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Chapter

Socio-Economic and Environmental Implications of Gold Mining in Afro-Descendant Communities from Colombia

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Abstract

The ethnic diversity of Colombia is one of the most attractive characteristics of the country, which includes the Afro-descendants, *Raizal* and *Palenquero* populations, who have led an ancestral lifestyle that is an essential component of the culture and heritage of the nation. Thus, the well-being of these communities is translated into a primary need to guarantee their quality of life, in addition to generate a contribution to their struggle for the recognition, inclusion and guarantee of their fundamental rights. In this chapter, a bibliographic analysis was performed in order to evaluate both the conditions in which the Afro collective territories are found, and the different forms of organization of the populations entitled as community councils, with a particular focus on vulnerable populations located in the department of Cauca. In addition, a conceptual diagnosis of the multiple socioeconomic, environmental and health impacts derived from gold mining in Colombia was developed, with special interest in the studies that have been carried out in populations located in areas of great biodiversity, including the Colombian Amazon, biogeographic Chocó and Bolívar, departments in which Afro-descendant communities also live. Finally, a detailed analysis of the different aspects of mining that affect the quality of life and the welfare state of the communities is provided, and some aspects are proposed to be taken into account by the actors involved to achieve the least negative impacts of these activities, emphasizing the current state of the Colombian case.

Keywords: Afro-Colombianity, ethnic diversity, contamination, mercury

1. Introduction

Afro-descendant ethnic identity is the set of customs, values and feelings integrated into the individual and collective daily life of the Colombian population. This term can then be considered as one of the most valuable historical assets for each of the Colombians, regardless of their skin color. Afro-descendant communities since colonial times have established themselves throughout the national territory,

making them part of the heritage and culture that identifies the country. The *Afro* term that defines this ethnic group starts from the concept of African descent as a result of the geopolitical history that began in the Colombian Pacific [1]. Currently, within this broad group, not only the Afro-descendant communities of the Pacific are recognized, but also the native groups of the San Andrés Archipelago and all the people located anywhere in the Colombian territory that meet the established conditions of historical descent, origin and cultural independence [2–4].

The territories in which these communities have been located throughout history correspond to areas of great biodiversity, whose environmental dynamics and survival have been highly deteriorated as a result of extractive activities, mainly those related to gold mining because of the use of mercury (Hg). The execution of these projects not only brings with it the destruction of the ecosystem, it also leads these communities to face a problem that violates their rights to well-being and protection of their health. The situation is even more serious, considering that there is a great lack of knowledge of the adverse effects that such activities may generate.

Other consequences derived from illegal mining activities are those concerning the lack of food and nutritional security of vulnerable populations, effects that are also widely related to the planting of crops for illegal use, forestry megaprojects, and the internal armed conflict. This entire cycle of alarming situations is described in the 2011 National Human Development Report, as well as in the 2018–2022 Black Communities Development Plan, which are focused on the living conditions and territories of these populations [5, 6].

In accordance with the above, this chapter was developed in order to describe the fundamental concepts that define the Afro-descendant communities that inhabit Colombia, from a geographic, legal, cultural, environmental and historical point of view. Throughout this chapter, the recognition of the fundamental rights of these populations will be taken into account, as well as the different forms of organization of the communities titled as *community councils* or *collective territories*, emphasizing those located in the department of Cauca.

The importance of this study is based on the right to health and well-being that Colombian Afro-descendant populations have by law, with a view to develop policies that improve conditions of inequality, as established in the 2019 report on human development [6]. The methodological development of this chapter was carried out through a documentary revision that included the search, collection and analysis of information obtained in multiple databases, as well as from other studies, documentation and research carried out on community councils and Afro-descendant communities, in the legal, economic, demographic, geographic and historical framework. Likewise, the databases of the United Nations Development Program (UNDP), the Black Communities Development Plan (BCDP), the Ministry of National Education, Victims Unit, the Constitutional Court, and the Ministry of Interior, Ministry of Culture, Ministry of Mines, as well as statistics from National Administrative Department of Statistics (DANE, by its acronym in Spanish) and the Colombian Mining Information System (SIMCO, by its acronym in Spanish), were revised. A diagnosis of the information obtained was carried out with special emphasis on activities related to gold mining, and on the potential socio-economic and environmental risks for the Afro communities.

