SUSTAINABLE MINING – SUCCESSFUL EXAMPLES

ARTHUR PINTO CHAVES
RESUMO

As atividades de mineração agridem o ar, o solo e as águas da região onde atuam. Isto leva a inevitáveis conflitos com a vizinhança. Três casos de relacionamento bem sucedido ou não entre a mineração e a comunidade são discutidos.

O primeiro é o da Pedreira Itaquera, na região metropolitana de São Paulo, SP. Ela começou suas atividades em 1923, como pedreira marroeira, tornou-se uma pedreira industrial nos anos 60 e desde 1956 passou a enfrentar a oposição das comunidades que vieram a se desenvolver em torno dela. Ela encerrou suas atividades em 1999 mas transformou a cava num depósito de material inerte, fazendo a disposição de maneira a permitir o uso posterior como área para construção de pequenos edifícios.

O segundo caso é o fechamento da mina de Águas Claras, na região metropolitana de Belo Horizonte, MG. Ela precisou ser fechada para não afetar a vista da Serra do Curral, responsável pelo nome da cidade.

O terceiro caso é o duma cooperativa de areeiros no Rio Ribeira de Iguape, no sul do Estado de São Paulo. Ela desenvolveu um modelo exemplar de relacionamento com a comunidade.

Palavras-chave
Mineração, mineração em áreas urbanas, relacionamento com a comunidade.
ABSTRACT

Mining activities harm the air, the soil and the waters of the region where they occur. This leads to unavoidable conflicts with the neighboring communities. Three cases of successful or unsuccessful relationships between mining activities and the communities are discussed.

The first one is that of Pedreira Itaquera (Itaquera Quarry) in the metropolitan area of São Paulo city. It started its activities in 1923, became a large quarry in the 60’s and, after 1956, faced the opposition of the communities that came later and developed around it. In 1999, it was closed, but the cave was used as an inert landfill. Controlled disposal was done to allow the use of the area for construction afterwards.

The second one is the closure of the Aguas Claras mine, in the metropolitan area of Belo Horizonte. It had to be closed to avoid impact on the landscape of this city, whose name means “handsome skyline”.

The final case is a cooperative for sand extraction in the Ribeira de Iguape River, southern São Paulo State. It developed an exemplar model of relationship with the community.

Keywords
Mining, mining in urban areas, relationship to the community.
The mining industry harms the soil, the air and the waters of the area where it is carried out. These impacts are small as compared to many other industrial activities and are also quite limited to the area around the mine site. Nonetheless, as especially the visual impact is quite ostensible, the mining industry is the preferred villain of all ecologists, unoccupied, and uninformed people.

The dearly remembered Prof. Joaquim Maia presented, in 1973, at the First National Meeting for Minerals Processing, a memorable paper which my students must read every year. This paper, for its relevance, has been reproduced in different journals as MAIA, J. (1989) and (1990). Professor Maia calls attention to what he names “ethical content of mining”: as mineral resources are natural and non renewable, in principle, they belong to all mankind, not to the few privileged people who have the access to its exploitation. They must be exploited in such a way to preserve them to the maximum. Mining has, as a consequence, an ethical content that very little human activities do have. In practice, this means:

- in prospection, proper reserve evaluation;
- in mining, maximum economic extraction of the ore;
- in beneficiation, maximum recovery of the values.

It is important to stress that Prof. Maia preached his ideas in 1973. Many years later, ONU’s World Commission for Environment and Development, lead by Ms. Gro Harlem Bruntland, established the concept of sustainable development that repeats Prof. Maia’s ideology!
Aggregates such as sand and crushed stone must be close to their market. Inside metropolitan areas, they are visible to everyone; as a consequence, they are the target of constant criticism.

Pedreira Itaquera, in São Paulo city, is an emblematic example of the constraints for an (almost) pacific co-existence between people and quarries. This company started its activities in 1923, producing dimension stone, or cobblestone for urban pavement. Its site was a completely insulated one, very far from the city. But the city grew and its neighbourhood was occupied. In the 60's a dwelling neighbourhood was built. At this time the quarry had became an industrial one, producing crushed stone and artificial sand. The traffic of big trucks was intense across the neighbouring streets. Blasting and powder were other sources of trouble for the neighbours.

