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The post-industrial landscapes of Riotinto and Almadén, Spain: scenic value, heritage and sustainable tourism

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ABSTRACT
The Riotinto and Almadén mining areas in Spain are two of the best examples of European experiences in restoring the heritage of traditional mining activities. Initially promoted by public administrations, particularly municipal bodies, with the active participation of private companies and the local community, these projects are an international reference in the protection and preservation of the mining-industrial heritage and the tourist use of buildings, machines and landscapes.

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Mining heritage; post-industrial landscapes; sustainable tourism; local community; integrated management

Tourism in old mining and industrial areas

Restored and reclaimed old factories and mining areas have become one of the most visible and trendy resources for tourism. Their essentially local dimension has managed to boost the economy in areas previously blighted by deindustrialisation, business closures, unemployment and environmental degradation. Traditional production regions have been boosted by tourism to enhance their traits, based on both tangible and intangible cultural aspects.

The tourism on offer in old mining and industrial areas is far removed from the criteria of other types of tourism, marked by densification and uniformity. This tourism creates new and competitive products within the framework of increasingly complex tourist diversification, requiring projects that should always consider the regional fabric, participation of the local population and management based on rational and sustainable principles. This is the only way of ensuring the success of destinations once associated with production.

The historical, technical and symbolic attraction of mining and industrial monuments and places arouses great interest. It is a legacy of great visual and scenic impact associated with a local culture closely linked to the traditional economic activity. Tourism has enhanced all these resources but has also altered the previous spatial structures and created new ones with scenic aesthetic effects.

Two very representative mining areas in Spain are analysed in this research: Riotinto and Almadén, whose regions have been greatly humanised by continued activity over time. The two areas are protected as Places of Cultural Interest. Riotinto is located in western Andalusia, in the province of Huelva. Almadén is situated in southern Castile-La Mancha, in the province of Ciudad Real, and is listed as a UNESCO World Heritage Site.

The mining areas of Riotinto and Almadén have a series of unique characteristics that are the result of prolonged mineral extraction. They represent two cultural landscapes whose value lies in the legacy of the mining residues, the identification that local people have to the mining industry, the extraordinary footprints left on the land and the multiplicity of other tangible and intangible elements. The activity extended into areas bordering the mineralisation, with open-cast and...
underground mining, barren slagheaps, workshops, warehouses, railway material and mining neighbourhoods. These elements define the current morphological characterisation of the two mining regions.

Since the closure of mining operations there have been continued efforts to publicise the cultural heritage of the two areas, with sustainability-based tourist programmes. The results that have been obtained allow the visitor to understand the abundant tangible heritage, the legacy of centuries of continuous mining, with mining culture an important part of a more subtle intangible heritage, yet nevertheless one that is very much present in local society.

This research has several main objectives: to interpret the restoration for tourism purposes of the landscapes of the Riotinto and Almadén mining environments, very striking for their high scenic values and built heritage, to compare the projects and to calculate the level of economic, environmental, social and management sustainability resulting from the actions.

An additional objective is to analyse the territorial significance of restoration work carried out and interpret industrial heritage as an integral part of a region and landscape. This legacy cannot be conceptualised in a “deterritorialized” way, because it would lose all its meaning. The two mining areas are cultural landscapes of great interest and therefore a heritage category that should be covered by management policies that ensure their conservation and enhancement, in line with the guidelines provided by the UNESCO (1972), the ICOMOS Cultural Tourism Charter (1999) or the European Landscape Convention of the Council of Europe (2000).

The statistical and documentary sources consulted and interviews and surveys conducted have helped achieve the proposed objectives and to contrast the initial assumptions with those on which the final results are based: (a) heritage restoration has been initiated by local bodies; (b) the tourist scope achieved is based on coordination between the various players involved; and (c) the landscape and aesthetic values of the two mining areas are major tourist attraction factors.

Qualitative and quantitative approaches were used to assess the restoration work and interpret the tourist models developed and their degree of sustainability. A key part was the literature review, use of written, cartographic and photographic documents, fieldwork and direct observation of the locations, as well as the preparation of various surveys and interviews between. The method applied has helped produce a local assessment model that can be used as a reference for future tourism development in other geographical areas.

This reassessment of tourism has become a point of reference in Spain due to its material heritage, the recovery of the terrain, the coordination with mining companies and the public authorities and the way in which initial obstacles were overcome in order to transform mining resources into tourist products. The analysis carried out during research considered three different levels: existing heritage, with a complete relationship of elements and its distribution across areas of heritage protection, the recuperation of tourism and its defining feature and the level of tourism sustainability achieved, with a diagnosis based on indicators and components aimed at providing a specific profile for each mining area. Research to date has mainly focused on the economic and social effects of the recovery of areas turned over to mining, with an emphasis on the initiatives undertaken, the resources used, the encouragement offered by the public authorities and the creation of wealth and employment in rural environments (Álvarez, 2007; Cañizares, 2011a, 2011b; Cole, 2004; Ebert, 2012; Hidalgo, 2010; Jansen-Verbeke, 1999; Tempel, 2012). Less attention, however, has been given to project sustainability. This has meant that it is essential to ensure there is a summary index of sustainability based on certain key aspects of an environmental, economic, social, cultural and supervisory nature.

**Industrial landscape as an object of attraction**

Cultural tourism started growing in the mid-twentieth century, and prompted people to begin regarding heritage as a legacy, but tied not so much to aesthetics as to the broad inheritance handed down by a local community in a given space. This significant change stemmed from the very evolution of ideas on how to protect and handle natural and cultural components, which were no longer
considered on their own but associated with one another in a specific space. Another factor that contributed to this change was the concept of landscape and, more specifically, cultural landscape. Defined as the interaction over time between people and the natural environment, whose expression is a region perceived for its cultural qualities, it is the result of different environmental, social and cultural processes and, therefore, underpins a community’s identity.

