

Conserving Local Mining as Geoheritage in the Region for Geoscience

by Herry Riswandi

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**CONSERVING LOCAL MINING AS GEOHERITAGE IN THE REGION
FOR GEOSCIENCES**
(case study in local mining gold area in Paningkaban, Gumelar Subdistrict,
Banyumas Regency, Central java)

**Heru Sigit Purwanto
Herry Riswandi
Dedi Fatchurohman**

sigitgeologi@hotmail.com

Geology Engineering, University of Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

ABSTRACT

Local gold mining in the regions in Indonesia are usually considered as illegal gold mining by the government. However, if it is well-managed and is guided by the government, it will have added value. A large amount of profit will be received by central government and especially by the region, that are local revenue which make the economy around mining area is better, geological outcrop conservation which can be geotourism in the region and as geosciences education for the next generation. But the region of artisanal mining area has to be localized according to need and security of the region, if there is mining area that can be carried out by a bigger company, then the artisanal mining area must be placed in separated area.

The mining activities in this area is run by residents and is managed by cooperative. An observation shows that the agents of micro economy of artisanal mining are more likely to survive and not influenced by the lethargy of ore mineral exploration and exploitation both nationally and worldwide. In that case, local government must hurriedly make local regulation about artisanal mining which is referred to Law No.4 of 2009 and No.23 of 2014 about Implementation of Local Government which is autonomous, giving welfare to the people, and increase local revenue.

Key words : local mining, conservation, geotourism, geoheritage

INTRODUCTION

Local gold mining in the regions in Indonesia are usually considered as illegal gold mining by the government. However, if it is well-managed and is guided by the government, it will have added value. A large amount of profit will be received by central government and especially by the region, that are local revenue which make the economy around mining area is better, geological outcrop conservation which can be geotourism in the region and as geosciences education for the next generation. But the region of artisanal mining area has to be localized according to need and security of the region, if there is mining area that can be carried out by a bigger company, then the artisanal mining area must be placed in separated area.

Research about geology and its relation with mineralization and deposit of gold in Paningkaban area and its surrounding, Gumelar Subdistrict, Banyumas Regency, Central Java, show an indication that the gold mineralization in quartz veins are controlled by geological structure pattern. This is based on several researches and observations that AAS analysis result of quartz veins filling the tension and compression fractures shows relatively high (0.25 – 4.75 ppm) Au unsure (gold).

Gold mineral and its accompanying mineral are crystalized in quartz veins (late magmatic) in fractures channel, either in tension fractures, shear zone, or fault zones. The quartz veins follow fault and fracture structure pattern in study area, generally in northwest – southeast, northeast – southwest, north – south and west – east direction.

The mining activities in this area is run by residents and is managed by cooperative. An observation shows that the agents of micro economy of artisanal mining are more likely to survive and not influenced by the lethargy of ore mineral exploration and exploitation both nationally and worldwide. In that case, local government must hurriedly make local regulation about artisanal mining which is referred to Law No.4 of 2009 and No.23 of 2014 about Implementation of Local Government which is autonomous, giving welfare to the people, and increase local revenue.

GEOLOGY OF STUDY AREA

Geomorphology of study area is dominated by hills with steep slopes from relatively northeast – southwest and northwest – southeast direction, in erosion level of weak – strong. Generally, the landscape is controlled by lithology, geological structure and erosion process.

Based on data collection which covers preliminary interpretation, previous research data, field data and laboratory analysis, we can obtain stratigraphic sequence of study area according to the order of rock unit from old to young. From the result of data collection in the field and analysis conducted in laboratory, stratigraphy of study area is divided into 6 informal lithostratigraphy and 2 lithodem of igneous rock. Halang breccia – volcanic unit, Tapak breccia – volcanic unit, Tapak sandstone unit, Tapak limestone unit and Alluvial.