A permanent conflict was installed between the quarry and the neighbourhood. Ironic is the fact that the quarry had always been there. It did not invade the neighbourhood. The neighbours invaded the quarry surroundings! If a villain had to be punished, it was not the quarry but the people who sold the land and built the houses... And the Authority who allowed it!

In 1956, an undersigned petition to close the quarry was submitted and, in 1978, the Prefecture intimated the quarry to close. But there was no money to indemnify the company and it went on producing crushed stone.

The conflict extended. In 1989 the local community organized a great assembly to discuss the problem and to press the company. Under pressure, the company hired specialized assistance and, in 1992, started to dialog with the community.

As a result:

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- the blast pattern was reviewed,
- water aspersion into the quarry was introduced to reduce dust emissions,
- green barriers were planted around the quarry, safety signalization was implanted in the whole area, degraded areas started to be recovered, a program of relationship with the community was started including talks, visits to the quarry, environmental education etc.
Upgrading construction works in the neighbourhood, building material was donated, equipment for construction in the area was lent by the company.

As all these measures were costly, in August 1999 the quarry finally decided to close. But it did not stop its activities. The cave was transformed in an inert materials landfill. In fact it was a very convenient transformation as:
- the area of the estate was 300,000 m²;
- the volume of the cave was 6,500,000 m³;
- should the Prefecture build such a deposit, it would have to purchase that estate;
- the company assuming this activity yielded no cost for the Prefecture;
- this operation was a nice solution for the Prefecture’s disposition problem;
it meant the end of the conflicts with the neighbourhood.
It is important to stress that the quarry had reserves to go on for 8 more years (20,000 m³). So, it was a strategic decision! In the same spirit, careful planning was done in order to allow for the future utilization of the land for other purposes after the end of the cave’s filling.

A minimum compaction rate of 1.2 kgf/m² was defined in order to be able to support two-level constructions. 4,600,000 tons of inert material have been disposed there. Only inert material was accepted in order not to produce leachate.

Water into the landfill was driven to a single accumulation point from which it was pumped out of the cave.

A third party company was hired to operate the landfill, people with previous experience in this kind of operation.

On April 2006, the landfill was completed.

Fortunately, the region where the quarry / landfill is located is now undergoing great urban transformations as a function of the 2014 World Soccer Cup. A soccer stadium, designed to host the most popular soccer team in Brazil (and the best one!) and to receive the opening game is being built very close to it. Four hotels will be built there as well as commercial towers totalling 226,000 sq m.

Residential areas are under construction now over the landfill, comprising malls, schools and parks. 35,000 peoples are expected to live there.

The lesson to be learned is that despite the normalization of the relationship with the surrounding community, the company decided to close the quarry and to change the purpose of use of the land. And planned carefully this change.
Another interesting case is that of the now closed Aguas Claras mine, from the extinct MBR. This mine, in the hill side of the Serra do Curral mountains, was situated between the cities of Belo Horizonte and Nova Lima, MG. When the excavation arrived to the top of the mountains surrounding Belo Horizonte ("nice skyline") and the skyline (which really is handsome) started to be modified, a big conflict arose with all the metropolitan population. In fact the spoiling of the landscape was notorious and the legal system forbade the mining company to go on and obliged it to redraw the skyline.

It must be mentioned that the relation between the mining company and the communities was excellent. A remain of the Atlantic Forest was kept inside its property by MBR – Jambreiro’s Forest. When an uninformed judge determined the delivery of this forest to the authorities, invasions, deforesting, fires and so on started. Public Ministry requested and achieved the devolution of the forest guard to MBR. The mine was very deep and demanded constant drainage: deep pits drained it and the excellent quality water (as filtered by hundreds of meters of sand or itabirite) was given to the municipalities of Nova Lima and Belo Horizonte (100% of Nova Lima’s demand and 20% of Belo Horizonte’s were supplied by it).

As it became impossible to go on with the mining activities, the company was pressed to end its activities. An enormous reserve of extra quality ore remained, as well as a pit, tailing and water dams, roads and buildings. A careful reclamation project was made. Total area is 2,000 ha, 350 impacted by the mine. It was the first Brazilian great mine to be decommissioned.