Although the origins of the term “cultural landscape” can be found in some articles by late nineteenth-century French and German geographers (e.g. Ratzel, Schlütter, Vidal de la Blache), the current meaning appears in the early twentieth century with Carl Sauer, who defines it as the action of a social group on a natural landscape (Sauer, 1925). Another contribution came from John Brinckenhoff, who was concerned about the relationship between landscapes and local communities. From 1951 to 1996, he was editor and publisher of the journal Landscape, and published a large number of articles from a variety of perspectives that aimed to lay the foundations for a solid interpretation of cultural landscapes.

Sauer’s and Brinckenhoff’s legacy was resurrected towards the end of the twentieth century by UNESCO, albeit with rather more administrative and political intentions than for academic and scientific purposes. UNESCO’s definition and classification of “cultural landscape” are not very enlightening, nor are the categories established by the US National Park Service, despite having promoted the conservation of more landscapes than anyone, one example being the creation of the Coal Cultural Park in 1972, a year before the mythical recovery of New Lanark in Scotland. The driving forces behind these projects, and many others, were local communities who advocated that a comprehensive approach be taken to large areas full of heritage remains (Davidson, 1998).

This led to the scientific study of industrial heritage in England, France and Germany, focusing first on the most significant examples of the nineteenth-century industries and then spreading to other less grandiose or unique cases and to a global interpretation of the industrial landscape (Albrecht, 2012; Cossons, 2012; Timothy, 2011). At the same time, different anthropological museums were set up in the Nordic countries, together with the so-called eco-museums in France and some interpretation centres in England. Soon the initiatives were geared towards reactivating old industrialised areas, promoting their cultural values, the preservation of their heritage and reviving their recreational and tourist industry. From a historical perspective, industrial and mining activities came to be regarded as linchpins of cultural landscapes, leading to the recovery of such emblematic enclaves as Lowell, Blackstone and Lackawanna. These efforts to recover the industrial past prompted the creation of “heritage parks” as an economic development strategy, and this new comprehensive concept was subsequently outlined in the European Landscape Convention signed in Florence in 2000.

The United States is home to the most important projects on account of its extensive industrial heritage, which has turned into a key aspect of national identity ever since the Sixties (Alonso, O’Neill, & Kim, 2010; Shackel & Palus, 2006). The associated landscapes were a cultural landmark that legitimised any proposed intervention, helping to revive the collective memory and keep it alive (Ludlow Collective, 2001; Walker, 2000). Major parks have been created in Europe (e.g. Riotinto, Ironbridge, Bergslagen), and in Asia and South America too (Sabaté & Schuster, 2001). As different authors have pointed out, proper recovery and management of heritage resources provides an unquestionable opportunity for economic development because it attracts tourism and investment, creates jobs and strengthens the local image (Dambron, 2004; von Droste, 1995; Ebert, 2012; Rubenstein, 2010; Sabaté, 2004).

Even though “sustainable tourism” is an internationally accepted term, there is still a certain debate about its definition, and broadly speaking there are four different interpretations (Blancas, González, Guerrero, & Lozano, 2010; Clarke, 1997; Hardy, Beeton, & Pearson, 2002). The first regards sustainable tourism as a form of alternative tourism, and the opposite of mass tourism. The second interprets it as an extension of mass tourism, with sustainability being attained steadily and in an orderly fashion, more easily in small-scale destinations. The third case stresses the idea that it is a goal attained through specific courses of actions, irrespective of the scale of the tourist
destination per se. Finally, the fourth interpretation conceives sustainable tourism as a general goal for all kinds of tourist activity, beyond any geographical scale or types of action taken (Hunter, 2002).

After analysing the different definitions and interpretations (Liu, 2003; Sharpley, 2000), and those put forward by certain international agencies (World Tourism Organization), the conclusion drawn is that it is sustainable tourism that guarantees both the protection of the natural, social and cultural resources that sustain the activity and also that the needs of tourists and resident populations alike are met. In this respect, any model of sustainable tourism entails the best possible use of environmental resources, respecting the genuineness of local communities, ensuring the long-term viability of business activities, guaranteeing the resort’s participation and management and raising tourists’ awareness about sustainability issues (Europarc, 2010).

The definition of sustainable tourism has been used to identify the basic aspects that need to be addressed to make sure that any industrial heritage-based tourism is fully sustainable. Those basic issues (indicators) are grouped in several conceptual blocks (components), and new aspects can be added from the manager’s viewpoint. An indicator is a tool for obtaining the information necessary to understand tourism’s ties to and impacts on the environment in which it takes place. Based upon this consideration, which most authors share, it can be said that they serve to measure, compare and facilitate resource management and planning-related decision-making. The indicators selected in this research record a specific situation in time, but can measure constant changes and allow one to design economic, management, environmental, cultural or social actions aimed at ensuring the highest level of sustainability in tourism’s use of the buildings and landscapes left by industrialisation.

The selected indicators are defined as a function of the prior conceptual analysis and meet a series of criteria: scientific validity, representativeness, relevance, comparability, quantification, geographical coverage and reliability. This leads to a multidimensional kind of sustainability measure that is easily understood and permits comparative analyses of different areas.

After defining the system of sustainability indicators and components, we referred both to the available statistical and bibliographical information and to a survey conducted between April and May 2014 among the managers of the two mining parks selected. The managers were asked a total of 23 questions about the five components described above (Figure 1). To rate them in terms of final tourist sustainability, a direct control factor of 0–4 was applied to find the mean value of each component and the synthetic index of sustainable development in each place, defined as the mean value of all indicators used. The general guidelines issued by certain public institutions for quantifying indicators have served as an essential point of reference (European Environment Agency, 2008; EUROSTAT, 2006; Ministerio de Medio Ambiente, 2008).