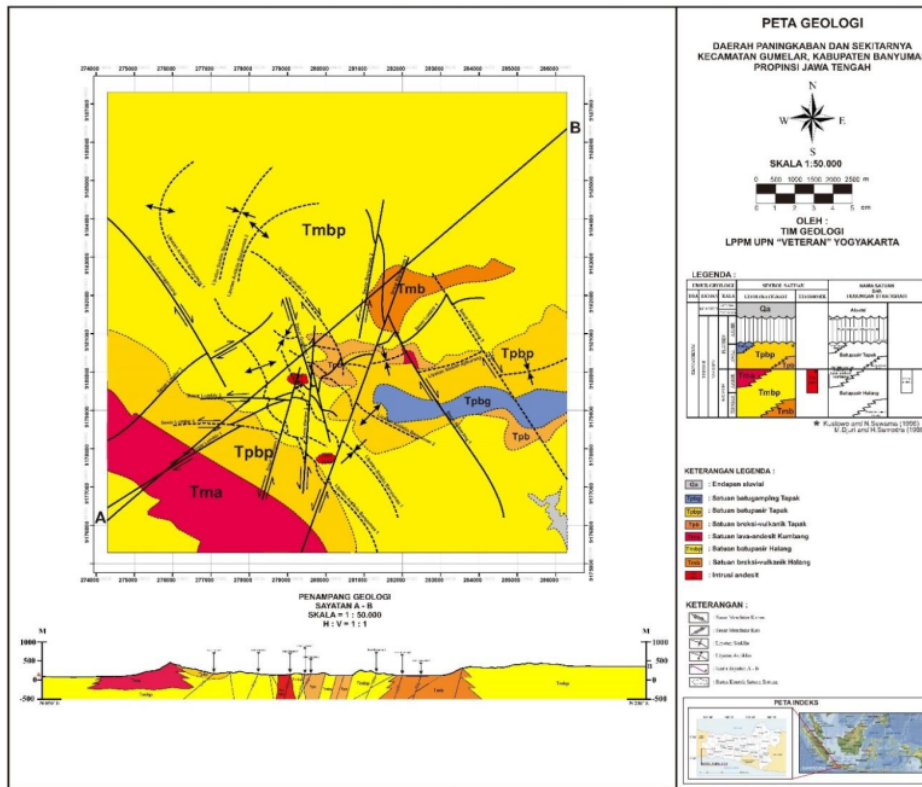


Figure 01. Geological map of Paningkaban area, Banyumas, Central Java

ALTERATION AND MINERALIZATION

Alteration and mineralization process is a process of rock changing in terms of chemical, physical, and others due to process impacted from hydrothermal hot solution medium. In this case, the rock subjected to impact or change is known as wall rock. Meanwhile the process occur in wall rock is known as wall rock alteration process, which is a chemical process that changes the original rock by the flowing hot fluid medium.

Based on all that information, the most important aspect in rock that make it able to be altered and mineralized is channel way which is the way out of hot fluid to the surface thus interact with wall rock. Usually, new minerals will be deposited, either secondary mineral or ore mineral (base metal) and the association of new mineral is usually reflected as an alteration type.

The mineralization in study area is relatively associated with quartz vein or veinlets, in Halang sandstone unit, and also in intrusion body found in the area. The ore mineralization in the study area is in form of sulfide mineral, such as; pyrite (FeS₂), chalcopyrite (CuFeS₂), few galena (PbS) and bornite (Cu₅FeS₄). The AAS analysis results show that Au (0,1 – 4,75 ppm), Cu (40 – 1250 ppm), Ag (4 – 19 ppm) and --- (60 – 8550 ppm).



Figure 02. One outcrop of rocks and minerals in the study area.

LOCAL MINING IN THE STUDY AREA

The study area with artisanal mining region is a part of Local Mining Area, based on the information from Agency of Energy and Mineral Resources of Central Java. A lot of sporadic holes had been dug by local residents. The search of location and direction of gold-contained quartz veins exploration are defined by reference from hole neighbor which has been successfully obtain that vein containing gold.

The digging of mining location that are not well structured with the bad condition of roof and wall of the hole or that are not safe for the miners will be threat for their safety anytime which can fall out and causing landslide, thus technical guidance from local government is needed.

Rock and quartz vein which are obtained or taken from inside the holes are then accommodated and put into iron drum and mercury is put into it, and then it is rolled either by water energy or diesel engine. The obtained gold will be sold to friends or shop that had pay all the needs for making holes, but only few given to the formed cooperatives

The money circulation from micro economy of artisanal mining sector in the regions is very useful and further study is needed, because their activities is not affected by the lethargy of either national or international mining activities.



Figure 03. Condition of hole in local mining area and the drum to accommodate the gold ore.

THE CONSERVATION OF LOCAL GOLD MINING LOCATION

The gold mining run by residents in anywhere in this world do not pay enough attention to the conservation of rock outcrops, the miners safety and environment's impairment. Whereas, the region or area of the gold mining is very rare, according to geology and not all area of alteration and mineralization have gold mineral, let alone the economic ones. In that case, the government needs to manage and give technical guidance needed by residents thus can raise the regional income and conserve the location of geological outcrops and mining area for geotourism of geosciences, at the same time.

The program will be really useful which can increase the local revenue and save geological outcrops and geological area that is very rare to be found so that the next generation will understand the geological history of certain area. It can be advantageous for geoscience and it is hopefully can be a reference for other regions.

