Iberian Pyrite Belt (FPI)

An Iberian Coalfield (1)

The Iberian Pyrite Belt has a geological continuity has historically led to economic, social and cultural development based on exploitation of Mineral Resources. We are at the leading European pyrites deposit metallogenic exploited by humans since time immemorial. Originated in the Late Paleozoic, the Spanish-Portuguese coalfield is located in the southwest of the peninsula, in the Alentejo and the Algarve in Portugal, and Andalusia and Extremadura in Spain, from the western edge of the province of Seville, occupying much of the province of Huelva and the Portuguese Atlantic coast to with dimensions of 200 miles long by 40 wide.

It was this singular geological unit causes the systematic and unsustainable exploitation of natural resources, which has led to a demographic and strongly dependent on the mining sector, which has been given the thin glue that gives it its unity as county economy.

Perhaps the greatest concentration of volcanogenic massive sulphides planet (2)

The Iberian Pyrite Belt, with over 1,600 million tonnes of massive sulphides originally in place and about 2,500 million tonnes of mineralization in the stockwork, is one of the most important metallogenic provinces in the world and perhaps the largest concentration of sulfides Planet.

It has some 82 mines have been exploited on a regular basis apart from just over a hundred small leaflets made in massive sulfide or stockwork zones. The ratio of the total tonnage and the surface is very high, about 15,000-20,000 t per hectare massive sulphide Volcano - Sedimentary Complex flush. Includes 22% of the deposits of "world class" (> 32 million tonnes). Despite its large size, with nine tanks with more than 100 million tonnes of massive sulphides, most are rich in pyrite (FeS2) and only 11 depots can be considered large with respect to its content of copper (Cu) - Zinc (Zn) - lead (Pb). As Neves Corvo in Portugal is a giant reservoir based on its content and supergiant tonnage copper tin (Sn).
Submarine hydrothermal more than 350 million years ago (3)

A question that remains without a definitive answer, is how the huge concentrations of polymetallic massive sulphides formed IPF. The sulphide mineralization of IPF, which formed between 360 and 350 million years, have their current analog at hydrothermal vents that dot most oceanic ridges, and also found in some sedimentary basins associated with volcanic arcs. But what we know of the current deposits not yet given a satisfactory metal sulphide deposits of IPF explanation.
One of the oldest mining districts in the world (2)

Both the abundance of mineralization as its geographical location at the western end of the Mediterranean make the Iberian Pyrite Belt is one of the oldest mining districts in the world with over 4,500 years of history. The first systematic exploitation of the Tartessian time, were later replaced by a large industrial mining from Roman times where more than 20 million tons were extracted and left abundant remains (Rio Tinto, Tharsis, etc.). After the abandonment of the mines due to the crisis of empire in the s. IV, the mines were exploited only on a small scale until the late nineteenth century, when several British and French companies rediscovered the economic importance of the area. It is the gold mining era, which was a driving force for the Spanish and European industry and an important focus of industrialization.
Although the FPI has been exploited for millennia, it was in the late nineteenth century when it produced its use on a large scale in the train photographs of mineral from the Tinto-Santa Rosa (Zalamea la Real) mine road cementing the Vines (Calanas) and wagon used by management in their movements Sotiel by the same route (source: forum-ciudad.com)

The gradual decline in the use of pyrite as a source of sulfuric acid and depletion of the main deposits gradually makes mining decreases until in 2003 the last mine was paralyzed in Spain. However, the gradual resurgence of metal prices since 2004 has made the scan again IPF. There are currently four operating mines: Neves Corvo and Aljustrel in Portugal, and Water Dyed and Cobre Las Cruces in Spain, and several projects in varying state examination (among them Rio Tinto, La Zarza, Sotiel-Migollas and Lomero Poyatos).

Panoramic short of Cobre Las Cruces (Gerena, Seville) in 2010 (source: CLC)

*Its natural environment (4)*

Biogeographically is a portion of the Luso - Extremadurense province of the Mediterranean Region. It lies between the western area of Sierra Morena geomorphological units and the Guadalquivir depression and can be considered an inclined towards the south and penillanura ongoing rejuvenation. The Pyrite Belt as a natural area brings together elements of the two units that surround but with considerable intrinsic homogeneity derived from a territory with a strong sociological and cultural component because of its great metallogenic wealth. This has meant that since time immemorial has been intensively exploited by mining which has left a huge mark on the landscape in the form of mining infrastructure: short, dumps, buildings, chain of reservoirs, sedimentation ponds, railways, bridges, tunnels.