To analyse the sustainability of tourism at destinations regarded as industrial heritage, the information has been aggregated in two phases. In the first phase, a synthetic indicator was obtained for each component (management, social, economic, cultural and environmental). Phase two involved calculating a global synthetic indicator that provides a multidimensional measure of sustainable tourism. The final analysis of the values obtained can be used to determine each destination’s characteristics, studying the relative situation of each component and the best and worse rated indicators within the set. Despite the differences, the comparison between the two places selected served to identify certain similarities in terms of the level of sustainability: cultural heritage conservation, available infrastructures, visitor’s degree of awareness, scope of tourist information, satisfaction of the local community, job creation and promotion of the local culture. The biggest differences relate to the provision of amenities, the level of visitor satisfaction, revitalisation of local culture, organisation of parallel cultural activities, implementation of energy efficiency measures and the connection between the built heritage and the natural environment.

Interest in industrial heritage in Spain emerged in the 1980s. This is later than in other European countries, with a more intense and longer manufacturing tradition, but a collective awareness of the value of the remains of industrialisation has also been generated. The aim has been to somehow return to the people a heritage that once belonged to them (Samuel, 1994). This legacy
awakens a great longing in people to discover and remember a not too distant past in areas of major industrialisation (e.g. Asturias, Catalonia and Basque Country) and in more specific places whose local identity has been created historically around industries and mines (e.g. Riotinto and Almadén).

The characteristics of these areas have determined that the landscape would replace the odd simple monument as an object of attraction (Benito, 2012). A broader view is adopted in which social, economic and cultural aspects are considered that ultimately reaffirm the collective identity and promote opinions favourable to conservation (Casanelles, 1998; Feliú, 1998; Hidalgo, 2010). Landscape has been a matter of interest to the UNESCO World Heritage Committee since the early 1970s when it was defined as the combined work of man and nature. Since then, the idea has gradually taken hold of protecting areas classed as “cultural landscapes”, officially recognising them as part of the World Heritage List since 1992. Industrial landscapes were also included in that category.

<table>
<thead>
<tr>
<th>Components</th>
<th>Indicators</th>
<th>Almadén</th>
<th>Riotinto</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Effective and integrated management of cultural and natural resources</td>
<td>I&lt;sub&gt;1&lt;/sub&gt; Level of patrimonial protection</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;2&lt;/sub&gt; Level of patrimonial restoration</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;3&lt;/sub&gt; Compliance with local zoning</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;4&lt;/sub&gt; Information provided to visitors</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;5&lt;/sub&gt; Provision of sufficient funds</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;6&lt;/sub&gt; Local economic contribution</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Average value</td>
<td></td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>b) Generation of social benefits</td>
<td>I&lt;sub&gt;10&lt;/sub&gt; Satisfaction of the local community</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;11&lt;/sub&gt; Collaboration of the local population</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;12&lt;/sub&gt; Local origin of workers</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Average value</td>
<td></td>
<td>2.7</td>
<td>3.3</td>
</tr>
<tr>
<td>c) Generation of economic benefits</td>
<td>I&lt;sub&gt;13&lt;/sub&gt; Improvement of infrastructure</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;14&lt;/sub&gt; Provision of more facilities</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;15&lt;/sub&gt; Creation of new employment</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Average value</td>
<td></td>
<td>2.7</td>
<td>3.7</td>
</tr>
<tr>
<td>d) Generation of cultural benefits</td>
<td>I&lt;sub&gt;16&lt;/sub&gt; Level of visitor satisfaction</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;17&lt;/sub&gt; Promotion of local culture</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;18&lt;/sub&gt; Revitalization of local cultural events</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;19&lt;/sub&gt; Realization of external parallel activities</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;20&lt;/sub&gt; Level of community satisfaction</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;21&lt;/sub&gt; Appreciation of the population for industrial heritage</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Average value</td>
<td></td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>e) Generation of environmental benefits</td>
<td>I&lt;sub&gt;22&lt;/sub&gt; Level of environmental recovery</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;23&lt;/sub&gt; Aesthetic consideration of the recovered environment</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;24&lt;/sub&gt; Use of renewable energy resources</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;25&lt;/sub&gt; Implementation of energy saving measures</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>I&lt;sub&gt;26&lt;/sub&gt; Built heritage connection with the natural environment</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Average value</td>
<td></td>
<td>3.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Total average value</td>
<td></td>
<td>2.90</td>
<td>3.52</td>
</tr>
</tbody>
</table>

**Figure 1.** Components, indicators and values of industrial heritage tourism sustainability.
Source: Author’s survey and own elaboration.
In 1978, the International Union for Conservation of Nature and Natural Resources included in its protected areas system the category known as “protected landscape”, later replaced by the present wording of 1994, defining it as a distinctive space with specific aesthetic, ecological and cultural values. In 2000, the Council of Europe adopted the European Landscape Convention in Florence. This Convention establishes a looser definition of landscape and highlights its temporal and perceptual dimension through relationships between human action and the natural environment.

This provided the general context for the approval in Spain of a National Plan for Cultural Landscapes, in line with the commitment with various international conventions. Another initiative is the National Industrial Heritage Plan, which was introduced in 2000. The mining areas of Almadén and Riotinto became a part of the initial catalogue of priority intervention assets of this Plan in 2002.

Reviving industrial heritage is an employment and local economic growth opportunity. The goal is to achieve a sustainable balance between conservation and exploitation, for which maximum coordination between the different administrations and the promotion of private enterprise is essential (Sanz, 2008). Also important is the implementation of integrated management projects in urban, regional, tourist and cultural policies, as well as in the economy and society of the host areas (Benito & Alonso, 2012; Firth, 2011; Pardo, 2010, 2014; Timothy, 2011; Troitiño, 2007).