Finally, it is important to mention that the bibliographic analysis carried out in this section was developed in order to have an integrated vision of the conditions in which the Afro-descendant collective territories are found, as well as the multiple impacts derived from the gold mining activities and extraction processes. Thus, this chapter arises from the desire to create a significant contribution to the struggle of these groups for their human security and social well-being.

2. Afro-descendant communities in Colombia

Colombia is a country with a wide ethnic and cultural diversity, in which the rights of all its inhabitants are recognized. In this sense, the 1991 constitution, in addition to the equality of human rights without any discrimination, also guarantees the participation, protection, recognition, decision-making and equality of the entire Afro-descendant population [7]. Since then, many Afro-descendant communities that live in vulnerable conditions have been recognized in the country, and are a priority for the competent authorities [8–12].

Law 70 of 1993 defines the *Afro-descendant communities* in its article 2 as a set of families of Afro-descendants who have their own culture, share a history and have their own traditions and customs within the countryside-town relationship. The Colombian constitutional court includes within this group, the Afro-descendant communities of the Pacific, the traditional groups of the Archipelago of San Andrés and Providencia (Raizal), and all people located anywhere in the Colombian territory that meets the established conditions of historical descent, origin and cultural independence, as is the case of the Palenquero communities living in the Municipality of Mahates (Department of Bolívar) [13–15].

Colombia is the third country in America with the largest number of Afro-descendant population. Thus, according to data from the DANE, between 18 and 22% of the country's total population is Afro-descendant, a percentage in which about 8.500.000 Colombians participate [16]. Similarly, the DANE has established in the National Population and Housing Census with an ethnic differential approach in 2018, that there is an estimated total of 4.671.160 people belonging to the Afro-descendants, Raizal and Palenquero populations, which is equivalent to 9.34% of the total national, approximately [17].

The guidelines for the development plan for Afro-descendant communities 2018–2020 have established that currently, this population in the country is mainly concentrated in twelve regions: Pacific Nariñense, Pacific Buenaventura-Valle, Pacific Chocoana, Pacific Caucano and Patía, San Andrés and Providencia, Urabá, Chocó, Antioquia-Córdoba, Caribbean, North of Cauca-South of Valle, Bajo Cauca Antioquia-Córdoba-Sucre, Caldas and North of Valle. These sites concentrate approximately the 91.6% of the total Afro-descendant population in the country, the rest are distributed within 876 municipalities [6, 18–20]. The distribution of the Afro-descendant, Raizal and Palenquera population in the Colombian territory is shown in **Figure 1**.

2.1 Afro-descendant communities in the biogeographic Chocó

Biogeographic Chocó is the Colombian territory with the largest number of Afro-descendant communities since colonial times. This region includes the Colombian Pacific, humid forests, hydrographic basins, estuaries, mangroves and coastlines. Some statistics indicate that 82.7% of the population that inhabits this department is Afro-descendant, which is comprised of 60 community councils in charge of overseeing the rights of the territories and their inhabitants [6, 23, 24].

According to Rolland [25] in the department of Chocó, and specifically in the Bajo Atrato region, the introduction of the Community Council figure produced great changes in the local organizational system: the figure of the Community Action Board (JAC, by its acronym in Spanish) that had worked for a long period of time almost disappeared from the political landscape of the region. Today, in the area, some communities - mainly mestizo - are still organized in the form of the Community Action Board, but are in a minority situation. Local Community



Figure 1. Distribution of the afro-descendant, Raizal and Palenquera population in the Colombian territory. The number of people belonging to each population corresponds to that reported by DANE [21]. The percentage of each population was calculated taking into account the projection of the total Colombian population for the year 2020 according to DANE [22] and the number of people belonging to each group for the year 2018.

Councils are constituted as intermediate political forms between a classic form of community organization, and a new form of authority in the process of construction, founded on identity ethnicity and the collective appropriation of a titled territory.

The promotion of the ethnic rights of Afro-descendant and mestizo communities drives an innovative political context that is more participatory, and that allows the construction of a new collective political subject, the Association of Community Councils and Organizations of bajo Atrato, (ASCOBA, by its acronym in Spanish). Such political subject includes the identification, social representation and territorialities of the biogeographic Chocó population. Being an *ascobatic* becomes a new political identity for the inhabitants, who includes individuals from different ethnicities, as well as displaced and peasant people [26].

