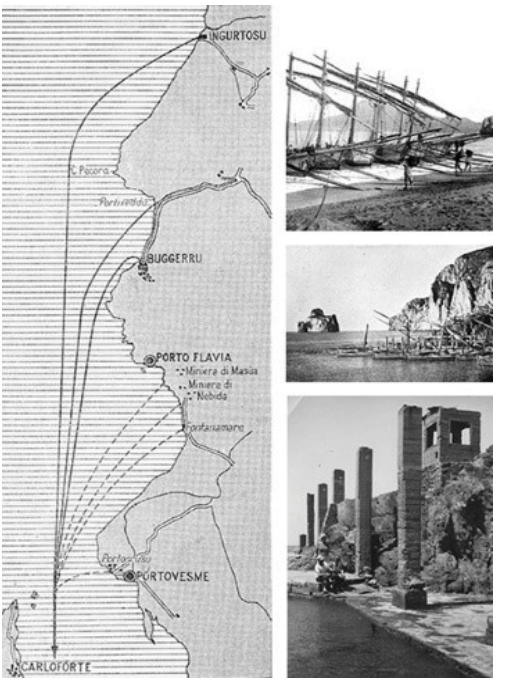

Fig. 02 : Inflow of mineral ore to the Port of Carloforte ready to be exported, (map taken from the text "I porti della Sardegna" [Ports of Sardinia] by Spano B., Mori A.); the bilancelle boats being loaded by the galanzieri, historical photos of the landing point at Masua and Buggerru, Igea Archive, Iglesias

The landing place and the warehouse were the bridgehead for the loading and unloading routes made by the series of companies that serviced the mine. The first ones were partly suitable for vehicular traffic and partly for rail tracks and were used to connect the warehouse with the processing facilities. While the downstream route, alongside and sometimes intercepting the winding path of the Matoppa Canal with little bridges, connected the landing place with the mineral-dressing plants and then continued along the northern slope winding its way into the village of Masua which included the housing for the miners, the manager's house and public facilities, i.e. the "Dopolavoro" (a kind of labour club, literally "after-work"), the company store, school, church, cinema and a small hospital. Nowadays, to the east, this path still converges with the main road which goes from north to south and connects the inland mines of Montecani and Acquaresi with the hamlet of Nebida.

Fig. 03 : Regional Technical Map, 1968 Private Archive of Fausto Pani. Fig.04: In the background, the foundry of Masua with its brick façade that overlooks the Canal of Matoppa and the first slag heaps, in "Album delle più importanti miniere della Sardegna" [Album of the major mines of Sardinia] (193?), Biblioteca della Camera del Commercio [Library of the Chamber of Commerce], Cagliari

In 1870, an engineer called Marchese was appointed Manager by the *Società Mineralogica di Montesanto* and obtained an extension to the Masua concession to cover the possibility of open-cast mining of the nearby calamine deposits. The new work sites dramatically scarred the landscape by adding more invasive scenarios to those created by the tunnels dug underground. The consequent significant increasing production made it imperative in 1886 to improve and extend the washing facilities which after only ten years were defined as "old", upon completion of the construction of the new plant erected in 1906. A report dated back to 1901 documents the construction of two overhead lines that replaced the use of ox-drawn carts to transport the mineral ore mined from the Montecani deposits. The first one was 250 metres long and

connected the San Carlo field with Punta Is Cortis, while the second, 380 metres long, reached Masua just before the village. Conversely, the minerals mined in Monte Nebida reached the valley along a self-powered inclined plane that with a large arched structure crossed over the road connecting Nébida with Acquaresi and covered a difference in altitude of 220 metres over a distance of 510 metres. A distance that had never previously been achieved in Sardinia.