The concept of sustainability has been applied to tourism with much confusion and ambiguity, compounded by the profusion of specific forms of tourism and vague definitions of sustainable development (Butler, 1999). The most widespread has been claiming that any small-scale tourism, such as industrial heritage, is sustainable; however, further analysis and the use of indicators to analyse the actual situation are required.

Sustainable tourism is often understood as a lasting form of tourism. Other times it is considered that it must coincide with general criteria applied to sustainable development, in terms of the economic, social, environmental and reliability perspective of long-term projects (Coccossis, 1996; Edgell & Swanson, 2013). In other cases importance is given to governmental and administrative regulations as a framework for reference and action (Bramwell & Lane, 1999).

The vast array of approaches makes sustainability difficult to define in the tourism field. In this research, industrial heritage sustainable tourism is interpreted as that which ensures its use and preservation as a cultural resource and promotes the participation of the local community, minimising negative impact and generating maximum social, economic, cultural and environmental benefits.

**Identifying the two mining areas: tourism transformation and sustainability**

The closure of mines and industrial areas is, in most cases, followed by abandonment, requiring major investment in maintenance tasks. This is then followed by decline and often the looting of property. This makes restoration and the tourist revival as difficult as the lack of coordination between private companies and public administrations. The end result is normally a ruiniform landscape created by the erosion of artificial structures.

The first task of the restoration is to erase all traces of the past and return to the natural landscape of the pre-industrial period. The priority should then focus on employment recovery and restoring environmental quality with sustainable activities that foster local development. Another very different circumstance, and less frequent, is when maintenance tasks are performed by the company, stemming the decline and subsequently favouring tourist recovery.

The situations are therefore very varied after cessation of the activity. They basically depend on the commitment of companies and public bodies to accomplish their maintenance, revitalise the local economy, restore environmental damage, promote tourism and create a new production structure based on the tertiary sector. In this respect, tourism is one of the best options after abandonment (Jansen-Verbeke, 1999).

Industrial heritage tourism is an activity compatible with sustainable development objectives (Cole, 2004). The benefits gained favour the recovery of industrial remains and viability of tourism projects undertaken (Benito, 2002). In any case, the involvement of very different actors, with diverse
interests, curbs the immediate generation of employment and wealth due to the delay caused by the implementation of projects (Valenzuela, Palacios, & Hidalgo, 2008).

The socio-economic scope of industrial heritage is reaffirmed as the value of inherited resources is restored. Beyond the recognition of the built heritage, general awareness now perceives the industrial landscape as a non-renewable resource and something that should also be protected (Castillo, López, & Millán, 2010; Vahí, 2010). Almadén and Riotinto can be categorised according to the criteria established by the UNESCO World Heritage Committee, as organically evolved landscapes, resulting from a long evolutionary process that determines their morphological characteristics, still visible today after the cessation of the activity. From that moment on, these landscapes, and others with the same characteristics, become identified as relics or fossils through their reflection of the extractive features of the past (Stuart, 2012).

The Almadén mines, in the south-east of the province of Ciudad Real, had the largest deposits of mercury in the world. Extraction began in ancient times by the Romans and was then continued by the Arabs. Things really took off in the sixteenth century, when mercury became essential for the amalgamation process of silver, extracted in large quantities from South American sites. Afterwards the mines became tied to the state.

After a decline in the seventeenth century, mining production increased in the eighteenth century. In the nineteenth century, the mines were mortgaged, granting the monopoly to several foreign enterprises, which resulted in a relaunch of production that reached its zenith in the mid-twentieth century. A decline in consumption and exploitable reserves caused a subsequent loss of profitability of the mines. After the final closure of the mine in 2003 and the decision to restore it for tourism, the area has become a cultural space for public visits known as Almadén Mining Park.

Several aspects of the mining area have been protected since 1992 as Places of Cultural Interest. In 2007, the mines were declared an Historic Site by the regional government of Castile-La Mancha and in 2012 were included in the UNESCO World Heritage List in recognition of their value as the largest mercury mines in the world and the only example of mining over the centuries. The total protected area is 104 hectares with several of the material features included in the tourist itinerary: the seventeenth-century distillation furnaces with various earthenware pipes (aludeles) through which smoke, gases and mercury vapour were eliminated; two eighteenth-century circular buildings (bariteles) for the extraction of mineral and the drainage of the shafts by animal traction; a nineteenth-century shaft tower, next to the machinery room, and some old leftover machinery; and the walls (cerco) which marked the boundaries of the mining operation, with some monumental gateways such as the eighteenth-century Puerta de Carlos IV. In the town of Almadén, there are also several buildings directly related to mercury mining, such as the San Rafael Royal Mining Hospital (1755–1775), the Royal Prison for Hard Labour (1754), for prisoners condemned to working in the mines, and the Academy of Mines (1777), the first to be established in Spain and the fourth in the world in its category.

Table 1 shows the most important heritage features and their distribution in terms of protection area borders. The project also highlights the landscape aspects that identify each group, with the incredible heritage from the various periods (corresponding to extensive mining activities) located in the direct protection area and the town of Almadén.

The industrial heritage of the Riotinto mining area is an important resource for local development in the north-east of the province of Huelva. The area has been historically linked to mines and has depended on the civilisations and companies that operate them. This has resulted in a substantial cultural legacy.