Article Fifth of Law 70 defines the entire range of functions provided for the Community Councils of the Pacific communities. This political figure plays an important role as environmental and traditional authority, and as justice organ of the Afro-descendant culture. In this sense, this article stands that the Community Council must watch over the use and conservation of natural resources, act as mediatory organ to solve and conciliate internal conflicts, and watch over the preservation of cultural identity [13]. In general terms, the common activities of the Board of Directors of the Community Council include three main factors: the administration of the territory and the issue of boundaries with other communities, management of timber resources, and the role of dialog with the Colombian government, with Non-Governmental Organizations (NGOs) and with municipal administrations. The Afro-descendant riparian communities from the biogeographic Chocó were titled by the Colombian State between 2000 and 2001. Notions of cultural identity and Afro-descendant ethnicity, recognized by Law 70, become essential tools that allow sustaining the territorial claims of community members [25].

2.2 Communities of the Archipiélago de San Andrés, Providencia and Santa Catalina

In the region of the Archipelago of San Andrés and Providencia live Raizal communities, whose descendants are Afro-Anglo-Antilleans. It is a department made up of three islands that are equivalent to a territorial extension of 52.5 km²,

with an approximate population of 73925 inhabitants [27]. This population shares two linguistic forms, *Creole* and Caribbean English, and religious traditions that include the baptism. The Archipelago is also inhabited by people arriving from continental Colombia, mainly from the Colombian Caribbean coast, Valle del Cauca and Antioquia. In the specific case of the San Andrés island, there is a foreign migration of people from Syria, Libya, Turkey and Palestine, who are called *Turks*, and who currently manage the trade of the islands. This group came driven by commercial initiatives from other places of Colombia, such as Maicao or Barranquilla, or directly from their countries of origin. Additionally, it is important to mention the existence of another group, the *half and half*, *mitimiti* or *fifty-fifty*, which correspond to the sons and daughters of a foreign or continental mother or father, and of an island-raizal mother or father, who are the mestizos in this insular context [28]. The Archipelago is an area of great cultural wealth, declared by United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2000, as part of the *Man and the Biosphere Reserve program* [29].

Currently, the inhabitants of the Archipelago proclaim a movement for the Self-determination of its inhabitants, AMEN-SD, which takes into account a series of historical demands of the Raizal People, under the banner of the Right to Self-Determination of Peoples with the support of the national and international regulatory authorizations. Thus, the reparation to the possible damages caused by the national state policies and the defense of the model of sustainable development, the culture and the territoriality of the Raizal people, are the great proposals of AMEN-SD. The group is made up of various local organizations, among which are: SAISOL –San Andrés Isla Solution-, Barrack New Face, SOS –Sons of the Soil- INFAUNAS –Independent Farmers United National Association-, KETNA – The Ketlena National Association, Just Cause Foundation, and Cove Alliance [30].

2.3 The community of San Basilio de Palenque

The community of San Basilio de Palenque is located in the municipality of Mahates, in the department of Bolívar. This population is located approximately 70 km from Cartagena. It achieved its freedom in 1603 and became the first free people in America. The inhabitants of this community speak the Afro-descendant Creole language called *Palenquero* [31, 32].

In the community of San Basilio de Palenque there are multiple organizations that watch over the well-being of its inhabitants. One of these social movements is the Black Communities Process (PCN, by its acronym in Spanish), which has the greatest strength both in this area and in Cartagena, represented by the Regional Palenque and a group of organizations of diverse character, such as the “Jorge Artel” Corporation, the “Gavilaneo” Afro-Caribbean Social Integration Council, the Festival of Drums and Cultural Expressions of Palenque Corporation, the Network of Community Councils, among other groups [33]. In addition to these mixed organizations, there are also other feminist movements, such as the Association of Afro-descendant Women of the Caribbean “Graciela Cha Inés”, which also integrates the Local Committee of the Network of Afro-descendant Women, an entity that in turn, coordinates in this region of the country to women’s organizations belonging to the National Network of Afro-descendant Women “Kambiri” [34].

This region was declared “Oral and Intangible Heritage of Humanity” by UNESCO in 2005, and in addition, the Colombian Ministry of Culture approved by resolution 2245 of 2009, the Special Plan for the Safeguarding of San Basilio de Palenque, declared as an asset of Cultural Interest in the National Environment and included in the representative list of Intangible Cultural Heritage [35] achievements after which there was a dedicated and intense work in order to preserve its historical

value [36]. Due to the efforts of the organizations, the institutionalization of the government agencies that deal with policies for the Afro population, together with the perseverance of organized groups in the communities; it has been allowed the maintenance of their cultural and historical heritage [37]. In addition, there has been a phenomenon of identity reaffirmation, and valuation of being *palenquero* or Afro-descendant, with an important component of gender identity. Undoubtedly, this is a population of special interest given its preservation of the African tradition through time, which remains in force today.

