

How does it affect mining in Guavio (Colombia)?

¿Cómo afecta la minería en el Guavio (Colombia)?

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This article presents true and reliable information about mining in Colombia, particularly concerning Guavio, highlighting the problems generated by mining in that region, to raise awareness among Colombian and foreign mining companies. In the Guavio region, there is a great potential to extract construction materials and immensity of minerals, that is why there is a high level of mining activity. Likewise, there is a great variety of environmental and social problems, such as contamination of water bodies by solid waste, generating deviation in riverbeds, causing overflows and loss of land and crops. Finally, possible alternatives are analyzed to reduce the problems generated by mining in Guavio.

Keywords: Crops, extraction, land, mining, mining companies, water

Este artículo presenta información verídica y confiable sobre la minería en Colombia, particularmente respecto al Guavio, resaltando las problemáticas generadas por la minería en dicha región, con el fin de concientizar a las empresas mineras colombianas y extranjeras. En la región del Guavio se presenta un gran potencial para extraer materiales de construcción e inmensidad de minerales, es por esto que allí se presenta un alto nivel de actividad minera. Así mismo, se presentan una gran variedad de problemas ambientales y sociales, como contaminación de los cuerpos de agua por residuos sólidos, generando desviación en los cauces de los ríos, causando desbordamientos y pérdidas de terreno y cultivos. Finalmente, se analizan posibles alternativas para poder reducir las problemáticas generadas por la minería en el Guavio.

Palabras clave: Agua, cultivos, empresas mineras, extracción, minería, terrenos

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Introduction

Colombia has many natural resources, is the second country with the greatest biodiversity of flora and fauna species in the world, has more than 9,000 endemic species (species whose distribution is restricted to a certain geographical area), in addition to the first in birds and orchids, the second in plants, amphibians, butterflies and freshwater fish, the third in palms and reptiles and the fourth in mammals (Decaens et al., 2018; SiB Colombia, 2019). Due to the great number of moors in the territory, it can be said that it is a great producer of water; but mining is destroying all these resources since licenses have been granted for environmental protection zones and also for the riverbeds (Gallego, 2018; Morán, Ceballos, Peña, Lorenzo, & López, 2018).

Some areas have said *No to mining*, using the popular consultation, one of them is the municipality of Cajamarca, which through this resource managed to ensure that mining in the territory did not continue to affect the environment in which its inhabitants lived, but achieving this goal is not very easy and making people aware of the great problems that mining brings is even more difficult.

The only ones who know the problems generated by mining are the inhabitants of the areas directly affected by it. Informing the population is the beginning of the awareness process and this will be the purpose of this article.

In the first chapter, we will contextualize the mining wealth in Colombia, its distribution, the regulations that govern it, and some companies that carry out mining operations in the country, and we will discuss illegal mining. The second chapter will focus on mining in the Guavio region, highlighting its water and ecological importance, the materials that are extracted daily, the contamination and consequences generated by mining, the applications, and titles granted, and the territory. The third chapter will deal with the impact, conclusions, and opinions about mining.

Mining in Colombia

Following the Political Constitution, all non-renewable natural resources of the soil and subsoil belong to the Nation in an inalienable and imprescriptible form (Ministerio de Minas y energía, 2018). The mining industry is one of the main economic managers in the country. In recent years this activity has intensified thanks to new technologies that have come from foreign investors (Wikipedia, 2018).

The geological morphology of Colombia allows it to have a great potential of minerals, such as gold, coal, emeralds, nickel, zinc, lead, platinum, etc.; highlighting also the amounts of salt, gravel, sand, asbestos, gypsum, sulfur, phosphoric and ornamental rocks, among others. These are

destined for the manufacture of different objects used daily by the entire population.

This richness made the first inhabitants of the country, besides dedicating themselves to hunting and fishing, also dedicate themselves to the manufacture of objects and tools with clay, gold, and platinum (Vanguardia, 2018).

In every Colombian home, there is a mineral product that we may not know about. For example, there is nickel in computer and cell phone batteries, clay in skin masks, or salt in soap, among others. All are included in the classes of minerals (metallic and non-metallic), which are part of the great mining potential of the country.