The present-day heritage is made up of very varied places and sites, but representative of historical evolution in one of the most important mining regions in the world. The continued use of the subsoil has created a unique cultural landscape resulting from the intense transformation of the natural environment. According to the first archaeological remains found, extractive work began 5000 years ago. Mining subsequently gathered pace in line with increasing needs and mining systems improved. The mines belonged to one of the most important mining districts in antiquity. Mining
declined during the Middle Ages before recommencing in the eighteenth century with the Bourbon dynasty. Activity reached its peak after 1873, when a British consortium purchased the mines and began operations on an industrial scale: open-pit mining (cortas), intensification of underground mining, accumulation of large spoil tips, industrial facilities (factories, warehouses, chimneys, buildings for mineral extraction, Shaft and engine room), planned mining districts, a residential area for the groups of British leaders and construction of the railway. This resulted in the shaping of a unique morphological and landscape model in Europe.

The railway heritage is particularly interesting because of the large number of preserved buildings: stations, bridges, tunnels, signal boxes and halts or steam engines that date back to the start of the industrial revolution in Spain. The railway track that was built between Riotinto and the port of Huelva, to export the extracted mineral, was the second to be laid in Andalusia.

Changes also occurred at an urban level, with the adoption of the construction models directly imported from Great Britain. New houses were built for the workers, in a very simple and ordered grid pattern, as can be seen in the town of La Dehesa, the Alto de la Mesa neighbourhood or El Valle. The latter was designed as a new village by the Río Tinto Company Limited mining company to rehouse miners who had previously lived in the place known as La Mina, destroyed to enable use of the subsoil.

Several symbolic typically British-style buildings were also built, such as the old hospital (today a museum and visitor reception centre), and a physically isolated neighbourhood with elegant looking homes for the British technical team. This is the Bellavista neighbourhood, with tennis courts, a golf course, Anglican church and English club. For 81 years up until 1954, when the mines were returned once again to the Spanish state, the area was essentially a functioning English colony.

The Riotinto mining area became protected in 2005 as a Place of Cultural Interest in the Historic Site category, under the Andalusian Historical Heritage Law of 1991. The rewording of that law in 2007 made it possible to begin the procedure to register the area as a Heritage Area, including it in the General Catalogue of Andalusian Historical Heritage in 2012. The protection established divides the mining area into several areas.

Table 2 shows the Riotinto mining area’s vast heritage. This area is one of Spain’s largest mining-industrial complexes, as can be seen in its distribution across seven different protection areas. All of these are characterised by an artificial landscape that has a profound visual impact, the result of the

<table>
<thead>
<tr>
<th>Area</th>
<th>Most important heritage</th>
<th>Landscape aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification</td>
<td>Most important heritage</td>
<td>Landscape defined by the existence of an extraordinary heritage of mediaeval, modern and contemporary eras</td>
</tr>
<tr>
<td>Mine of Almadén</td>
<td>Cerco de Buitrones</td>
<td>Landmark defined by the existence of an extraordinary heritage of mediaeval, modern and contemporary eras</td>
</tr>
<tr>
<td></td>
<td>Cerco de San Teodoro</td>
<td>Landmark defined by the existence of an extraordinary heritage of mediaeval, modern and contemporary eras</td>
</tr>
<tr>
<td></td>
<td>Puerta de Carlos IV</td>
<td>Landmark defined by the existence of an extraordinary heritage of mediaeval, modern and contemporary eras</td>
</tr>
<tr>
<td></td>
<td>Distillation ovens and aludeles</td>
<td>Landmark defined by the existence of an extraordinary heritage of mediaeval, modern and contemporary eras</td>
</tr>
<tr>
<td></td>
<td>Buildings for mineral extraction</td>
<td>Landmark defined by the existence of an extraordinary heritage of mediaeval, modern and contemporary eras</td>
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<tr>
<td></td>
<td>Shaft and engine room</td>
<td>Landmark defined by the existence of an extraordinary heritage of mediaeval, modern and contemporary eras</td>
</tr>
<tr>
<td>Protection area</td>
<td>Academy of Mines</td>
<td>Outdoor area with different real estate distributed by the urban framework of Almadén</td>
</tr>
<tr>
<td></td>
<td>Casa Grande</td>
<td>Outdoor area with different real estate distributed by the urban framework of Almadén</td>
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<td></td>
<td>Bullring</td>
<td>Outdoor area with different real estate distributed by the urban framework of Almadén</td>
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<td></td>
<td>San Rafael Royal Mining Hospital</td>
<td>Outdoor area with different real estate distributed by the urban framework of Almadén</td>
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<tr>
<td></td>
<td>Royal Prison for Hard Labour</td>
<td>Outdoor area with different real estate distributed by the urban framework of Almadén</td>
</tr>
</tbody>
</table>

Source: Government of Castile-La Mancha (29 October 2007) and own elaboration.
deep scars left by the decades of industrial activity. The intense transformation of the natural environment has become the area’s greatest tourist attraction, more than the wide variety of production elements distributed throughout the region. It could be argued that admiring aesthetic qualities is more appealing than understanding the original function.

A mining park has been created in both Almadén and Riotinto. The parks have become two tourist resources that generate employment and income in two regions away from the main tourist routes, modifying the degradation that would have resulted from the permanent closure of the facilities. Initially different projects were implemented, as each one adapts to the specific characteristics of the location. However, there are some common references that should be highlighted, such as the precise definition of the range of services, tourist-cultural proposals, which include the tours of the underground tunnels or aboveground open spaces, or visits to the museums opened on the sites.

