Preliminary assessment of the post-mining geotourism potential of the Plateau tin fields, Nigeria

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ABSTRACT
Field assessments of the geotourist potential of the Plateau tin fields were carried out with the aim of qualitatively and quantitatively highlighting their tourism potential. The results show that mining on the Plateau has extensively devastated the environment leaving a landscape that pose a serious danger to life and property ranging from pits, mining ponds and steep dissected earth cuts. The categorisation of these pits and ponds show that in the light of associated variables, nearly 50% of the ponds and earth cuts can be utilized for geotourism with minimal geo-stabilisation procedures. The cost of maintenance can be transferred to wealth generation for socio-economic benefits when properly managed.

Key words: Post-mining, geotourism, Plateau tin fields, Nigeria

INTRODUCTION

Tourism is increasingly becoming a very lucrative economic venture even to the point of sustaining medium level economies. Geotourism has become a recent type of tourism with considerable growth potentials (Alexandrowicz 2006; Gordon 2012; Hose, 2000, 2007, 2008, 2010; Newsome & Dowling, 2010; Radwanek-Bąk 2012).

According to Hose (1995), geotourism, first defined in England, has two viewpoints which include a purely geological and geomorphologically-focused Sustainable Tourism as abiotic nature based tourism which is the definition followed in most part of the world. The second viewpoint is the geographically sustainable tourism, the most common definition in the USA which emphasises preservation of the geographical sense of a place in general, beyond simple geological and geomorphological features, as a new charter & concept in the sustainable tourism.

There are basically four major definitions of geotourism in geological sense (abiotic nature based tourism). The first is when the major attraction is the geological patrimony, the interpretation and the promoting of its popularisation leads to the development of the Earth Sciences including their conservation.

The second is when "Geotourism is a knowledge-based tourism, an interdisciplinary integration of the tourism industry with conservation and interpretation of abiotic nature attributes, besides considering related cultural issues, within the geosites for the general public" (Sadry, 2009).

The third is a form of natural area tourism that specifically focuses on landscape and geology. It promotes tourism to geosites and the conservation of geo-diversity and an understanding of Earth Sciences through appreciation and learning. This is achieved through independent visits to geological features, use of geo-trails and viewpoints, guided tours, geo-activities and patronage

of geosite visitor centers (Ruchkys, 2007)

The fourth involves the provision of interpretative and service facilities for geosites and geomorphosites and their encompassing topography, together with their associated in-situ and ex-situ artefacts, to constituency-build for their conservation by generating appreciation, learning and research by and for current and future generations (Gordon, 2012; Hose, 2010).

The summary of all the above definitions is that geotourism can exploit both the geological landscape artefacts as well as the associated cultural and geographical attributes. In all cases, the aspect of interpretation and conservation keeps coming up. However, the definition of geotourism in Nigeria hardly touches on geo-heritage related to mining except for natural geo-artefacts. If any at all, proponents of tourism in Nigeria involve the utilization of the mining ponds by hoteliers.

Geotourism is considered an extended form of tourism which originally focuses on geosites covering geological and geomorphological aspects. Now mining sites and associated heritage sites are included as sites for tourism. Geotourism explores monuments associated with mining activities such as mining works, mining museums, archives mining, trade routes of transporting commodities obtained from collectors and mining activity, and the technical and cultural heritage associated with historical mining activities, which could be included under the term mining tourism (Rybar & Carvajal, 2014; Pavolová et al., 2014). Mining tourism therefore is now firmly accepted as a component of geotourism whose potential is projected in this paper. Newsome and Dowling (2012) however pointed out that if geotourism is not properly managed, it can pose a threat to the geo-heritage sites.