Several things that is needed to be managed and conserved are:

- 1/ Managing local mining by making local regulation for taxation and circulation of gold metal obtained or the regional economic dynamics.
- 2/ Making road which is integrally connected between holes and mining activities
- 3/ Making books/brochure/text of brief geology of the mining area location.
- 4/ Making representative location site's building to explain about condition of the region and its geology to visitors.
- 5/ Building infrastructure related with geotourism and geoheritage of local mining area.

The lack of conception and government's standing to the society which related to the lack of central government's support in licensing and facilities in area in term of supporting the local mining activities had cause the lack of spirit of local government to seriously manage the artisanal mining in Indonesia.

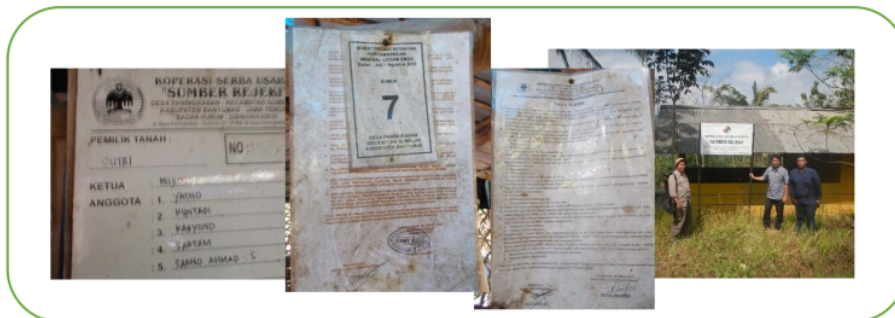


Figure 04. Activities in local mining area, which have had organization's activities that is well-structured and cooperatives that had been formed.



Figure 05. Resident's activities in the area of local mining and counseling from Institute of Research and Community Services (ICRS) of UPN Veteran Yogyakarta

PLANNING OF LOCAL REGULATION FOR GEOTOURISM AND GEOHERITAGE

Draft of local regulation for geotourism and geoheritage is very urgent, due to the lethargy of geotourism nowadays, especially for geoscience education geotourism which causing people to look for alternatives.

Interview and forum group discussion with local artisanal mining residents, has been executed. Study of Law No.4 of 2009 about mineral and coal and Law No.23 of 2014 about local government and several examples of local regulation about mining has been conducted. Based on Law No.4 of 2009 about law of mineral and coal, article of mineral mining in the regions has been regulated from how to do the mining up to processing before export. However, the artisanal mining area is not being cleared with the presence of unincorporated artisanal mining.

Based on that case and facts in the field, the arrangement and management ruled by local government is needed, especially in technical execution and processing and then the management of gold selling. Hereafter, local regulations are made for management of geotourism and geoheritage which can be acquired by coordination with education institution.

The explanation of several articles in Law No.4 of 2009 can be a reference to make autonomous local regulation. Those local regulations also can avoid conflict among residents.

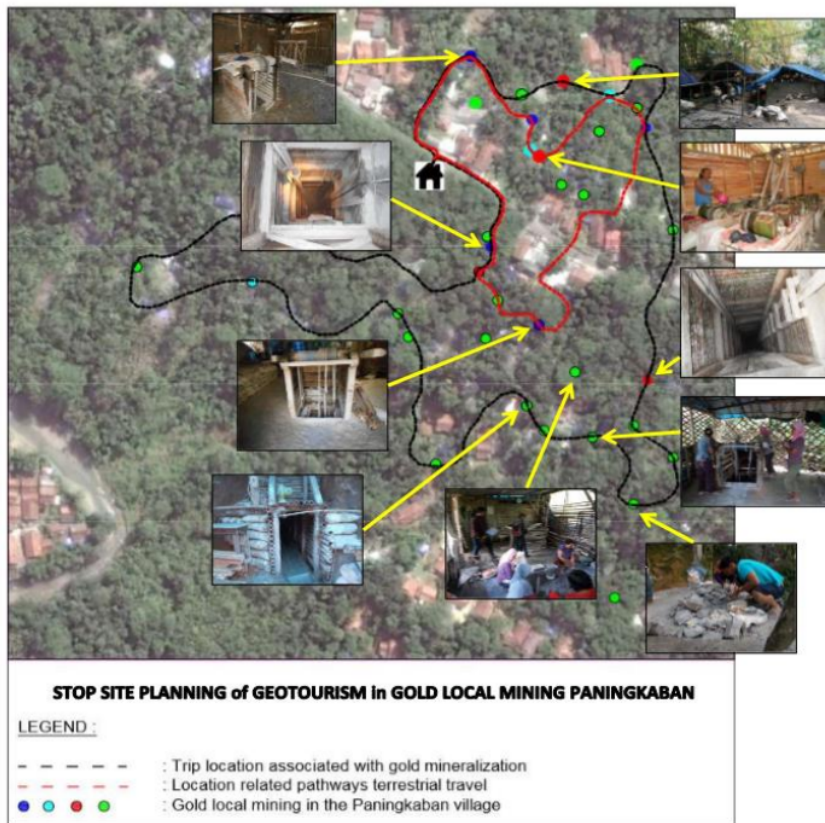


Figure 6. Stop site planning of geoheritage and geotourism area in Local mining, Paningkaban, Banyumas, Jawa Tengah, Indonesia