There have also been a series of common obstacles to overcome in the transformation of mining resources into a tourism product. Both areas are far from the main tourist circuits, above all in the

### Table 2. Different areas of protection in the mining area of Riotinto.

<table>
<thead>
<tr>
<th>Area</th>
<th>Identification</th>
<th>Most important heritage</th>
<th>Landscapes aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area A: Mining in Corta Atalaya and Cerro Colorado</td>
<td>• Corta Atalaya&lt;br&gt;• Cerro Colorado&lt;br&gt;• Masa San Dionisio&lt;br&gt;• Shaft Alfredo</td>
<td>Open-cast and indoor mining, human settlements and archaeological remains</td>
<td></td>
</tr>
<tr>
<td>Area B: Zarandas-Naya area</td>
<td>• Locomotive depot in Naya&lt;br&gt;• Ventilation chimneys&lt;br&gt;• Marismilla reservoir&lt;br&gt;• Nerva railway station&lt;br&gt;• Foundry slags&lt;br&gt;• Inclined plane of San Luis</td>
<td>Artificial landscape with slags hills and foundry chimneys associated with railways</td>
<td></td>
</tr>
<tr>
<td>Area C: Storage area for mining wastes and reservoirs</td>
<td>• Dams called Cobre, Aguzadera and Gossan</td>
<td>Area of intense transformation of the natural environment. It is one of the most picturesque place in the mining area</td>
<td></td>
</tr>
<tr>
<td>Area D: Mining railway</td>
<td>• Halt of Naya&lt;br&gt;• Lever houses&lt;br&gt;• Gurugú bridge&lt;br&gt;• Zarandas workshops&lt;br&gt;• Peña de Hierro station</td>
<td>Main railway section of the “Río Tinto Company Limited” and of the Peña de Hierro</td>
<td></td>
</tr>
<tr>
<td>Area E: Peña de Hierro</td>
<td>• Corta Peña de Hierro&lt;br&gt;• Roman mines&lt;br&gt;• Housing area of San Carlos&lt;br&gt;• Chimney and engine room&lt;br&gt;• Santa María tunnel</td>
<td>Area with a wide variety of productive elements and mines of reduced dimensions</td>
<td></td>
</tr>
<tr>
<td>Area F: Urban settlements (year of creation)</td>
<td>• El Valle (1881)&lt;br&gt;• Alto de la Mesa (1878)&lt;br&gt;• Bellavista (1881)</td>
<td>Landscape defined by the urban development of the British company. Apparition of new villages and growth of existing ones</td>
<td></td>
</tr>
<tr>
<td>Area G: Other areas</td>
<td>• Dolmen of La Lancha&lt;br&gt;• Archaeological site of La Chaparrita&lt;br&gt;• Settlement of Padre Caro</td>
<td>Surrounding landscape to the main protected area, with proliferation of archaeological objects</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Government of Andalusia (Decree 504, 16 October 2012) and own elaboration.
case of Almadén, while there are negative connotations associated with mining and the legacy it creates, characterised by an “ugly aesthetic” (Edwards & Llurdés, 1996). The serious detrimental effect on the environment and it impact on the landscape should be borne in mind, increasing the cost of recuperation and initially reducing the area’s suitability for transformation into a site that might attract tourists. Nevertheless, in Riotinto such an impact represents an additional resource due to the tonal variety of the landscape and its visual appeal. The mining landscape has taken on a monumental air as a tourist attraction, becoming a fundamentally important resource that is closely tied into human activity. The area has been treated both generally and strategically to highlight its outstanding features, only occasionally recuperating the most deteriorated spaces. This shows that the success of an operation with such characteristics does not always need to mean restoring an area to its natural pristine, pre-industrial state, hindering any real understanding of the mining landscape as a cultural environment. New trends in tourism have moved in the same direction, seeking out experiences that differ from the traditional products and services offered to visitors (Cañizares, 2004, 2011b), although the results from the two mining areas are still some distance from those achieved in other European countries (Valenzuela et al., 2008).

This can be explained by the problems that the various recuperation projects have had to face. The most serious of these is the demographic crisis, with a population that is declining faster than in other regions since the mines were closed (García, Delgado, & Felicidades, 2013). Between 1960 and 2015, the population of Riotinto fell from 8436 to 4063, while Almadén dwindled from 13,443 inhabitants to 5794. Such a dynamic leads to a lack of private business initiatives and the need to rely on public subsidies. It also results in a greater capacity of local town councils to attract financing for investment in the development of mining heritage tourism. This characteristic is actually one of the main shortcomings in Almadén and Riotinto, a major problem in ensuring suitability in the new role for mining heritage.

Some commentators feel that this role for the new tourism can be reduced to that of standardised cultural services, resulting in the poor competitiveness of mining areas (García et al., 2013). Although mention has been made that, with time, the uniqueness of the recuperated areas will diminish, to be replaced by a more conventional form of heritage management which markets tourism products (Mas & Sabaté, 2012), there has also been a move to re-examine original, creative strategies that see industrial heritage as an element that generates opportunity (Benito, 2012). The Riotinto and Almadén projects fit this pattern. The unique nature of each site has been taken as a point of reference in order to make the mining past an effective tool in ensuring collective affirmation and local development. In any case, it will be necessary to increase tourism support services which are somewhat limited in both areas.

The vast heritage of the mining areas and their unique and stunning scenery are two clear strengths that have favoured their protection and the approval of far-reaching eco-museum projects, resulting in Almadén being reinvented as tourism destination (Cañizares, 2011a, 2011b). Change has been instigated by several ministries (Public Works, Industry, Culture) and the regional government of Castile-La Mancha, with the provision of European funds. The Almadén Foundation, created by the mining company, has managed and coordinated the project and the initiatives aimed at the economic recovery and diversification of the area.

The Master Plan was approved in 2003 as a tool for the design, planning and control of the tourism transformation. The objectives of the plan, in line with sustainability, have been the restoration and revival of heritage, the promotion of quality cultural tourism based on the development of new infrastructure and respect for the environment. Final suitability was preceded by several studies: architectural, geological, museological and feasibility.

Environmental restoration has been necessary in Almadén. After the final closure of the mines, the objective of minimising the impact on the environment was proposed leading to the drafting of the San Teodoro slag heap restoration project in 2004. This slag heap received as much spoil from mining work as slag from the metallurgical processes, covering a surface area of nearly 10
hectares and totaling 3.5 million tons of materials considered hazardous because of their mercury content.