Mining has been of age-long economic benefit to man and his environment. It involves the location and exploitation of mineral deposits from deep down the bowels of the earth, often utilising mechanized techniques that dig deep into the ground. Consequently, deep pits and unwanted soil materials are exposed and brought to the surface. If and when not properly managed, these pits constitute extensive nuisance to man and his cosmic environment. It has therefore become necessary to devise methods of mining that cause the least damage to the environment or means of managing the scars left by mining. This wishful thinking however is practically impossible since the need for exploitation is often more needful than whatever consideration that may suggest leaving the ground untouched. The devastation of the ground sadly will continue and pits, ponds, hips and other hazardous 'leftovers' consequentially cannot be prevented. Their preservation and conversion to tourism artefacts appear to be the best way for now to attempt to make them environmentally friendly.

The main aim of this paper is to highlight the neglected post-mining history of the Plateau tin fields and to proffer solutions and ways for safe utilization of the artefacts as against the present trend of costly reclamation of the landscape.

TOURISM IN NIGERIA AND GEOTOURISM POTENTIALS OF THE JOS PLATEAU

In Nigeria, according to the tourism master plan developed in 1990, five major tourism clusters have been identified. These include the Sahara gateway, Scenic heartland, Capital conference centre, South east and Atlantic gateway clusters (Fig. 1). Three of these five clusters, which include Scenic Heartland, Capital Conference and South East, are geotourism based.

The Scenic heartland is almost entirely covering the Jos Plateau, the wisdom and concept of the developers essentially based on climatic, cultural and scenic beauties of the Plateau. Then, little attention was given to core geotourist values and features partly because of the late emergence of