But have not only been followed mining infrastructure which attest to the importance of this activity in the area, let it also be seen in the considerable extent that occupy their stocking with alien species although today they have another purpose, its implementation in the area searched feeding fuel requirements of mine. Result of a population that grew around the mining activity also gave an extension of marginal agriculture and overgrazing. The combination of all these factors with the fires, which in turn have been
brought about largely by the wrong forest policy conducted in the past have distorted a landscape characterized by masses of evergreen sclerophyllous forest than today few remaining strongholds.

Heather mine (5)

But perhaps the botanical species most characteristic of IPF is Erica Heath andrevalensis or mine, endemic to the mining area of Huelva and included in the Andalusian Endangered Species List. This heather is presented as a pioneer species, colonizing acid substrates, rich and poor in base metals bordering rivers and streams, or on bare ground, under strong acid leaching, and runoff grooves and shady areas mine tailings.
A Protected Landscape (6)

The Protected Landscape Rio Tinto is a place that embraces the high and middle reaches of the Rio Tinto, being unique in the world by chromatic beauty of its landscapes and its unique environmental conditions, among which the large colony of microorganisms living in the acidic Tinto river.

Despite the strong environmental degradation presents the Red River, has enclaves of unquestionable beauty (source: seviocio.es)

Another form of protection that falls in this space is the Site of Community Importance " Ecological Corridor Rio Tinto" (included in the Natura 2000 network ) is also proposed the inclusion of the Cuenca Minera Rio Tinto as a European and Global Geopark.

The region most heavily affected by AMD on the planet (7)

The rivers Tinto and Odiel represent an extreme case of acid mine drainage with high concentrations of toxic elements. These rivers run mostly by materials Iberian Pyrite Belt (FPI ) , with numerous polymetallic massive sulphide deposits that have been mined since ancient times, but especially since the second half of the nineteenth century. These materials , exposed to atmospheric conditions , undergo an oxidation process by which release toxic metals and generate acidity. The many sources of pollution , along with the low buffering capacity of the rocks that form the substrate of the basins of the rivers Tinto and Odiel , make these rivers have a high levels of contamination, unparalleled worldwide.

In the world there are other points where the acidity and concentration of toxic metals in water are higher than in IPF , however are restricted to relatively small areas . In the present case , the high toxic levels bind to a large extent of contamination , affecting most of the main courses of the basins of the rivers Tinto and Odiel . All this means that the problem is serious , it is the most heavily affected region contamination by acid mine drainage on the planet.
In sections of the Tinto and Odiel rivers affected by this pollution, no invertebrates, amphibians, fish, plants, etc., constituting the normal biota of river ecosystems. This does not mean that the rivers are free living, organisms abound and certain species of algae adapted to these particular conditions, are called extremophile species, which have also attracted great scientific interest.
Another recent interest in the study of these systems, namely the head of Rio Tinto, has emerged in the field of astrobiology at the possible similarity of these environments with the conditions of the planet Mars.

The impact of mining on the rivers Tinto and Odiel throughout history (8)

There is confusion in the scientific community, and society in general, whether the state presented by these rivers is due to natural conditions, caused by the special features of IPF, or the intense mining activity in the region. To clarify this issue, five stages can be distinguished:

1) Nature Oxidation of sulfides, which dates back to more than 24 million years and there was a geological scale, very slowly, so that there was a significant impact,

2) Home of mining in the Chalcolithic period (III millennium BC) and then in the Bronze Age and the Tartessian civilization, which caused a slight elevation of the geochemical background levels,

3) The period of Roman mining, intensive, resulting in significant impact on the rivers of the area and in the Ria de Huelva,

4) A decrease in pollution levels during the Middle Ages and Modern and

5) big impact from the mid-nineteenth century to the present, which caused unprecedented degradation in rivers, the demise of the fishing resources in the estuary of Huelva and even its effects are seen in the Gulf of Cadiz.
Look, Platero, how have put the river between mines, evil heart and padrastreo. Just if your red water collects here and there this afternoon, between violet and yellow mud, sun, and its course can almost only go toy boats. What poverty!

(taken from The River Chapter XCV, Platero and I, Juan Ramón Jiménez)

In the photo section under the river Tinto (source: panoramio.com)

In short, the current state of the rivers Tinto and Odiel is nothing natural and is mainly due to the intense mining activity in the last 150 years, since the natural processes of formation of mine drainage are "negligible" compared with those generated by mining.


(6) Consejería de Medio Ambiente y Ordenación del Territorio. 2013. Paisaje Protegido Río Tinto. Disponible en: Junta de Andalucía