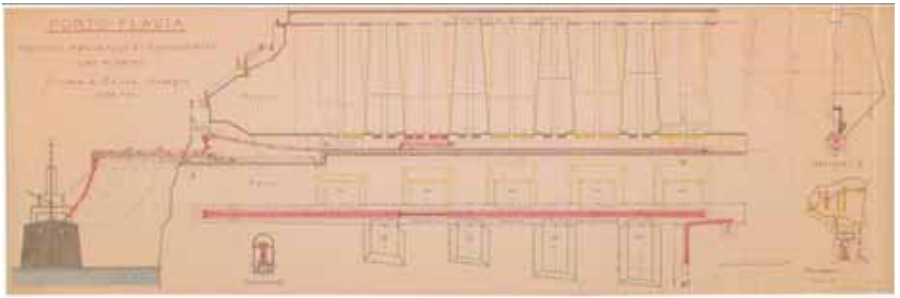

Fig. 05 : Project section, Ex-Distretto delle miniere Archive, Iglesias (in this regard we would like to thank Antonello Falchi)

Montesanto had in the meantime been taken over by the *SocietàAnonimaMinieredi Lanusei*[3] from Genoa, and in 1911, this company again revamped the infrastructure system. An extremely-modern loading system was installed on this surfaceconsisting of a raised railway served by two cranes and supported by two rows of six single-block, concrete pillars developed along the longitudinal sides of the quay[4]. In 1921, the *Société des Mines et Fonderies de Zinc de la Vieille-Montagne* purchased the majority of the share capital and obtained control of the mine of Masua, which in this way became part of a single large group consisting of all the deposits at Montecani and of the complex of Acquaresi mines, i.e. Enna Murta, Canal Grande and Pubuxeddu. The main objective of the new manager, Cesare Vecelli, was to rationalise the transport system, creating by introducing new routes to

[3] The *SocietàAnonimaMiniere di Lanusei* was founded in 1869 by the Mayor of Genoa and the calamine it produced was shipped to England, while the lead went to the Pertusola works in Liguria.

[4] One of the two cranes, which was controlled from a concrete electricity substation built on the rocks, was used to lift the wagons full of mineral and place them down on the track. The other crane had the task of hooking the wagon, sliding it horizontally and positioning it above the hatchway before making it descend vertically to the required height. At that stage, a worker would open the wagon bottom with a bar and the mineral fell into the cargo hold of the ship.

make the transportation of the minerals more functional and less expensive. An electrically-powered railway route followed by an inclined plane and a tunnel section connected the Pubuxeddu mine (Acquaresi) with the Montecani Mine Shaft which, after a drop of 140 metres, was subsequently connected to the Galleria Lanusei, an impressivetramming tunnel equipped with a double track 900 metres long, developed on a straight line, where the wagons used to run, initially drawn by horses or by hand, and then by an electric locomotive. The tunnel ended in Lanusei Square near the village of Masua. From this point the mineral was transported to the "laveriavecchia" (old washing facility) by means of an aerial funicular measuring 500 metres. After the first treatment phase, a railway which crossed the valley from side to side transported the materials to the hoppers of the shaft furnaces and of the underlying Oxland furnaces, which were served on the west side by a double-track inclined plane which was built in 1917 and covered the level difference of 50 metres. It provided the downstream transportation of the mineral going to the warehouse and the upstream transportation of waste materials which were disposed of through a tunnel which ended on a rock cliff overlooking the coast. The slag dumped into the sea changed the coastline extending the sandy shoreline. Consequently, in 1915, the *SocietàAnonimaMiniere di Lanusei* extended the quay a further 60 metres with a monolithic concrete surface, reinforced on the bottom with old sheet metal wagons and boiler ringsa single embarkation point on the north side of the small port of Bega Sa'Canna. In fact, part of the mined mineral from Acquaresi, reached the attractive landing place at Cala Domestica along an extremely modern electrically-powered railway opened in 1903. The first one ever built in Sardinia. In 1921, under the funicular railway that connected PiazzaleLanusei with the "old washing facility", Vecelli designed and built an inclined plane of 320 metres using the tracks which had been used to serve the now-exhausted deposits of Monte Nebida, and simultaneously started the construction of Porto Flavia[5].By taking best advantage of the terrain features that to the north of the inlet ended with a huge spur overlooking the sea, he dug two