2.4 Communities of the big cities

Afro-descendant communities are distributed in practically the entire national territory, mainly in the Valle del Cauca, Cali, Buenaventura, Antioquia, Bolívar, Chocó, Cauca, Atlántico, and Sucre regions [17].

Despite being distributed over a wide territory, the communities largely share their traditions and culture. In general, for Afro-descendant men and women, natural resources are essential for the sustainability of the planet and for biodiversity. The knowledge related to the care and use of territories largely corresponds to the main tool for preserving the environment in which they live. Likewise, the gender roles for these communities are well defined, and these are based on activities and the use of resources. For instance, tasks that require greater physical strength are reserved for men, and the rest of the spaces are activities carried out by women and children, or by the general community. For the Afro-descendant population, the territory expresses organizational forms around fishing, mining, hunting, searching for wood, planting and harvesting. In addition, the territory is made up of knowledge of the healing properties of medicinal plants [35].

Another of the key aspects for the Afro communities located in the big cities corresponds to their rites and traditions. For these groups, ancestral resistance is vital to preserve their culture and knowledge. The festivities are the representation of the collective sentiment, the reflection of the adaptive process and various forms of reinterpretation of cultural symbols and meanings. In Colombia, Afro-members mobilize from different areas of the country to participate in events such as the Barranquilla Carnival, the Kings' Party - in the Andean Festival of Blacks and Whites -, the Devil's Festivals, and the Balsadas de los Santos in the Pacific, in which the inheritances of the African culture are expressed with enough color and iconographic content [38, 39].

The organization of these communities in cultural and social movements has contributed to the establishment of actions in favor of equal opportunities for the Afro-descendant population. For this, it is necessary the proper interaction between the decisions of the governments and the reality of the people. Thus, the generation of scientific evidence of the environmental and social problems that these communities are facing is highly encouraged.

3. Afro-descendant community councils

Afro-descendants are a group of families that have proclaimed their own culture and traditions. Transitory article 55 of the 1991 political constitution and the subsequent issuance of Law 70 of 1993 allowed the recognition of these communities in the national territory. This meant the possibility of forming community councils for Afro-descendant populations, in order to collectively title the lands where they traditionally have lived [40].

The establishment of Afro-descendant community councils is one of the main tools to safeguard the rights of these populations. Thus, a number of political and

Department	Number of collective titles	% Based on total titles
Chocó	57	35.2
Nariño	41	25.3
Valle	33	20.4
Cauca	17	10.5
Antioquia	12	7.4
Risaralda	2	1.2
Total	162	100

Source: PNUD [5].

Table 1.
Departments with the largest number of collective territories titled in Colombia.

social acts are favored for the well-being of each of the individuals who are part of the community, thus backing free and independent decisions in the realization of their projects, their own political organization, and collective titling of their territories. For these communities, the right to territory is inalienable [8, 41].

In the context of environmental management, participation of community councils in decision-making is not only essential, it is also mandatory on the part of entities and/or companies that seek to develop economic projects that involve territories in which these communities inhabit. Thus, Colombian legislation has established that those responsible for the project to be carried out must prepare environmental studies with the participation of these ethnic groups [42].

In Colombia, the vast majority of community councils and collective territories are located in the departments of Chocó, Nariño and Valle del Cauca (**Table 1**). These organizations are in charge of titling such areas, implying to date, an approximate of 162 [5]. Some of the most recognized councils in the country are: Bajo Mira, Los Cardonales, Playa Renaciente, Santianga, Santo Domingo de Tanando, la Toma, Cajambre River, Naya River, Salahonda, Caribbean Community Councils network and the Cauca Community Council network [43, 44].

4. Gold mining in Colombia and laws related to this activity

In Colombia, mining activities, and in particular those related to gold extraction, imply great economic interest by large public and private entities within the legal framework of their projection, as well as by small communities who carry out these processes in an artisanal way. In the country, Antioquia, Chocó, Bolívar, Nariño, Caldas and Cauca, are consolidated as the departments with the highest gold production, with a total of 1.32 million ounces, between 2015 and 2017 [45].