Gold, coal, and emeralds are the best known. However, the Colombian subsoil gives for much more. It is estimated that in Colombia only 5% of the area that potentially has gold, 1% of the area rich in emeralds, and 8% of the nickel deposits have been explored and exploited. Colombia is in the line of the Pacific belt, considered a strategic strip with copper potential. There is talk of a deposit of 500 million tons of the mineral, which would put the country on the map of large mining. Currently, it imports about 70% of the copper required by the domestic industry, and the national production barely reaches 50,000 tons, according to figures from the ACM (Colombian Association of Mining) and the DANE (National Administrative Department of Statistics). Although in Colombia copper exploration is starting to increase so far, it is believed that in eight or ten years this business will start to shine.

From ANDI (National Association of Businessmen of Colombia) there is a great expectation to take advantage of the investment in infrastructure works and housing plans, two factors that make steel dynamic. According to him, for the works of the first 4G wave, it is estimated that there will be a demand for steel of 939,000 tons, of which 500,000 tons correspond to types of steel produced in the country.

It also estimates that the demand for steel for concrete will have a positive behavior until 2018 since 600,000 tons will be required only for housing projects subsidized by the national government if the 315,000 social interest housing (VIS) are built (Dinero, 2018b).

It is necessary to highlight that Colombia has the largest open-pit mine in the world, El Cerrejón. It is located in the Guajira peninsula with a surface of 69,000 hectares. In 1980, the conditioning works began led by the American company Exxon (Fig. 1).

In the last few decades this problem, along with others, has been deteriorating in a large part of the Wayuu territory. In addition to generating different types of contamination and accidents that not only affect the environment but also the people who live around the mine (Dinero, 2018a).



Figure 1. Cerrejón coal mine (Contagio Radio, 2018).

Distribution in Colombia

Although many people claim that mining activities in Colombia are concentrated mainly on the northern coast, because large coal companies are located there, the National Mining Agency established through its work of monitoring, control, and control of titles, that mining is not concentrated in one or two areas of the country.

Through three-zone coordinations (Central Zone, Northern Zone, and Western Zone), which in turn group together twelve Regional Attention Points (PAR), the National Mining Agency has been carrying out an inspection work, which after its first phase that ended in December 2014 and in which 100% of the titles in force were inspected, already presents important results about what mining is and where this activity takes place.

Of the 9,602 mining titles in force in Colombia, 17% are in departments that are part of the Nobsa PAR, 16.5% are in departments that are part of the Bogotá PAR, 16% are in the hands of the Governor's Office of Antioquia, 8% are in the Ibagué and Cúcuta PARs, which together account for 65% of the total number of titles. The remaining 35% is distributed among the PAR Bucaramanga 7%, Cartagena 6%, Manizales 5%, Cali 5%, Valledupar 5.5%, Medellín 2%, Pasto 2% and Quibdó 2% (Agencia Nacional de Minería, 2018).

Mining legislation

To promote the formalization of mining in Colombia, as well as the different tools that accompany it, the Directorate of Mining Formalization signed the inter-administrative agreement 094/2013 with the National University of Colombia - Medellín campus; using workshops with mining communities and municipal authorities, it seeks to strengthen the development of this activity by publicizing the existing legal, environmental, social, technical and business tools for the support of small-scale miners to improve mining productivity and competitiveness in the country (Ministerio de Minas y Energía, 2018).

Exploitation in Colombia is regulated directly by the National Mining Agency, Regional Autonomous Corporations, National Environmental Licensing Authority, the Colombian Geological Service, the National Hydrocarbons Agency, the Ministry of Mines and Energy, and the Ministry of Environment and Sustainable Development, and indirectly by the Procuraduría, the Contraloría, the Alcaldías, ONGs (Non-Governmental Organizations) and the community in general (Agencia Nacional de Minería, 2018; El Espectador, 2018).

The 2016 mining policy and the 2018-2025 National Mining Development Plan seek to increase mineral production and establish the basis for future mining (El Espectador, 2018). The extraction of the different materials that exist in the country has produced different consequences, both environmental and social since the territory has been destroyed when obtaining them.