[5] The construction site was arranged in an extremely rational way. The 600 metres of the loading tunnel were completed in 50 working days, while the construction of the 100-metre unloading tunnel took about three months. The surveys that examined the seabed ascertained that even the largest steamships could moor without additional manoeuvres, while the wind studies revealed that 100 working days could be saved by avoiding the port of Carloforte.

tunnels into the mountain, one above the other: the top one with the mouth upstream, the bottom one with the outlet onto the sea. The two tunnels have a level difference of about 20 metres[6], and nine large silos were dug between them to store the mineral. During loading operations, a mechanical arm, located in the end section of the lower tunnel, projected outwards over the sea for about twenty metres and ended with a "vertical tube chute" which directed the mineral down into the steamship hold. In this way, the landing place and its storage warehouses became the working cogs of large, single infrastructural engineering and embarkation works, which revolutionised the mineral transport system, eliminating the economic drawbacks of having to go to the port of Carloforte and, at the same time, drastically reducing risks and unnecessary effort. The loading tunnel crosses the cliff from one side to the other and, at the mouth overlooking the sea, the track forms a "noose" that allows the wagons to return inside. Two transverse paths ending on the south side of the cliff were excavated to facilitate the disposal of debris produced by the explosions. An iron staircase also had to be installed on the rock face overlooking the sea using a system of clamps, to assist with making the unloading tunnel. Conversely, the railway route, which used to end upstream of the storage warehouse, was extended for about 2 km as far as the mouth of the loading tunnel and was served by an electrically-powered railway. Vecelli used an essential and clean compositional solution for the ingenious transport system overlooking the sea, seeking legitimacy and magniloquence in the sobriety of two buildings standing close together, a parallelepiped and a tower, with the evocative capacity of just a few elements drawn from the neoclassical language. The use of an arch framing the opening for the mechanical arm, and a crenellated tower on the top provides that decorative extra, drawn from past historical periods according to the typical revival taste of nineteenth-century culture, which produced objects that were undoubtedly unrelated to the widespread sensibility that was used to the

[6] An accurate survey established the right layout for the silos and the profile of the railway that connected the loading point represented by the furnaces with the rock wall overlooking the inland area. This is how the level of the top tunnel was obtained: 37.40 metres above sea level. While the height of the unloading tunnel, located 16 metres above sea level, was established by considering the most convenient position for unloading the mineral into steamships of any size. Thanks to its position, which was sheltered from the wind for nearly five sectors, it was possible to produce 9000 tons with 500 workers.

simple shapes of the small *medaus* and *furriadroxius* (historical rural settlements) that were scattered across the inland areas. Furthermore, the tower is also the closing corner of a system of steep terraces which connect the mouths overlooking the sea of the two tunnels with an open staircase in turn connected to a series of very small rooms used as offices and a "canteen" built on the rocks and closed by an external wall made of local stone blocks which previously had plaster rendering. The staircase is also made in masonry but the metal sheets which cover the intrados of the ramps and of the horizontal sections, emphasise a peculiar constructive feature. These sheets are in fact the bottoms of the formworks used for concrete castings and taken from the railway construction sites.

Modern materials borrowed from the industrialised world of the mining production, such as concrete or metal, easily blend in to support construction solutions, which to some extent can be considered archaic, and that until then had been solved only by using traditional materials. The composure of the composition, the white plastered surface covering the main buildings and staircase emphasise the perception of this "monument" which is now an integral part of the environment and comparable to a rock formation.

Under the direction of Vecelli, the cableway was completed and commissioned in 1930, with a total length of 3.80 km. This carried the mineral extracted from the mine of Enna Murta to the calcination furnaces nestling on the north slope of Masua.