The renovation involved the encapsulation of the slag heap to ensure the stability and waterproofing conditions. The existing banks were also made gentler to integrate the forms better, from the initial gradient of 36° to the current gradients of 25°, more in line with the natural slopes of the area. Restoring the plant cover has helped achieve better landscape integration of the structures with native species and some fast growing plants used to reduce the erosion as quickly as possible.

Visitor numbers have fallen short of the estimates of the Master Plan, which provided the following totals: 19,956 in 2005, 34,922 in 2006, 61,114 in 2007, 73,337 in 2008 and 88,004 in 2009. In any case, the actual number in recent years (12,182 in 2012 and around 10,500 in 2013 and 2014) is still a significant figure, which has placed Almadén and its district among the most emblematic tourist destinations of the entire region (Cañizares, 2008).

The impetus for the creation of the Riotinto mining park came from the mining company itself, becoming in 1987 the Rio Tinto Foundation. The tourist project developed has recovered many of the heritage assets dispersed throughout the district, with the transformed natural environment providing widespread testimony to this. An area as extensive as this has required the implementation of various projects, such as the opening of a museum and archive, the partial restoration of the railway line, the restoration of locomotives and other rolling stock and the setting up as a museum of ‘Casa 21’ in the English neighbourhood of Bellavista. Unlike Almadén, no renaturation plan of the landscape has been followed because this would have removed the aesthetic appeal of the transformed area. The result is a 900 hectare mining park. Total visits went from 11,366 in 1992 to 42,138 in 2002, 69,783 in 2010, 62,092 in 2012 and around 58,000 in 2013 and 2014.

Riotinto is better placed than Almadén from the sustainable tourism perspective. On average, it has more strengths in all the assessed aspects, and only certain weaknesses in specific issues (Table 3). In both cases, there is a clear need to improve the provision of the financial resources, local authorities’ contribution, the local population’s cooperation, the provision of amenities and the use of renewable energy sources. Given the small number of visitors, human pressure on natural and cultural resources is still low, yet it could increase in the coming years at the same time as tourism demand rises, and the gradual decrease in the current highly seasonal nature of tourism.

Table 3 is a summary of the average values in reference to the selected indicators for each component, as can be seen in Figure 1. The earliest example of tourism transformation at Riotinto highlights a greater experience in the planning of conservation and usage programmes and strategies, as well as promotion and diffusion. The difficulties that have to be tackled in the early years of these projects have been highlighted by most academics, above all in reference to an integrated management approach that establishes the intervention priorities of the projects to be developed and their subsequent upkeep. This is a task whose best results come after a time due to coordination of the widely differing agents and the continued involvement of local people.

The creating of environmental benefits tends to be a priority in many mining industry recuperation projects, in some cases an even greater one than cultural and social concerns. This has been the case in Almadén, with a well-developed environmental adaptation programme, representing an

<table>
<thead>
<tr>
<th>Component</th>
<th>Almadén</th>
<th>Riotinto</th>
</tr>
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<tbody>
<tr>
<td>(a) Effective and integrated management of cultural and natural resources</td>
<td>2.8</td>
<td>3.2</td>
</tr>
<tr>
<td>(b) Generation of social benefits</td>
<td>2.7</td>
<td>3.3</td>
</tr>
<tr>
<td>(c) Generation of economic benefits</td>
<td>2.7</td>
<td>3.7</td>
</tr>
<tr>
<td>(d) Generation of cultural benefits</td>
<td>3.0</td>
<td>4.0</td>
</tr>
<tr>
<td>(e) Generation of environmental benefits</td>
<td>3.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Synthetic index of sustainable development</td>
<td>2.90</td>
<td>3.52</td>
</tr>
</tbody>
</table>

Source: Author's survey and own elaboration.
average value that is greater than that recorded for other components. It is essential to assess environmental improvement, due to previous degradation of the area. Nevertheless, it is more important to consider all aspects of the surroundings as a cultural and economic resource that contributes to sustainable maintenance of the heritage site and the satisfaction of local people.

The promotion of local participation in the running of the mining heritage has been more intense in Riotinto, making it a highly effective tool in driving tourism sustainability and the identification of people with the area’s historical assets. This management has been an extraordinary instrument for local development, which has had a knock-on effect on ensuring improvements to infrastructures, providing new equipment and job creation. This explains how the value derived from the creation of economic benefits is higher in Riotinto than in Almadén. The promotion of local culture, so closely tied in with the mining tradition, has been a factor in both areas, although in Riotinto this has seen a more intense revitalisation, due to the support given to a wide range of parallel activities which has contributed to a greater level of satisfaction and recognition on the part of local people towards the recovered mining heritage.

The Almadén Mining Park has a medium to high value in the synthetic index, highlighting the cultural and environmental components, (3.2) and (3.0), respectively. Sustainability with regard to social and economic environments has slightly lower values. Highest indicators: $I_1$, $I_4$, $I_5$, $I_{10}$, $I_{12}$, $I_{14}$, $I_{19-20}$. The Riotinto Mining Park has a high sustainability synthetic index and higher values than Almadén in all the components. Cultural is the most notable component (4.0) followed by economic (3.7). Management has a lower value, perhaps influenced by the fact that it is a very extensive area, with a very high number of heritage assets and insufficient allocation of local or regional funds to properly integrate all existing natural and cultural resources. Very high indicators: $I_{1-4}$, $I_7$, $I_{10}$, $I_{12}$, $I_{13-19}$, $I_{22-23}$.