According to the Vice Minister of Mines Carlos Andrés Cante, Colombia will continue to be an attractive country for mining investors because there is enough information to know the material wealth that the country possesses, adding also that the mining titles granted do not exceed 5% of the area of the territory, demonstrating the potential for development and investment opportunities in *well-done mining* projects. It is also important to note that the aim is to reduce the informality of the activity, to be more environmentally friendly, and to improve the image of mining (Vanguardia, 2018).

Companies

Colombia's exports have been positive for three consecutive months, and many sectors have contributed to these figures. This means that foreign sales have been focused on the agro-industrial sector with products such as coffee, palm, sugar, and a significant recovery in the manufacturing sector, without demeriting Colombia's mining companies.

According to the portal Portafolio.com, in January 2017 exports from the "Other Sectors" group registered a variation of 65.5%, thanks to the growth in non-monetary gold exports with 66.3%. All of this despite the difficult times, because the mining industry was affected by issues of legal security, competitiveness, and high volatility in international markets, as affirmed by the Colombian Mining Association (ACM).

The hope and expectations that the sector will grow are placed on the production of coal, nickel, and gold because at the end of 2016 they showed positive numbers.

List of mining companies in Colombia.

- ANGLGOLD: has been assigned 406 mining titles in the country, distributed in five projects that cover 781 hectares: La Colosa in Tolima, Quebradona and Gramalote

in Antioquia, Salvajina in Cauca, La Llanada in Nariño, Chaparral in Tolima and Rio Dulce in Antioquia.

- **MINERALES ANDINOS DE COLOMBIA:** they are owners of 111 mining titles and operate in Segovia, Antioquia, and in Marmato, Caldas, where they carry out open-pit operations and coexist with old artisanal mining that exists since the XIX century.

- **NEGOCIOS MINEROS S.A.:** has 88 titles that comprise 35 thousand hectares in the departments of Antioquia, Chocó, Risaralda, Cauca and Tolima.

- **CONTINENTAL GOLD DE COLOMBIA:** has been assigned 67 titles distributed in 79 thousand hectares in the municipalities of La Vega and La Sierra in Cauca, Bagadó and Lloró in Chocó, Suratá and Vetan in Santander, Silos and Mutiscua in North Santander and in Antioquia.

- **MINEROS S.A.:** is a firm with national capital that has been awarded 67 mining titles. Its operations extend over 116 thousand hectares in the municipalities of Bagre, Zaragoza, and Nechí, Bajo Cauca Antioqueño and has an annual production of approximately 120 thousand ounces (Catelli, 2017).

Illegal mining

Illegal or illicit mining has generated the greatest social, environmental, and economic problems since these mining settlements are located in the poorest populations. It is called illegal mining because it is operated without licenses or adequate safety standards to work within them, generating high mortality rates due to landslides, as has already happened on several occasions in the country. Also, the lack of environmental and police control entities in the areas generates problems, since no barrier blocks the processes of this type of mining.

Some of the areas currently affected are Antioquia, Nariño, Chocó, Sur de Bolívar, Córdoba, Caquetá, and Cundinamarca with a problem of contaminated water, deforestation, damage to the soil and subsoil, and the poor progress of the place and the bad life of the thousands of Colombians who are engaged in this activity since most of the people who engage in this type of mining are part of groups outside the law.

This type of mining pollutes the natural resources too much because they use large amounts of mercury and cyanide to separate the metals that are extracted from the soil. For this reason, Antioquia is the department with the most serious problems of contaminated water, due to the presence of large quantities of these compounds in water sources.

Also, the conflict in the country between the FARC-EP (Revolutionary Armed Forces of Colombia - People's Army) and the national government plays a very important role because the strong guerrillas cannot compete against the country's supplies or income, so to continue with the conflict they are forced to enter into illegal processes to finance

their activities such as illegal mining which according to Aníbal Fernández de Soto, Vice Minister of Defense has reached such a point that it has overcome the finances of drug trafficking. This activity is carried out without any type of regulations or licenses for the regulation of the environment as reflected in two main cases. The first case is in the region of Catatumbo; an area that has had a historical presence of guerrillas of different types, with a tradition of oil exploitation and a great potential for coal extraction. The second case is southern Bolívar (Simití, Santa Rosa del Sur and Montecristo) where gold extraction has been a fundamental activity in the process of its territorial configuration, and where different types of mining take place (formal, informal, traditional, and so-called criminal) that have been carried out directly and indirectly by armed groups (guerrillas and paramilitaries) (Bibliothek der Friedrich-Ebert-Stiftung, 2017).