At the same time, however, due to the progressive depletion of the deposits, the *Vieille Montagne* began sending workers to other mines owned by the company to cushion the effects of unemployment. And shortly afterwards, it sold the mine to the *Società per Azioni Piombo e Zinco*. But the Second World War led to a forced suspension of activities which then resumed in 1947.

In 1952, a new flotation plant was completed, radically modifying the original layout of the mine of Masua. And in the 1980s, with most of the activities shifted to the Campo Pisano complex and underground mining work restricted to Acquaresi, the management of the facility passed to the *Società Italiana Miniere S.I.M*. in the E.N.I. group until its final closure in 1991.

Fig. 06 : Recent image with the mine of Masua and its village,photo by Gianni Alvito, Archivio Parco Geominerario Sardegna. Fig. 07 : Recent image of the Mine of Masua and of the path which marks the coast to the north and leads to the mouth of Porto Flavia, photo by Gianni Alvito, Archivio Parco Geominerario Sardegna

Since 2000 Masua, Acquaresi and Montecani, along with the other mines of the Sulcis-Iglesiente region, have been part of the *Parco Geominerario Storico e Ambientale della Sardegn*a (Historical and Environmental Mining Park of Sardinia), which includes eight areas covering a total of 3500 Km^2. This is one of the most extensive and diverse national parks in Italy which was also included in the global and European UNESCO GEOPARKS network in 2007.

Between the coastal landscape and mining archaeology landscape of the inland area

Remains from all the periods of industrial development, that rapidly followed one another, coexist in the mine of Masua, a scene of continuous extensions, restructuring works and subsequent abandonment. The production method at the basis of the mining activity, which was conditioned by the continuous changes in ownership, the fluctuating conditions on the foreign market and the continuous technological renewal that was highly rational but also determined by the random dislocation of the mineral deposits, radically and irreversibly changed the territory and its physical characteristics. The Matoppa canal was eliminated, the settling basins for tailings redesigned the terrain creating a system of artificial terraces, while the recent sale process and the subsequent abandonment mean there is no longer any trace of the cableway or funicular, almost all the railway tracks have been dismantled, the original structures of the foundry, furnaces and washing facilities are now almost unrecognisable, some houses have been abandoned, others renovated, and others have been definitively demolished. Only a few remains bear witness to the history of the

Montecani mine, while the buildings at Acquaresi which have survived are now in an advanced state of dilapidation. On the other hand, Porto Flavia is far from the most-frequently used paths, is protected by the sea and the monumental cliff, and has managed to survive the uncontrolled overlapping of languages and elements, but has nevertheless been affected by the natural degradation of its materials which is now compromising its structural stability. As an inescapable symbol of the mining industry, it remains probably the most striking image/emblem that mining has produced in the Sulcis-Iglesiente region. In a balance between proto-rationalist architecture and echoes of an ancient monumentality, Porto Flavia is the fulfilment of an innovative work, which, however, embraces uncertain architectural and constructive features, where reminiscences of local building practices are mixed with citations of a type of architecture and constructive solutions that hybridise European typological and linguistic models, locating them in a context characterised by mere functional needs and by the lack of resources and their supply. Redeveloping this portion of the *Parco Geominerario*, including it in the new paradigms of sustainable local development which is also based on the economy of contemporary culture, means managing the dialectic between nature and technology, between local characters and international models, at all levels, through the rereading of permanence, transformation and crisis. And in particular, it means reinterpreting the metaphysical landscapes of the "Coast of Mines" starting from the dialectic between the extraordinary icons of the mining technical culture - Porto Flavia, Galleria Lanusei and the landing place at Cala Domestica - through the fabric of infrastructural relationships which connects Masua with Acquaresi and the powerful morphologies of the orography, that have been carved and reshaped by the mining industry. The artificial terraces designed by the mining slag, the artificial terraces are certainly integral parts of this mine landscape, the foundations of the history of the place, but also often potential sources of pollutants which are not easy to deal with. Furthermore, the investigations carried out so far have shown that the only reclamation procedures that are sustainable from an environmental and economical point of view must necessarily rely on long-term processes aimed at mitigation rather than the radical removal or reprocessing of the tailings. For example, since 2000, the Department of Plant Science together with the Department of Environmental Engineering and Architecture has been carrying out experiments in nurseries and in laboratories on the propagation

techniques of metal-tolerant plants, on their tolerance limits and on their capacity of extracting zinc and lead from the tailings and from the soil and of accumulating it in their tissues.