Although it is true that in Colombia there are a number of gold mining activities that do not have a mining title, the country has developed some strategies in order to regulate these processes. Thus, Law 685 of 2001 was designed with the purpose of controlling the technical aspects of these activities and promoting the exploitation of mining resources within the framework of legality. In addition, the code states that such activities must be met through multiple stages, which include prospecting, exploration, construction and assembly, exploitation, processing, transformation, and transportation and promotion of minerals found in the soil or subsoil, since they are of national or private property [46].

On the other hand, article 79 of the constitution establishes that all people have the right to enjoy a healthy environment. The law also guarantees the participation

of communities in decisions that may affect them. It is the duty of the State to protect the diversity and integrity of the environment, as well as to conserve areas of special ecological importance, through the promotion of education [4]. Another of the efforts that the government has made to regulate mining activities in the country consists in the issuance of the General Environmental Law of Colombia (99–1993), by which the Ministry of the Environment was created, whose main function is the protection of resources and due process for the execution of environmental projects [47].

Given that one of the main problems of gold mining activities carried out on the territories in which afro communities live is the release into the environment of Hg used for gold extraction, with the consequent appearance of toxic effects on ecosystems and human beings [48], on October 10, 2013, the Government of Colombia, along with 91 other countries, signed the Minamata Convention on Hg [49]. This treaty seeks to protect human health and the environment from anthropogenic emissions of this toxic element. Thus, the country deposited the Instrument of Ratification of the Convention on August 26, 2019, thereby becoming an active member of this organization [50].

Additionally, the commitment to the Minamata Convention led the Congress of the Republic to approve Law 1658 of July 15, 2013, through which a series of provisions are established for the commercialization and use of this toxic element in different industrial activities, setting requirements and incentives for its reduction and elimination [51]. The Ministry of Environment and Sustainable Development joined these initiatives in 2015, formulating, together with several government entities, the Single National Hg Plan, with the aim of developing strategies that lead to an early application of the Minamata Convention. This Plan was, at the time, considered the first route to be followed by the National Government for the implementation of mechanisms that contribute to the gradual and definitive elimination of Hg in the mining, industrial and commercial processes throughout the national territory, and that affect the environmental health of ecosystems [52].

Despite the aforementioned actions, mining from its foundations in pre-Colombian times to the present day is governed under illegality policies, using ancient techniques that are very difficult to change, and that contaminate the environment and, in turn, harm the health of the populations that inhabit these sectors [53]. Given that these sectors or collective territories correspond to areas of great biodiversity, the exploitation of resources by private companies have increased, and although they generate an economic contribution to the communities, they also constitute a potential hazard for both Afro-descendant and indigenous peoples [54].

4.1 Socio-economic impacts of mining activities

In many countries, gold mining is an activity of great economic impact. Thus, its defenders allege that its development allows the use of resources of territories, which is reflected in financial and trade benefits. In Colombia, mining projects, in addition to generate income to the affected areas, occupy an important place in the general economy of the country. Additionally, without taking into account the conditions in which they are developed, they involve local labor, a situation that positions this activity as one of the main livelihoods for low-income families [55, 56].

Small-scale gold mining is an important livelihood opportunity in Colombia. Since most of the mining is done in informal spheres, it is not easy to get exact numbers. For instance, in Latin America it is estimated that there are currently more than 500.000 active small-scale gold miners. This number does not yet include the number of people who indirectly depend on this sector by providing services to miners, which would be many hundreds of thousands more [57].

Despite the possible benefits of resource extraction as an economic activity, there are many other adverse effects for the populations that live in the territories where the exploitation processes take place. In the particular case of Colombia, gold mining brings with it a set of complex situations, including violence, illegality, and armed conflict [58, 59]. According to Andrade et al. [60], in the case of large-scale mining, it is important to recognize that it is a powerful political and economic actor, which usually generates imbalances between companies and governments, with detrimental effects on sovereignty and governance. As such activities demand a lot of capital; they could have effects on the local and national economy, especially because their development and employment implies the distribution of income and rents. The fact that localities impacted by small-scale gold mining generally have a weak institutional development, favors the prevalence of income extraction models over the generation of economic and social value. In the case of mining activities that are carried out in a legal form, there could also be participation of environmental NGOs, which are co-opted by private interests, with may indicate potential damage to environmental public goods.