The following section describes mining in the Guavio region, its aquifer and ecological importance, the materials that are extracted daily, the contamination and consequences generated by mining, the applications and titles granted, and on the territory.

Mining in Guavio

To focus this issue on the region, it is necessary to contextualize it a bit (Fig. 2).



Figure 2. Geographic location of Guavio (Bojacá, Hilarión, & Bojacá, 2018).

The Guavio region is located in the department of Cundinamarca, which borders it:

- For the North with: Province of Sabana Centro and Province of Almeidas.
- For the South: Province of Oriente, Province of Medina.
- For the West: Bogotá.
- For the East: Department of Boyacá.

It is composed of eight municipalities: Ubalá, Gachalá, Junín, Gachetá, Guasca, Gama, La Calera, and Guatavita. It has 79,621 inhabitants (3.6% of the department's total). Its area is 2,628 Km² and represents 11.6% of the total area of the department.

The main economic activities of the region are Agriculture (3.8%), livestock (It has 5.1% of the total heads of livestock in the department), pig farming (It produces 9.52% of pigs in Cundinamarca), and mining (It is characterized by mining operations in almost all municipalities) (Cámara de Comercio, 2017).

Water and ecological importance

It is a province of great importance for its large forest and water reserves such as the Junín Raft, the Chorreras, and Concepción rivers, the San Rafael and El Sapo reservoirs in La Calera, the Sucio river in Gachalá, the Chingaza Natural Park (declared a World Heritage Site under the title of Ramsar Wetlands), the Siecha lagoon in Guasca and the Guatavita lagoon and the Tominé reservoir in Guatavita.

It presents environmental deterioration caused mainly by the contamination of water sources, inadequate management of solid and liquid waste, destruction of forests by indiscriminate logging and burning, and of course mining.

It is an attractive sector for ecological and scientific tourism because it is one of the natural areas with the greatest production of water and unique biodiversity in the world; the Chingaza Natural Park and the Guavio dam are considered the second most important in South America in terms of energy generation. Besides, there are areas rich in medicinal thermal waters (Cámara de Comercio, 2017).

The entity in charge of regulating environmental activities in the region is the Corporación Autónoma Regional del Guavio (CORPOGUAVIO).

Extracted material

Construction. The exploitation of construction materials in the municipality of Guasca has two management plans for environmental recovery and restoration (PMRRA) (Fig. 3). It is an area not compatible with mining according to Resolution 222 of 1994. It is located within the savannah of Bogotá, its moors, waters, surrounding valleys, surrounding hills, and mountain systems were declared by Article 61 of Law 99 of 1993 as being of national ecological interest, whose priority destination is agriculture and forestry (Bazurto & Martínez, 2015; Lasso, Patarroyo, & Martínez,

2015). In these mining titles, the restoration of areas affected by old mining exploitations is being carried out, which are not currently being exploited.



Figure 3. Exploitation of construction materials in the municipality of Guasca.

José Miguel Palencia Cordoba is the owner of the company Agregados de la Sabana Ltda., which exploited construction materials in the municipality of Guasca. He began extracting stones, sand, and clay in the municipality approximately in 1973, according to Bernardo Mancera, an inhabitant of the municipality.

For him, the most relevant consequences have been the loss of the sources, since quite deep excavations are carried out to extract the materials, some sedimentation pools have a depth of 7 meters.

As for the landscape where the exploitation of the materials was carried out, there is no mountain, there is nothing, only the lagoons produced by the machines that carry out the extraction, Don Bernardo tells us. For about 15 years, the company has been covering the lagoons with materials brought from other areas.

He also tells us that for approximately two years there has been no exploitation in the area and that the company transports the materials from other areas of the country.

Precious stones. The municipalities of Gachalá and Ubalá belong to the mining district of Chivor, because it is a strategic zone, with geographical and geological continuity, in which emerald mining is the most interesting economic activity; in this zone, there are more titles and therefore it is the sector where more environmental licenses have been approved, this type of exploitation is done subway because this method generates fewer affectations to the landscape and renewable natural resources (Cámara de Comercio, 2017).