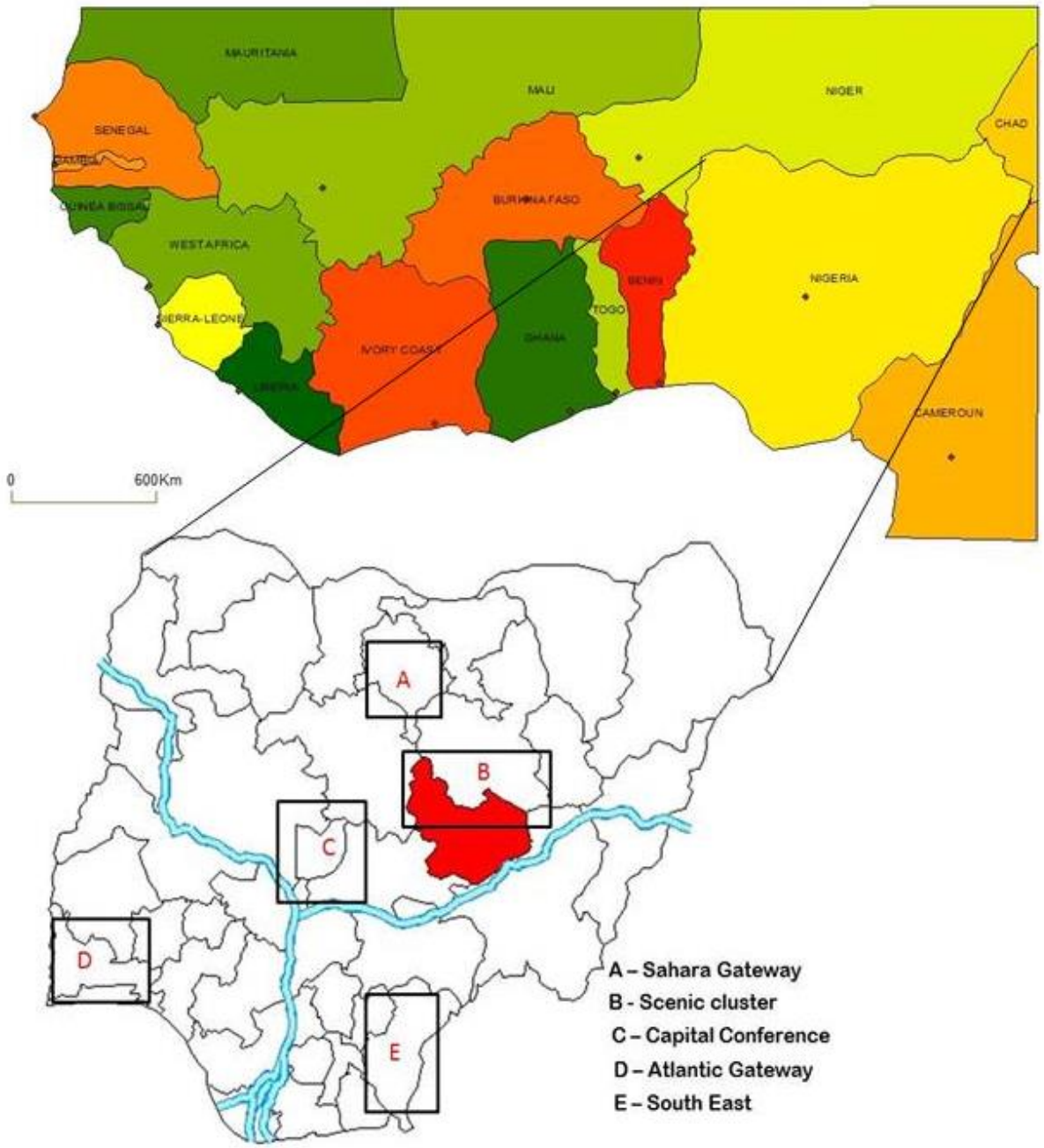

Fig. 1 Map of Nigeria showing the tourism clusters, location of Plateau state and in set West Africa.

geotourism and utilization of geosites in sub-Saharan Africa.

Ogezi et al. (2010) highlighted that Plateau State has the most striking physical features in Nigeria with the high lands rising from 1,200 meters above sea level and the low lands to a peak of 1,829 meters above sea level. Some of these classical geotourism landmarks of the Plateau include Wase Trachyte-Phonolite Plug, Kurra and Assop Water Falls, Surra Volcanic Line, Luham Rock, Riyom Rock, Kwi Conical Hill and Kerang Volcanic Hill, Shere Hills, Pankshin Hilltop, The Pudong ("Pidong") Crater Lake, Gahwang and Yembe Fall Columnar Basalts. More than half of the tourist landmarks in Plateau state are geological in nature such that the acronym home of "peace and geotourism" for the state would still have been

appropriate.

Aside from Wase rock, all the tourist landmarks are directly related to the uplift due to the emplacement of the Younger granites which form the core of the Jos Plateau. The Falls are also caused by the steep gradients generated by the uplift of the Plateau. The Kwi hills were possibly formed by lateritization of the Lower Cenozoic – Upper Cenozoic basalts in Nigeria (Woakes et al., 1989) while the Gahwang columnar basalts belong to the Younger flow volcanics of Nigeria.

From the foregoing, very little has been considered and or mentioned about the mining heritage as a potential for tourism. The major focus when the ponds are referred to is reclamation, the cost of which is exorbitantly huge that even the statutory Ecological Fund that comes from the Federal Government to states in Nigeria can hardly be sustained. A typical example of which outlived the two-term tenure of the immediate past administration (2007-2015) is the pond in the centre of the Ring road that connects Angwan Doki through the Yelwa Club Bukuru and the Bukuru-Jos Expressway (Fig. 2).

Economic realities premised on the present fall in oil prices are becoming increasingly clear that budgetary allocations for reclamation though according to environmental assessment prescriptions remain the best, may not be sustainable. Cheaper and easier ways therefore seem the best alternative.

GEOTOURIST HERITAGE

Remains of Former Activity

Madziarz (2013) documented that mining activity constitute a precious source of knowledge about the development of deposit mining technology, providing the evidence of knowledge and skills of the generations of miners connected over the centuries with the area of Lower Silesia. The treasures in mining does not only lie in the products themselves but also in the history that their extraction carry both during and after the mining. Mining on the Plateau at present has left traces of what at best can be referred to as historical artefacts of mining. All over the plateau, ponds and disturbances dot the landscape (Fig. 3).