In Colombia, gold mining is considered one of the greatest generators of foreign exchange, but as a large percentage of this activity is illegal, these resources cannot be used. According to the National Development Plan 2018–2022, the importance of the mining-energy sector is reflected in the main macroeconomic variables. For 2017, the GDP of the sector amounted to \$ 44.2 billion, equivalent to a 5.35% of the total; contributed royalties of \$ 6.9 billion; exports for USD 20.9 billion FOB, equivalent to 55% of the country's total exports, and represented USD 4.1 billion in direct foreign investment (6.65% of the total). The current development plan has established as a priority, to carry out these activities with environmental and social responsibility, since these activities are considered as one of the engines of economic growth in Colombia, at the same time that the sector attracts investment, generates royalties, taxes and compensation, resources that the Government considers necessary for the reduction of poverty and territorial development [61].

According to this Plan, the mining-energy industry must establish new productive chains in the territories, which seek the generation of goods and services with greater added value, increasing national and territorial income, strengthening local employment and increasing national productivity. On the other hand, to guarantee the security of energy supply, the development of different forms of generation is required, consolidating current sources and promoting the country's participation in the international energy market. Energy security represents for Colombia an unrepeatable opportunity to strengthen national competitiveness and promote regional development and other sectors. To achieve this objective, it is necessary to consolidate the sector as a catalyst for the development of sustainable territories and to carry out actions that ensure agility, timeliness and coordination in decision-making by national and territorial government entities, to ensure their orderly and responsible use.

For its part, the 2010–2014 Development Plan classified mining as one of the five development locomotives in the country and prohibited dredgers, mini-dredges, backhoes and other mechanical equipment in mining activities without a title or license. However, the use of this machinery, instead of decreasing, has multiplied to date. Only in Chocó, according to the report of the United Nations Office for Drugs and Crime in mid-2016, the presence of dredgers grew between 2012 and 2013 by 184 percent, and that department, along with Antioquia, has 79 percent of the 78.939 hectares devastated by illegal mining in recent years. The figure may be higher, as excavations multiply every day.

According to national reports, the Comptroller General of the republic has established that part of the responsibility for this uncontrolled increase in the

phenomenon lies in the lack of preventive actions, imposition of sanctions and also in the absence of technical support to Police operations by the Regional Autonomous Corporations. Likewise, the control body reports that the processes carried out by the CARs hardly end with a real sanction and actions that repair the damage caused. The same happens in the criminal part. Thus, of 75 cases prosecuted between 2011 and 2015 in Antioquia, only six ended with an accusation against the offenders; in Cauca, out of 51 processes, only 4 were indicted. The Comptroller's Office recognizes that the presence of illegal armed groups around illegal mining generates pressure and threats that make it difficult for the State to act. Meanwhile, the predation continues. One of the most serious cases is that of the Sambingo River. There, officials are constantly attacked and threatened both by the communities that carry out the exploitation and by the armed actors who control the business. In that area there are about 2.000 people who depend on the gold that they extract from that tributary of the Patia [62].

Despite the multiple efforts of the government to combat the negative effects of illegal mining, high levels of illegality are still perceived, it is for this reason that it is necessary to guarantee responsible mining by the actors involved, which will be translated into concrete and efficient actions. In this case, it would be necessary to legalize policies that allow the preservation of natural reserves, in order to counteract the negative effects left by this practice.

Large mining that would be acceptable must generate economic and social opportunities for involved participants, adding value to the economic chains. In turn, companies could make an important effort to diversify local economies, reducing levels of dependency on a single source of value generation, and working hand in hand with local governments and communities to strengthen their institutions and human and technical resources.

4.2 Environmental and human health impacts

In the environmental context, mining activities (gold extraction) involve one of the biggest problems worldwide because of the Hg use, a highly toxic metal for human health and ecosystems in general. It is well known that these activities generate a negative impact that affects natural resources, which in turn, affects the well-being of people. Therefore, various studies have evidenced the presence of this metal in multiple environmental and human matrices, deteriorating the quality of aquatic ecosystems [63], soils [45], fish [64], and human health [48, 65–67]. Thus, the use of Hg in this type of activities has made it one of the most dangerous pollutants in the environment, in fact, for WHO, this metal is in the top ten of substances of special interest, and which pose major public health problems [68].