**Discussion**

The two areas analysed are of undoubted importance for the history of Spanish mining, especially mercury and copper. The activity boosted local economic growth, introducing new social and population dynamics throughout the region. But it was also a growth factor nationwide due to the magnitude and uniqueness of the extractions and their role in the modern industrialisation of the country. Different extractive structures, equipment and ancillary buildings were created around the mines. A highly humanised landscape also emerged, a cultural landscape which today is interpreted as a result of the prolonged use of nature’s resources, based on the specific technical and economic conditions of society in each period considered.

This landscape and its associated scenic values are the basis of the new tourist use. Attractive landscapes have emerged for leisure purposes. Their power of information and ability to convey knowledge often surpass the most specialised museums. Two fundamental interpretive elements are also present: the area and the environment. It should not be forgotten that environmental awareness in Western countries, beginning at the end of the 1960s and continuing throughout the 1970s, coincided with the growing interest in the preservation of industrial monuments (Tempel, 2012).

Environmental restoration and soil decontamination work has in fact been very important in Almadén and Riotinto, more so even than the actual preservation of the built heritage. This is the current way of designing sustainable models and disguising the cumulative effects of the uses and abuses produced.

The Riotinto landscape is very spectacular for all of the open-pit mining work that took place there. It is impressive for any observer, and is perhaps one of the post-industrial areas with greatest scenic values of any across the continent due to the wide range of colours of the land and mineral debris. That is its principal strength as a visitor destination. The renaturalisation of the landscape has not been considered necessary, unlike the operations undertaken in some highly polluted coalfields and industrial areas (brownfields to greenfields).
The Almadén area is different, as it is smaller-scale underground mining, although the architectural and heritage values have recently received World Heritage recognition. In both cases, the remains are perfectly accessible to the public, enabling an interpretation of the area that also covers the working and family conditions of the miners. This dual aspect encourages visits to any industrial heritage area (Shackel & Palus, 2006).

The creation of the two mining parks has been the best possible solution. Not only because each of them is a homogeneous area from an educational and tourist point of view, but they also represent a very interesting overall strategy that combines the preservation of the built heritage and the geological environment where the mining activity took place.

The towns of Riotinto and Almadén have been very receptive to the two reuse experiences. They understand it as way of continuing the past, which forged outlooks and lifestyles that have lasted over time, and that have also helped to create jobs and wealth. All this means the selective revitalisation of two inland areas that have known how to reinvent themselves in the present based on a singular past.

The tourist-cultural proposals reflect that dynamic, just as risky at first as has proved successful in the end. The initial difficulties were overcome due to the extraordinary coordination of all the actors in the process. A key role was played by the municipal authorities, local population and the impetus offered by the mining companies. This shows that the coordinated involvement of different actors, and not only the quality of the projects themselves, is vital in the restoration for tourism of the industrial heritage.

There are many different reasons for the visit that provide a very interesting indicator for project managers: proximity to place of residence, aesthetic contemplation of the scenery of the area, knowledge of the industrial past, linking to personal work related experiences or positive references received previously. It is also true that sometimes there are no previous specific reasons and the visit appears to be unplanned, simply being a cultural addition to other tourist activities (Prat & Díaz, 2014).

There have been a lot of tourism suitability studies in the two selected areas, of an architectural, geological, museological and feasibility nature. The sustainable management and generation of benefits options have been ever present. The final sustainability profile, medium-high in Almadén and very high in Riotinto, offers an innovative image in line with the most demanding tourism flows. This ensures the continuity of projects and their future success.

The method used to assess sustainability is simple and effective. It uses easily measurable and quickly interpretable components and indicators. Based on a previously designed questionnaire, a survey was conducted among the managers of each mining park, being a very useful and applicable tool for industrial and mining heritage in both urban and rural settings. It establishes a new way of comparing different tourist projects and provides both a specific and general view of an aspect of great importance: the sustainable use and management of heritage resources.

**Conclusion**

The projects carried out in Almadén and Riotinto have great tourist and environmental scope because they have managed to revitalise many elements of the inherited past, attract a significant flow of visitors (with prospects for future growth), stimulate tourism and the service sector in two inland areas and restore the region dedicated for so long to extractive work from an environmental and sustainable criteria point of view. Recovering the collective memory has been a fundamental element that provides consistent actions and ensures the sites’ continuity. These are two of the best examples in this regard, due to the impact of the two mining areas internationally, the widespread heritage protection implemented and the results achieved.

The town councils and other local authorities have played a decisive role in the restoration, coordinating all actors involved in the action. This has ensured ultimate success and shows the need to achieve the highest levels of synergy in everything related to industrial heritage. The mining companies responsible for each operation were involved from the start of new projects, resulting in the
restoration from the bottom with the participation of former mineworkers and the local community. The experience has become an asset that makes interpretation of the place understandable and encourages visits.

The landscape has been another draw, as the aesthetic values of both areas are very high. The spectacular nature of the extraction locations, colour contrasts of the soils, techniques and machinery used for earthmoving or associated infrastructure create very unique, extraordinary and hugely fascinating environments. They are very evocative of other times, the enormous effort put in and human ingenuity for obtaining from nature the necessary resources for the progress of society. This is the hallmark of the new tourist products offered by the two mining parks.

The traditional mining activity of Almadén was underground and smaller in scale than in Riotinto. The renaturation of the area became a priority environmental goal to integrate the remains accumulated around the mine properly. In Riotinto, however, the primary tourist attraction is the intense transformation of the natural environment by large-scale open-pit mining, preserving the changes brought about as a value of significant aesthetic appeal. Their stunning scenery and colour contrasts are an international reference in mining parks.

The degree of sustainability is important in both cases and is a process that appears to strengthen over time. This explains why the final synthetic index obtained in Riotinto, whose restoration experience began earlier, is currently higher than that of Almadén (Figure 1).

Disclosure statement

No potential conflict of interest was reported by the author.

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