Fig. 2 Photograph showing an attempt to artificially stabilize a pond around Yelwa Club Bukuru.

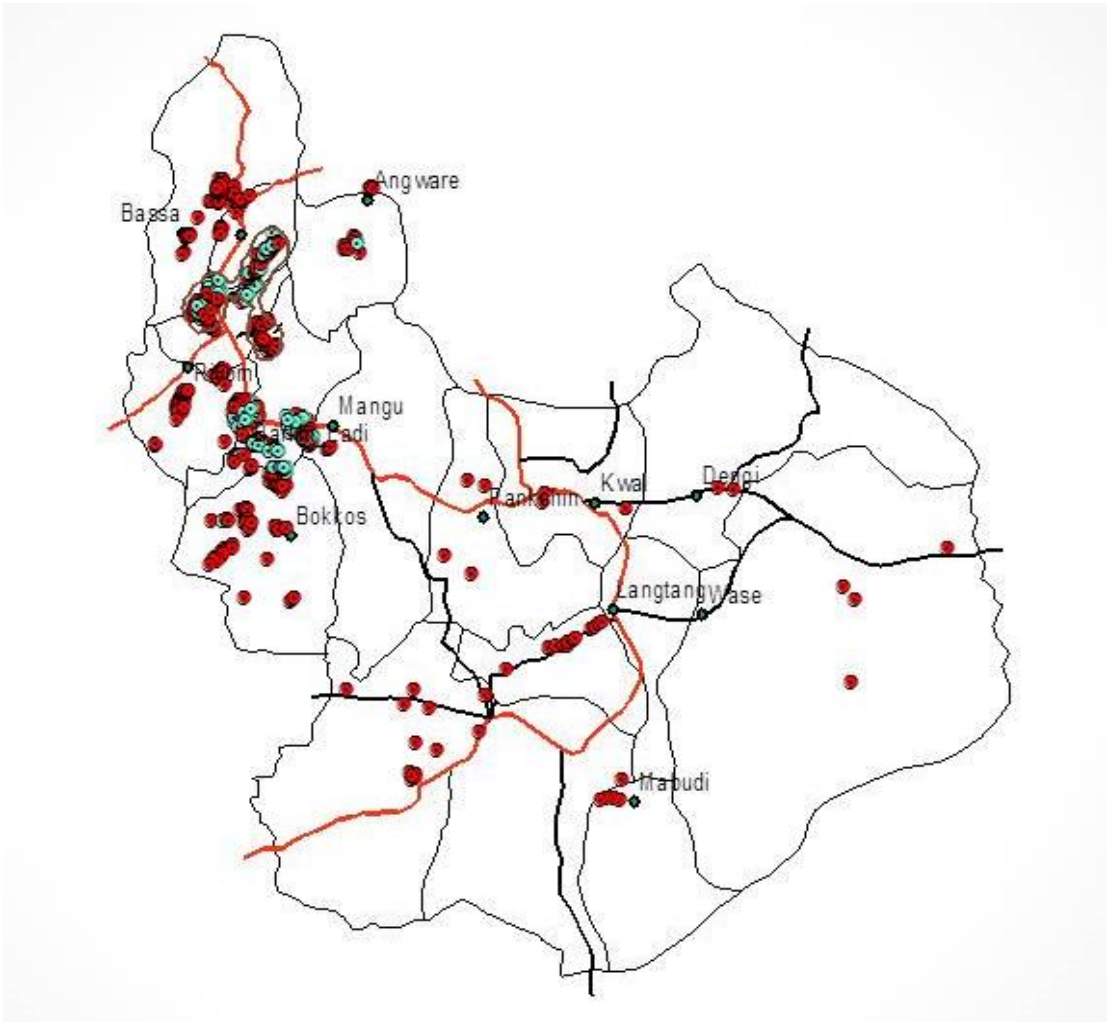

Fig. 3 Map of Plateau state showing locations of mining ponds (red dots) and mining disturbances (light greenish dots).