The identification of this toxic metal has been subject of investigative priority in Colombia. Several studies have shown high levels of contamination in Afro-descendant mining populations. For instance, in the Colombian Pacific (Quibdo and Paimado), Hg levels in human hair of up to 116.40 $\mu\text{g/g}$ have been identified, exceeding the maximum allowed limit of this element for this matrix. Air total Hg (T-Hg) levels were also high, especially inside gold shops, being up to 200.9-fold greater than the background. Although the presence of this toxic in hair shows the exposure of people, its concentrations in fish, main source of protein for the inhabitants of the region, are also of high concern. Mercury concentrations in fish from Atrato River were above the WHO limit (0.5 $\mu\text{g/g}$), with greatest concentrations in *Pseudopimelodus schultzi* and *Ageneiosus pardalis*, two of the most consumed species by local families [69]. Other studies carried out in the biogeographic Chocó demonstrate that the capital of the department is not the only one affected. Tadó and Unión Panamericana are also two Afrocolombian regions in which Hg pollution is widespread [70].

In relation to the Hg concentrations found in hair of inhabitants from other Colombian departments with gold mining problems, the pollution pattern and general panorama are also of high concern. Olivero-Verbel et al. [63] reported elevated hair T-Hg levels from inhabitants of the Mining District of San Martín de Loba, located in Southern Bolívar (2.1 µg/g), in which these activities are extensively carried out, especially in the municipalities of San Martín de Loba, Barranco de Loba, and Hatillo de Loba. These Hg levels were similar to those reported by Olivero-Verbel et al. [65] for Achi (2.44 µg/g) and Montecristo (Bolívar) (2.20 µg/g), but above those corresponding to Morales (Middle Magdalena) (1.50 µg/g) [71], La Raya (Bolívar) (5.27 µg/g) [65], and Caimito (Sucre) (4.91 µg/g) [72].

The Colombian government has defined the *Areas with Mineral Potential for Strategic Mining*, which are mainly located in the Andean region, biogeographic Chocó, Sierra Nevada de Santa Marta and the Amazon. With the strategic mining areas thus defined, the question arises about the commitments generated on other environmental assets. Among them, biodiversity is one of the main points to consider, since it is clear that large-scale open-pit mining generates net losses that cannot be compensated. In the Amazon, one of the areas with the greatest richness of species in the world, the country should be ready to sacrifice vast areas of jungle, which has not been completely identified and debated. Another important negative consequence of this situation is the increase of mining activity on mountainous areas. Indeed, the humid tropical Andes would be one of the most affected critical points of biodiversity in the world (hotspots) due to the loss of species and disruption of ecological systems. The facts that protected areas are characterized by representativeness of ecosystem types, and that biodiversity comprises multiple manifestations of wealth, assemblages or endemism's, should be considered. This constitutes mining as an enormous contributor to loss and degradation of biodiversity [60].

Although pollution problems are always thought of as a phenomenon that affects human health, in few cases their impact on organisms that share a habitat and that add value to the environment is evaluated. According to the 2018 Ministry of Health report, the extraction of gold that involves Hg amalgamation processes, results in the dumping of approximately 1.000 tons of Hg [45]. Generally, once in the global atmosphere, the Hg⁰ released as a result of mining activities can circulate for months and continuously disperse; this species of Hg will undergo various chemical reactions of photochemical oxidation and will become inorganic Hg, which will be combined with the water vapor and travel back to the surface of the earth and aquatic bodies. This chemical form can be converted into other Hg compounds of different solubility, such as Hg sulfide, which has the capacity to accumulate in the sediment, or it could be transformed by microorganisms that process sulfate in methylmercury (MeHg). This conversion is critical because the organic form is much more toxic than the inorganic, and aquatic organisms require more time to eliminate it, leading to bioaccumulation and biomagnification processes throughout the food chain [73].

Organisms that are at a higher level of the trophic chain can consume the MeHg processing bacteria, which could also release it or be later ingested by plankton, which is consumed by higher organisms. This pattern continues as small fish/organisms are eaten by progressively larger fish, until they are processed and distributed, and finally acquired by humans [74].

Unfortunately, once in humans, this element affects different target organs, including the nervous system, kidneys, and liver, causing mental disorders and damage to the motor, reproductive, speech, vision, and hearing systems. Various studies have reported severe cases of poisoning and death due to contamination with this metal [75, 76]. When ingested by pregnant women, MeHg has the ability to cross the placental barrier, accumulating in the brain and central nervous system of the developing fetus [77].