Fig. 08 : The system of terraces that connect the mouths overlooking the sea, of the loading and unloading tunnels, photo by Gianni Alvito,Archivio Parco Geominerario Sardegna

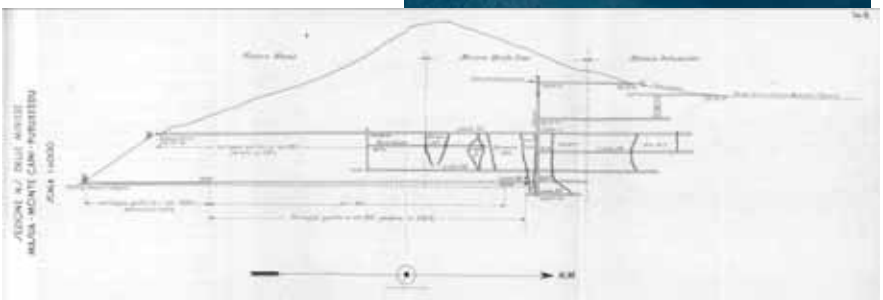

Fig. 09 : Section that illustrates Lanusei Gallery, in "Relazione sul servizio minerario e statistica delle industrie estrattive in Italia nel 1937", Roma, Istituto Poligrafico dello Stato

In such a framework, the recovery of the infrastructural network plays an essential role. The dismantling, abandonment and, in some cases, disappearance of the routes has radically changed the perception of this territory, which nowadays appears as a succession of isolated and fragmented parts, incapable of communicating the continuity relationship between soil and subsoil, of re-establishing the contact between the coastal landscape and the mining archaeological landscape of the inland area. Therefore, a critical rereading of the routes is necessary that can help with the re-emergence and transformation of the great system of installations and infrastructures in Masua and

Acquaresi into a collective heritage. Local public institutions and the University have started a process of definition of settlement rules, feasibility studies and master plans for the visible parts of this huge infrastructure – elements overlooking the sea, including the landing places and their rear zones – by means of cooperation agreements, also launching some initial actions of landscape restoration. Among these, we can surely mention the "Integrated Design" that the University carried out together with the *Parco Geominerario* between 2008 and 2010 for the "Recovery of the mining railway routes in SulcisIglesiente", one of which involved the access to Porto Flavia, and the collaboration for the drafting of the Feasibility Plan for the "Recovery and Development of the old Mining Landing Places in the Iglesiente area" between the Department of Civil and Environmental Engineering and Architecture of Cagliari and the province of Carbonia-Iglesias in 2012. In particular, in this last study, the recovery of the infrastructures and historical buildings was included in a strategy aimed at providing the coast, as it was historically, with micro-infrastructures, located in the old ports, capable of creating the conditions for pleasure boating. In fact, even if Porto Flavia still needs conservation works, it can be currently visited, and, in this sense, the recovery of the infrastructural system which leads to the spectacular opening on the cliff face seems to be necessarily included in the process of exploitation, through a project which involves soft mobility. In the same manner, the installations in Acquaresi and Masua, as well as the landing place at CalaDomestica, need to be included in a landscape project capable of bringing together the recovery of the abandoned buildings with the recovery of paths, landscape works and services, including the definition of new roles and relations at the territory scale. Following the example of economical and ecological reconversion carried out in the Emscher Park, or the more recent reconversion into a linear park of ancient industrial infrastructures, as demonstrated by the projects by NOWA in Sicily, new guide lines and strategies on the area can be defined and summarised as follows: 1. transformation into an integrated "linear park" of the system CalaDomestica/Acquaresi/Masua; 2. reconnection of the infrastructural system between the landing place at CalaDomestica and Porto Flavia, also including green walkways or greenways as footpaths, cycle paths or bridleways, i.e. introducing a new culture of soft mobility; 3. recovery of the industrial buildings which still have an historical value; 4. landscape maintenance activities and soil-care operations within the "park-system"; 5. recovery of the residential districts of Masua