Though these ponds are concentrated along highways posing great risks to road users, such proximity makes utilization for recreation very excellent.

Along the major highways where urban development has not caught up with these ponds, dissected cuts are rampant. While the majority are endangered and left at the mercy of the current resurgence in artisanal mining for tin and columbite, they provide extensive history of the over one century long mining activity on the Plateau. The cultures of the inhabitants of Jos, Barkin Ladi and Bassa areas have largely been modified or affected by these activities. The history of mining on the Plateau therefore is an opportunity for historians. Abandoned equipment also provides opportunity for post mining tourism.

Ponds for Recreational potentials

When the mining pits are filled with water, they are referred to as mining ponds. In a good number of the mining sites visited, the pits are deep enough to store water perennially (Figs. 6 - 9). Though the depths of a good number of the ponds are very deep and can be dangerous, the design of the mines through benching for safety of the miners has reduced the slopes of the hanging walls such that they appear very stable and have survived over fifty years without collapse since mining activity stopped in the late 1970s to early 1980s. The real and major threat to these ponds is the recent activity of man through artisanal mining, dry season vegetable farming, fishing and local laterite mining in that order.

Fig. 4 Remains of mining activity on the Plateau (a) colonial artefact in Kuru, (b) shaft for molybdenum in the Kigom complex, (c) mined out pit showing the ancient benching overtaken by recent mining for tin in Bassa and (d) recent mining activity distorting the historical site in Rayfield-Laminga bye-pass Jos.

Fig. 5 Benching in an open pit mining for tin in Bassa during the colonial mining era of the pre-1960s

Fig. 6 Naturally landscaped scenery after tin mining along Barkin Ladi – Bokkos road.

Fig. 7 One of the numerous mining ponds used for irrigational purpose

Fig. 8 A pond currently exploited by the Rayfield Resort Jos

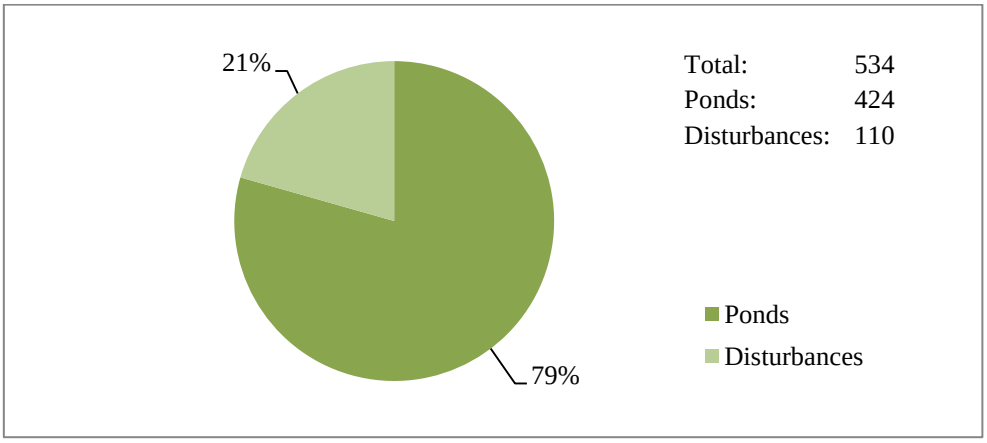

Fig. 9 Pie chart showing the percentage of the pits filled with water

The distribution of the pits visited shows that 79% are filled with water mostly around Barkin Ladi – Bokkos road, Dorowa, Du, Dilimi and Bukuru. These shows the great danger posed to life and property if left unattended to. Statistical analyses using area proportion shows that the most impacted area spans from Bokkos, Barkin Ladi, Riyom, Jos South, Jos North and Bassa covering about 494,426 square meters of land.