Minerals. There are also two environmental licenses corresponding to iron exploitation, one located in the municipality of Guasca; activity for which the Corporation established corrective management measures, to restore and environmentally recover the area affected by open-pit exploitation, but which is no longer operating.

The second iron exploitation is located in the municipality of Ubalá, a mining project that is subject to continuous

and strict environmental monitoring. Due to this and in the course of acting as an environmental authority since the time the license was granted, 2 closures have been imposed for non-compliance with the environmental management plan, which generated that this company will take action on the environmental part and begin to comply with the approved measures, to the extent that it currently has environmental compliance of over 85%. Considering the importance of this mining project for the region, the corporation asked the Attorney General's Office to create a special agency and as of 2011, it has the support of Dr. Oscar Ramirez Marion, Environmental and Agrarian Attorney, who constantly participates in the monitoring and everything concerning this license (Cámara de Comercio, 2017).

Contamination

Mining is a very destructive extraction activity in its process, it can become a very worrying factor in terms of how contaminated it can become audibly and environmentally.

A notorious discomfort lies on the beds of the Guavio and El Salinero rivers. There, the mining companies have the machines to crush the material that is dragged along, which generates a deafening noise.

In 2005, a judge indicated that, although the failures in their housing could be due to vehicle traffic, they were also a product of the irregular terrain where it is built. However, as far as noise is concerned, the Municipal Court of Appeals agreed: it ordered the owner of the sandpit to shut down his crushing plant and plant a tree barrier to reduce the noise (Fig. 4) (Guerrero, 2017).



Figure 4. Environmental pollution (Periodico Nueva Región, 2017).

According to a study by the National Institute of Natural Resources (Inderena), the environmental impact of mining is great. The transformations that they cause to the environment affect the hydric, geologic, biological, atmospheric, and

socioeconomic resources. Some of these consequences are preventable, but others cannot be avoided.

In water resources, open-pit mining, for example, causes contamination of water bodies by solid waste and domestic and industrial discharges related to mining activity (Jacinto, Martínez, & Martínez, 2015). As a result, sediment content increases, and riverbeds are diverted, leading to flooding, landscape transformation, and crop loss.

In the geological field, topographical and geomorphological changes occur due to the removal of surface layers of the land. The instability of the land by leaving the rock formations exposed can cause the triggering of erosive phenomena.

In the biological field, the impact on natural forests and water pollution cause the loss of resources and endangered species (El Tiempo, 1995).

Consequences

Unfortunately, because of mining in Guavio, there is a problem in its municipalities, since its inhabitants and the environment are being affected in different ways by this practice. Landslides, strong odors due to the poor condition of the sewage system, big noises generated by the machines, and pollution are some of the consequences that this entails.

Some of the inhabitants of the region have told of the consequences they suffered because of mining; below are some of them: *What used to be a green place with crystalline waters, is now just gravel, and a river occupied by crushers.*

Miguel Solaque says that after living two years near a mining site, not only did he lose his peace of mind, he also lost his hearing; since the crushers and dump trucks full of a material pass in front of his house, causing many cracks in his house and significant damage to his ears since the noise is unbearable, he is not the only one affected by this problem, of this same fact several inhabitants complain.

Carlos Duarte, a farmer, claims to have lost a large part of his farm, due to several landslides that have occurred. Thanks to mining extraction, the land is already very fragile and they fear a great tragedy because the over-exploitation of the Guavio River is causing landslides not only in his home but in several places in this region.

Another big consequence that has occurred is the infections from the sewage that overflows on the roads because the machinery used by the mining companies has damaged the sewage system, the inhabitants have to leave with boots, mouth covers and have to take firm steps to avoid falling into the wells that are formed and to avoid serious accidents (Guerrero, 2017).

Environmental. About the environmental impacts generated by mining, the transformations caused in the moors, water, geological, biological, and atmospheric resources are highlighted.

In the water resource, mining causes pollution in the bodies of water by altering the course of their rivers generating the overflow of the same and with this the loss of land and crops, also, there are topographic and geomorphological changes due to the removal of surface layers of land, also, the impact on natural forests and water pollution causes the loss of resources and species in danger of extinction.

Besides, among the conditions that occur in workers exposed to these toxic substances, the most common are those of the respiratory system, which include pneumoconiosis, chronic obstructive pulmonary disease, industrial bronchitis, and lung cancer that causes temporary or permanent disability.