Today, at the site, there is a first class residential area, hotels and an eco-tourism park with special areas for radical sports. The lake (0.7 km$^2$), when completely full, will be one of the
deepest lakes all over the world (234 m). Research laboratories have already been installed there.

The lesson to be learned is that despite the excellent relationship with both communities, the company had to close the mine and to change the purpose of use of the land.
4 | SAND EXTRACTION AT THE RIBEIRA DE IGUAPE RIVER

The Ribeira de Iguape River, near Registro city, in the frontier of the states of São Paulo and Paraná, is the source for construction sand for all of the Baixada Santista region. A cooperative of associated producers developed an environmental recovery program that must be reported.

Mining is done by cutting-head dredges into the river bed. Sand is brought to the shore, unloaded and washed in preparation plants. These barges’ pilots were properly instructed and co-opted, and therefore act as true environmental police agents. When they see boats spreading oil into the water or fishermen doing predatory fishing, they call the environmental police, who can act at once.

Riverside litter used to be spread all over the river. An education and awareness campaign yielded a commitment between the cooperative and these shore inhabitants: every Saturday a boat goes up and down the river collecting all the accumulated garbage.

On Sundays, students from the county’s schools are invited for strolls on the boats and receive environmental education.

All the sand is hauled to distribution parks. At these parks, nurseries, dressing rooms with clean sanitary facilities, and canteens have been built. These facilities started to attract a special kind of truck drivers – those who bring their wives or children along, Christian drivers, people who are honest and correct and use to avoid trouble. By themselves, they managed to purge the cheaters, the riotous, those who travel with prostitutes. As a result of this self-selection, there was a sensible reduction in tricks, pure cheats, or bounced checks received by the cooperative.
Life has become better for the member of the cooperative, too. Every year, the lower sand ports are flooded and become unproductive during the rainy season. The cooperative supports them during this season, paying them the average production. During the remaining of the year, they pay back—in sand—to the cooperative, the received amount.

As another result of this constructive action, the gallery forest was recovered by the cooperative members. Planned reforestation action favoured the fruit native species, which attracted birds, small mammals and... fish—which had abandoned the area. Verified this fact, an investment was done in colonizing the river with baby fishes to improve the population.
5 | CONCLUSION – CETEM’S ROLE

As a conclusion, reference must be made to Cetem’s action in environmental issues. From its beginning, due to a directive by Dr. Villas Bôas, Cetem became involved with all the environmental concerns in mining, including – which was not common at that time – antropogenic involvement.

Important projects were developed since then, as the study of mercury contamination in the gold “garimpos”, the remediation of Santa Catarina’s coal mining region and many other. A device to recover mercury by distillation was developed, as well as a method to measure mercury contamination in people.

This year, an important conquest was the awarding or Dr. Francisco Mariano da Rocha Lima for his PhD thesis on recycling of civil construction and demolition dump. This gentleman developed the concept of “urban mining” as the recovery of the values contained in the demolition dump for gravel, stone and sand provision as a secondary aggregate for civil construction.

The great difference between Dr. Mariano’s work and the current practice in civil dump recycling is to understand that this dump is not a homogeneous material but a mix of different ones: concrete, mortar, bricks, tiles, asbestos, plaster etc. They have individual properties and different mechanical resistances. By using mineral process principles like those that rule the densitary separation of minerals it is possible to sort different aggregate products like the concrete which has mechanical properties similar to those of the crushed stone, sand and a weaker aggregate, not so strong as the concrete but that can be used in less responsibility works.

This technique has an enormous potential for the conservation of the natural resources and enormous importance in reducing
the environmental impact of the reurbanization process that most of our cities are facing.
BIBLIOGRAPHIC REFERENCES


MAIA, J. Pelo econômico e social. Mineral Minério, ano I, nr. 4 (Nov. 89), p.3,

MAIA, J. Conceitos básicos de mineração. REM, nr. 1 (Set. 90), p. 3-10.


Pedreira Itaquera, acessado em 13/04/12 http://www.pedreiraitaquera.com.br/index2.html


http://www.prefeitura.sp.gov.br/cidade/secretarias/upload/infraestrutura/arquivos/clip