PROSPECTS AND POTENTIALS

The concept of mining tourism exploits mainly the relic landscape preserved from mining activities, ranging from shapes from the terrains, whether on the surface or underground, buildings and technical equipment. The focus here is mostly historical. Many developed and developing nations make good of such historical assets. Slovakia, Hungary and many western and eastern European nations (Conlin & Jolliffle, 2011; Drebenstedt et al., 2011; Hroncek & Liga, 2014), as well as Chile (Lopez & Perez, 2013), Spain (Perez et al., 2016) have many medieval, early Modern Age and recent mining sites that are useful tourist sites.

Geotourism is an emerging field where natural and for the sake of our discourse, geological and mining related landscapes

are harnessed for tourism purposes. The utilisation of the devastated landscape due to mining activities for recreation becomes not just the cheapest in terms of cost effectiveness for the mining companies, but also becomes the safest option since it attempts to not just beautify the scenery, but restores natural condition through planting of flowers and trees and artificial landscaping.

Mining being a profit driven venture, investing heavily in managing the after effects of mining can add to the cost itself and most mining companies shy away from that resulting in the majority of the industrial and environmental disharmonies that presently plaque mining areas. Environmentalists also raise the question of environmentally safe and friendly management techniques, all without recourse to the increasing budgets to the miners.

The present state of the Nigerian economy requires that States look inward for Internally Generated Revenues (IGR). Most States have started to vigorously exploit and tap from the natural endowments from their States. Plateau State has additional advantage of not just attracting investors to the mineral resources she is endowed with, but also scooping from the history left by the exploited resources as well. The cold weather and favourable climate makes it attractive. The choice of the scenic tourist cluster by the Nigerian Tourism Board should therefore be complimented by the State. Emerging avenues like the building of the Minerals Museums is a step in the right direction which should not be neglected by the State Government.

Additional prospects also exist in the area of collaboration with archaeological work especially with the proximity of the Institute of Archaeology which is situated in Jos. Such collaborations exist in countries like Poland in other to preserve and manage the mining heritage sites, the Institute of Archaeology and the Institute of History of the University of Wrocław is exploiting.

CONCLUSION

Plateau tin fields of central Nigeria was extensively devastated without proper reclamation leaving pits, ponds and steep dissected earth cuts.

Nearly 50% of the ponds and earth cuts can be utilized for geotourism with minimal geo-stabilisation procedures. The cost of maintenance of these ponds can be transferred to wealth generation for socio-economic benefits when properly managed. The geotourism potential of the Plateau Tin fields can exploit the historical remains of the mining activity and the utilization of the ponds for recreational activity.

The conclusion therefore is that a vast potential for utilizing the post-mining history of the Plateau tin fields exist. Rather than utilizing money for reclaiming the devastated landscape through the statutory Ecological Funds given to State Governments by The Federal Government of Nigeria) which often has been misdirected, the cost can be transferred to investors for use as wealth generating avenues through leases for personal or corporate recreational outlets.

REFERENCES

Alexandrowicz, Z. (2006). GEOPARK-nature protection category aiding the promotion of geotourism (Polish perspectives. Geoturystyka vol. 5, 3–12.

Conlin, M. V. and **Jolliffe, L.** (Eds.) (2011). Mining Heritage and Tourism: A Global Synthesis (Routledge Advances in Tourism). Routledge, New York, 280 p.

Drebenstedt, C., Rybár, P. and **Domaracká, L**. (2011). Montain tourism in Germany shown on example in Saxony. Acta Geoturistica, vol. 2, nr. 2, 60-63.

Gordon, J. E. (2012). Rediscovering a Sense of Wonder: Geoheritage, Geotourism and Cultural Landscape Experiences. Geoheritage, vol. 4, 65–77.