Social. Mining activity not only produces an environmental impact but also produces what is called a socio-economic impact, that is, an alteration in the lifestyles of the people affected by this activity and the economy of the region where it is implemented, which can be positive in some cases and negative in others (Vera, 2013).

On the social level, in any mining area, there is an increase in the demand for services, a massive migration of population, change in economic and social activities, and therefore the abandonment of the countryside (El Tiempo, 1995).

The inhabitants suffer the consequences of this activity due to the factors that influence their daily lives.

Licenses

The cartographic images show the mining applications and titles in the area of jurisdiction (Fig. 5).

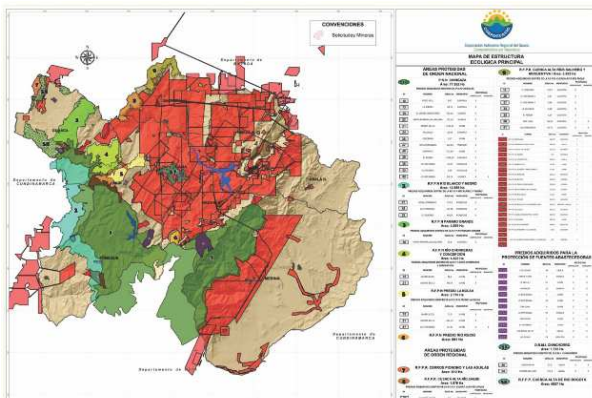


Figure 5. Applications and mining titles in Guavio.

Of the 103 mining titles, 23 have environmental authorization, distributed as follows:

- 16 environmental licenses.
- 5 environmental management plans.

- 2 management plans for environmental recovery and restoration.

This data is equivalent to 22.3% of the total of these. In addition to the above, 20 environmental licenses have been requested for mining operations, representing 19.4% of the total titles in force. Of these applications, 6 were denied due to different circumstances, among which are the affectation of ecologically important areas and management measures that did not comply with the principle of preventing, mitigating, correcting, and/or compensating for the impacts generated, 11 of these applications were withdrawn, given that the environmental impact studies were not complemented with the requirements requested by this authority, and the remaining 3 applications are currently under evaluation.

Currently, the corporation carries out the environmental follow up of 9 emerald titles, 7 dragging material titles, 2 iron titles, 2 construction materials titles, 1 quartz title, 1 receipt title, and 1 salt title (Periodico Nueva Región, 2017).

The following section describes prevention measures that can be implemented by those affected and by those who carry out this activity.

Impact

Mining is taking over more and more of the territory, but what is worrying is that this is being accentuated on water sources such as moors, rivers, and streams; this means that not only is the water resource diminished due to the greenhouse effect, pollution, massive cattle raising, the cutting down of trees and the reduction of the areas in charge of storing it, but it is also affected by the mining that is carried out on it since it contaminates a great part of the vegetable cover that is in charge of storing and providing the resource to the beings of the area (Figs. 6, 7 and 8).



Figure 6. Diagrama OSPF con sus respectivas áreas.

Although mining not only causes repercussions on water sources but also on the native fauna and flora of the areas affected by this type of extraction of minerals from the soil; when the water that feeds these beings is contaminated, a process of fauna migration and soil erosion begins, which generates a disappearance of the flora of the exploited area.



Figure 7. Diagrama OSPF con sus respectivas áreas.



Figure 8. Diagrama OSPF con sus respectivas áreas.

Also affected are the populations that inhabit the areas surrounding the areas of exploitation, the people who live in these areas because they are suffering from various complications and endure various types of pollution, such as acoustic, thermal, soil, etc. There are current cases of people who have lost some of their senses because of these contaminations or people who have had to leave their homes because they can no longer stand the exploitation.

Workers are also at risk due to landslides caused by mining, as has already happened on some occasions in the region.

It is almost impossible to talk about seeking non-polluting mining techniques because the sustainable development of the mining industry is given in the large-scale production, but it is feasible to find a way to cope with the situation with certain preventive measures both for those affected and the companies that practice this activity.