and Acquaresi and implementation of the essential services with innovative forms and sustainable techniques; 6. new proposals for social, cultural and tourist activities; 7. mitigation and reclamation of the tailings with short and long-term processes; 8. Renewed use of the mine water cycle.

Fig. 10 : The infrastructural system which connects the coastal landscape with the inland landscape, overlooking the sea with the landing place at Cala Domestica to the north and with Porto Flavia to the south, images edited by A. Dessì

Two applications of these strategies have been actuated within the previously mentioned studies, with the project for the Recovery of the Railway Route between Masua and Porto Flavia and the recovery of the quays and warehouse in the old landing place at CalaDomestica, with the twofold purpose of improving the accessibility to the sites and regulat the tourist flow in the delicate coastal systems behind the dunes. These also constitute two *modus* of the landscape recovery process in this territory: minimal buildings that can be used inside the existing cavities, which already house storage and transport systems (the railway route, the conveyor belts and the large silos in Porto Flavia) and are "lightly placed" on the archaeologies eroded by the sea, on the ruins of the mooring points, on the excavated landfills, and on the sand systems (which characterise the fjord of CalaDomestica). The same modi operandi, suitably preceded by pre-feasibility studies, such as characterisations, reclamations and stability checks, could be applied to the recovery of the Galleria Lanusei and the PozzoMontecani as an additional integration to the park. If this infrastructural system which extends underground were to be reconnected with the one which marks the surface, consisting of the electrically-powered railway system which used to connect the

landing place at Cala Domestica with the mine of Acquaresi, and of the route which connected the latter one with the mine of Montecani and of the railway paths which connected the Piazzale Lanusei with Porto Flavia, it would be possible to re-establish, not without construction difficulties, that direct system of connections and relations between the coast and the inland area. This is a strategy based on processes to be started in the short and long-term period and that complies with the critical recovery of the buildings and the routes on the different scales, rather than with the "as-it-was" recovery of the places (moreover impossible) in search of an identity intended as ontology.

Fig. 11 : Recent photos of the landing point at Masua photo by Gianni Alvito, Archivio Parco Geominerario Sardegna

Only by transforming the fragments of this infrastructural network into paths involving knowledge and use will it be possible to give back some meaning to the places with "a re-establishment of sense" capable of returning a feeling of belonging to the community, helping the latter to understand the complexity of the system and to provide visitors with a hospitality which derives from "*taking care of*" places and their history. We therefore intend to address the problem in the terms indicated in the European Landscape Convention: considering the territory as a whole landscape. The challenge posed by the mining landscapes leads to the exploration of all the most problematic aspects of the relationship between technique, design and construction innovation at the highest levels and the natural environment including the subsequent issue related to the crisis of this particular aspect of "solid modernity", with the well-

known implications on the relations and balances between conservation and modification related to environments that are in a ruinous state and potentially polluting. All the current processes at this scale must also be structured in order to make the palimpsest readable (i.e. not in mimetic terms) and at the same time must embrace the contemporary culture of environmental sustainability within the global framework and in detail within the single interventions.



Fig. 12 : Recovery of the landing and railway route that leads to CalaDomestica, images edited by A. Dessì; Fig.13: Recent image of the CalaDomestica landing point. Fig. 14 : The railway route that connects the CalaDomestica landing point with Acquaresi mine,Igea Archive, Iglesias

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