Hose, T. A. (1995). Selling the story of Britain's Stone. Environmental Interpretation. vol. 10, nr.

2, 16-17.

Hose, T. A. (2000). European Geotourism – Geological Interpretation and Geoconservation Promoyion for Tourists. *In: Geological Heritage: its Conservation and Management (Barretino, D., Wimbledon, W. A. P., Gallego, E., Eds.)*. Instituto Tecnologico Geominero de Espana Madrid, p. 127-146.

Hose, T. A. (2007). Geotourism in Almeria Province, southeast Spain. Tourism: Preliminary Communication, vol. 55, nr. 3, 259-276

Hose, T. A. (2008). Towards a history of geotourism: definitions, antecedents and the future. London. DOI: http://dx.doi.org/10.1144/SP300.5.

Hose, T. A. (2010). The significance of aesthetic landscape appreciation to modern geotourism provision. *In: Geotourism: The Tourism of Geology and Landscape (Newsome, D., Dowling, R., Eds.)*. Goodfellows Publishers, Oxford, p. 13-26.

Hroncek, P. and **Liga, J.** (2014): Lost mining landscapes and their use in geotourism. A case study from the dolina peklo - hell valley in the central Slovakia. Proceedings of the 14th International Multidisciplinary Scientific GeoConference SGEM 2014, 5(2), 415-422 .

Lopez, M. I. and **Perez, L.** (2013). Sustainable mining heritage tourism: indicators and a methodological proposal for the former coal mining settlements of Lota and Coronel. Eure-revista Latinoamerica de Estuidios Urbano Regionales, vol. 39, nr. 118, 199-231.

Madziarz, M. (2013). Historical ore mining sites in Lower Silesia (Poland) as geo-tourism attraction. Acta Geoturistica, vol. 4, nr. 1, 15-26.

Newsome, D. and **Dowling, R.** (Eds.) (2010). Geotourism: The Tourism of Geology and Landscape. Goodfellows Publishers, Oxford, 246 p.

Newsome, D., Dowling, R. and **Leung, Y.** (2012). The nature and Management of geotourism: a case study of two established iconic geotourism destinations. Tourism Management Perspectives, vol. 2, nr. 3, 19-27.

Ogezi, A.E., Aga, T. and **Okafor, I**. (2010). Geotourism Resources for Sustainable Development and Recreation: Plateau State Case Study. The Pacific Journal of Science and Technology, vol. 11, nr. 2, 610-618.

Perez-Alvares, R., Torres-Ortega, S., Diaz-Simal, P., Husillos-Rodriguez, R. and **De Luis-Ruiz, J. M.** (2016). Economic Valuation of Mining Heritage from a Recreational Approach: Application to the Case of El Soplao Cave in Spain (Geosite UR004). Sustainability, vol. 8, 185-209

Pavolová, H., Bakalár, T. and **Štrba, L.** (2014). Model for the assessment of competitiveness of geotourist destinations in Slovakia. Acta Geoturistica, vol. 5, nr. 2, 31-36.

Radwanek-Bąk, B. (2012). Assessment of geodiversity as a method of geotourism potential assessment. Annales – Universitatis Mariae Curie- Sklodowska, Section B, vol. 67, nr. 2, 77–95.

Rybar, P. and **Carvajal, D.** (2014)**.** Geotourism and mining heritage. Proceedings of the 14th International Multidisciplinary Scientific GeoConference SGEM 2014, vol. 5, nr. 1, 331-338.

Ruchkys U de A. (2007). Patrimônio Geológico e Geoconservação no Quadrilátero Ferrífero, Minas Gerais: potencial para criação de um geoparque da UNESCO. Tese de Doutorado—Instituto de Geociências, Universidade Federal de Minas Gerais, Minas Gerais, Brazil.

Sadry, B.N. (2009). Fundamentals of Geotourism: with a special emphasis on Iran. Samt Organization Publishers, Tehran, 220 p.