In both subway and open-pit mining, technical or environmental prevention measures aim to avoid the production of dust or to reduce the amount of respirable dust as much as possible, which is achieved with technical prevention alternatives:

1. Adequate ventilation of the workstations.
2. Use of dust extraction mechanisms.
3. Humidification of the materials through the use of tools provided with water injection, watering of the materials, and

use of hygroscopic salts, burn a certain degree of humidity and prevent the suspension of the dust.

4. Insulation of vehicle cabins and machine control stations in installations.

5. Use of individual protection masks of proven efficiency.

6. Separation of personnel from the source of the dust, through the use of remote control.

7. Use of appropriate technologies in the various departments and mineral processing plants to minimize the emission of pollutants to the workplace and the community.

Social prevention alternatives:

1. Increase the training of management and workers of the companies in the management of the impacts of mineral dust and its consequences on human health.

2. To develop a system of environmental education among the different factors of the company aimed at the formation of awareness on the management of the protection and safety means, individual and collective, as the most direct way of immediate protection of the directly exposed worker.

3. To train the Legal Department of the producing companies in the treatment of those who do not comply with the established legislation and on the need for new resolutions aimed at raising the demand in the treatment of technological indisciplinary.

4. Guarantee the existence of a system for the treatment, in case of disasters, of those affected, including the training of medical and paramedical personnel and the maintenance of material resources to provide first aid.

5. Carrying out specialized medical examinations, taking into account the recommendations of international and national health institutions (Vera, 2013).

A solution could be sought to improve the problems generated by mining, following in the footsteps of some municipalities in the country, such as Cajamarca in Tolima, Cabrera in Cundinamarca, Cumal in Meta, among others; but when making one of these decisions, alternatives must be sought to replace it, that is, when saying *no* to mining, one must say *yes* to another activity.

On many occasions, we have heard it said that popular consultations are not legal, but according to article 8 of Law 134 of 1994, the popular consultation is the institution through which a question of a general nature on a matter of national, departmental, municipal, district or local importance is submitted by the President of the Republic, the governor or the mayor, as the case may be, for the consideration of the people so that they can formally pronounce themselves on the matter.

In all cases, the decision of the people is obligatory. When the consultation refers to the convenience of calling a constituent assembly, the questions will be submitted to the people's consideration using a law approved by the Congress of the Republic (Registraduría Nacional del Estado Civil, 2017).

One of the municipalities that we can take as a reference and a sign that it is possible to avoid mining exploitation in a territory is Cajamarca, located in the department of Tolima; after much effort and even a change of governors, its inhabitants managed to get a popular consultation on the acceptance of mining in the area approved. Of the 6241 voters, only 76 said yes, that is, 97.92% of the population, did not want the company AngloGold Ashanti to carry out an open-pit gold mining project called La Colosa (Dinero, 2017).

It should be added that by 2013, the cities and municipalities could not prohibit mining in their territories, since the regulation of the use of the subsoil was considered to be the responsibility of the central government (Dinero, 2017).

Conclusions

Mining is one of the most profitable businesses in Colombia due to the wealth the country has in different minerals since it has a great extension along with the territory and it is something very well paid for the sale of the extracted minerals, but what is criticized of this activity is that a great part of it is illegal, which does not have the authorization of the state and does not protect the environment, Besides this, it does not leave any profit or give any benefit to the regions where this practice is carried out, the only thing that it leaves are devastated regions, considering this way the business that more affects environmentally our country and this can be seen in the region of the Guavio, located in Cundinamarca since the purpose of this illegal activity is to extract the natural resources without environmental permits and without conscience of the damages that they cause.

The Guavio region has been highly affected by this activity since there is an immense variety of mining potential there that has generated contamination in its water sources due to inadequate management of solid waste, landslides, due to the weakness of the soil generated by the heavy machinery that works daily, the destruction of its forests by indiscriminate slashing and burning, bad odors due to the damage to the sewage system that has caused the extraction of some minerals and hearing diseases in its inhabitants in addition to causing them to lose their land and crops. This is devastating for the people who have been living in this region for years and see how everything is getting worse every day because of this practice that has not had an end so far.

The lack of commitment of the companies that exploit the territory, the irresponsibility of the control bodies, the lack of knowledge of the prevention measures that should be carried out, and the rules that have been broken are all causes of the devastation caused by mining daily.

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