CONCLUSION

1. Local gold mining which is recently called as illegal mining, can be useful either to central or local government if it is well managed.
2. Geologically, the study area has a lot of gold and also a lot of local mining, which also can be found in every mining area in Indonesia, thus have to be regulated and managed well to be made as an area of geoheritage and geotourism
3. Activities in local mining area is very potential especially in micro economy, that is to keep the economic stability in the regions, thus can help local economy.
4. Local regulations must be made soon in order to conserve the artisanal mining area to be geotourism and geoheritage so it can save the geological outcrops for science and make that region become national or even world's heritage.

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BIBLIOGRAPHY

- Agung Basuki, D. Aditya Sumanagara, D. Sinambela., 1994. *The Mount Pongkor gold-silver deposit*, West Java, Indonesia. *Journal of Geochemical Exploration* 50 (1994) 371-391. Elsevier Science.
- Asikin S., Handoyo A., B. Pratistho, and Gafoer S., 1992, *Banyumas Regional Geological Map Sheet* (1308-3), the Centre for Geological Research and Development, Directorate of Geology.
- Asikin S., A. Handoyo, sono Mrs. H., and Gafoer S., 1992, *Kebumen Regional Geological Map Sheet* (1401-1), the Centre for Geological Research and Development, Directorate of Geology.
- Satellite image of tele atlas, 2012, Image Image Google Earth, US Navi, NGA, GEBCO. SRTM imagery 2009, Shuttle Radar Topography Mission, srtm_58_14 & srtm_59_14, <http://www.gistutorial.net/resources/download-data-srtm-wilayah-indonesia.html>
- Condon WH, Pardyanto L., Ketner KB, Amin TC, Gafoer S., and Samodra H., 1996, *Map Sheet Banjarnegara-Pekalongan geological Regional* (1408-2, 1407-5), Geological Research and Development Centre, Directorate of Geology.
- M Brocx & V Semeniuk, 2006, Geoheritage and geoconservation. history, definition, scope and scale, *Journal of the Royal Society of Western Australia*, 90 (2007) : 53-87
- Kastowo, 1975, *Map Sheet Majenang Regional Geology* (10 / XIV-B), the Centre for Geological Research and Development, Directorate of Geology.
- Rahardjo Wartono, Sukandarrumidi and Rosidi HMD, 1995, *Map Sheet Yogyakarta geological Regional* (1408- 2.1407 to 5), Geological Research and Development Centre, Directorate of Geology.
- Solarska Anna & Jary Zdzisław, 2010, Geoheritage and Geotourism Potential of the Strzelin Hills (Sudetic Foreland, SW Poland), *Geographica Pannonica, Volume 14, Issue 4 (December 2010)* : 118-125
- Tamara Jojić Glavonjić, Milovan Milivojević, Milena Panić, 2014, Protected geoheritage sites as a touristic value of Srem, *J. Geogr. Inst. Cvijic*. 64 : 33-50
- Tjokrosoepetro Soebardjio, 1997, *Relationship Tectonics with Presence Mineral Metal*, Center of Mining Power Development.
- Heru Sigit Purwanto, 2002. *Kontrol Struktur pada Mineralisasi Emas di daerah Penjom dan Lubok Mandi Semenanjung Malaysia*. (Desertasi S3, tidak dipublikasikan).
- Heru Sigit Purwanto, Herry Riswandi & Arfan Parmuhunan, 2007, *Prospeksi Cebakan Emas Berdasarkan Kontrol Struktur Untuk Penentuan Titik Bor Nirmala Dan Sekitarnya Kabupaten Bogor Propinsi Jawa Barat. Laporan Penelitian P.T. Aneka Tambang. Jakarta (Tidak Dipublikasikan)*.
- Heru Sigit Purwanto. 2006. Magmatism and Structural Control of Gold Mineralization in Lubok Mandi Area, Peninsular Malaysia. *Proceeding International Interdisciplinary Conference Volcano International Gathering 2006*. 301-30
-Undang-Undang No.04 tahun 2009, tentang Mineral dan Batubara.
-Undang-Undang No. 23 tahun 2014, tentang Peraturan Pemerintah Daerah.

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