In addition to the effects on ecosystems that mining activities produce thanks to the use of Hg, it is important to remember that small-scale gold mining requires a lot of labor, uses simple technology (including artisanal) and limited mechanization, it is mainly informal, outside the legal frameworks of nations and out of sight of national policies [78]. The scope of activity fluctuates, responding to different factors, such as the international price of gold and the political measures taken by nations that can stimulate, but also hinder, small-scale miners in their search for gold. As the scope of activities increases, problems related to small-scale mining increase accordingly. Thus, mining is characterized by a disorderly occupation of territories, chaotically organized mining operations and dangerous working conditions. This activity causes deforestation and deterioration of soils and riverbeds. However, the full scale of these negative impacts is still unknown [79].

Probably, the health risks that are most often overlooked in small-scale gold mining are those associated with occupational safety. Every day, miners are exposed to long hours of work in hot and humid conditions, they work in uncomfortable physical positions, they are exposed to constant and loud noises, bathe in contaminated water, and live in houses with poor waste management, just to mention a few conditions [80]. In addition to this, the danger of working in a mining raft can cause injuries to arms, legs and back, for this reason, fatal accidents are not uncommon [81]. These dangerous working conditions should receive special attention from the authorities responsible for the formulation of environmental and labor policies and regulations. As long as gold mining remains a sector surrounded by spheres of informality, occupational health and safety is unlikely to become a solved problem for those who carry out these extractive processes.

5. Afro-descendant communities and mining in the Department of Cauca

The department of Cauca is located in southwestern Colombia, between the Pacific coast, the high Magdalena Valley and the Amazon region, with an area of approximately 29,308 km². It limits to the north with the department of Valle del Cauca, to the northeast and east with the departments of Tolima and Huila, to the southeast with Caquetá and Putumayo, to the south with Nariño, and to the west with the Pacific Ocean. It currently has 42 municipalities [82].

The main rivers of this region are born in the Colombian massif (Cauca River, Magdalena River, Caquetá River) as well as the eastern mountain range that crosses the entire Cauca territory. The department of Cauca is recognized for its great biogeographic diversity, which is distributed among the Isla Gorgona, Munchique, Nevado of Huila, Puracé, and Serranía de los Churumbelos National Natural Parks, and the Doña Juana-Cascabel Volcanic Complex. These places increase their tourist interest and signify an important line in the country's economy [83]. In addition to tourism and the beautiful landscapes rich in flora and fauna, the economy of the population that inhabits the Cauca territory is linked to agricultural production, livestock, commerce, the exploitation of wood and gold mining. Particularly, agriculture has been developed in the north of the department. Its main crops are sugar cane, traditional corn, rice, banana, fique, yucca, potato, coconut, sorghum, cocoa, peanuts and African palm [82].

The Department of Cauca is also a strategic territory of the armed conflict. Its rich geography made up of inter-Andean valleys and jungles that extend from the Central Cordillera to the Pacific, is attractive to communities that have become responsible

for the illegal exploitation of resources [55]. Thus, in this region, informal gold mining is carried out mainly in the municipalities of Argelia, Cajibío, Caldono, Guapi, López, Patía, Santa Rosa, Santander de Quilichao, Timbiquí, Timbo, and Totoro [84] (Figure 2).

Cauca is the fifth Colombian department with the highest number of population known as Afro-descendants. Thus, it has been constituted as one of the most inhabited regions by Afro-descendant populations, after the Pacific and the Colombian Caribbean [86]. Given that the majority of this population recognize themselves as belonging to this ethnicity, the analysis of the life conditions of the Afro-descendant communities that live in vulnerable circumstances is of high importance, as indicated by the MPI (Multidimensional Poverty Index of Colombia), with a total percentage of 32.5 [17].

The Afro-descendant communities in the department are organized into community councils of which the following stand out: Campesino Palenque Monte Oscuro, El Samán, Vereda La Paila y Cabecera Municipal, Comzoplan, Corregimiento Centro de Caloto Pandao Caloto, Guachené y Santander de Quilichao, Aires de Garrapatero, Cauca River Basin, Micro Basin of the Teta and Mazamorrero Rivers, Timba River Basin, Páez-Quinamayo “CURPAQ” River Basin, and de Pilamo [87, 88].

The main mining areas of the department are located in the municipality of Buenos Aires, where there exists a cooperative of miners entitled *Coomultimineros*, which, in addition to grouping them, is responsible for intermediating mining supplies [43]. Mining occupies the second most important economic activity of the region, developed by its inhabitants in a traditional way (mining of reef and alluvium).

Special attention deserves the fact that collective properties of Afro-descendant communities, become part of the mining territory, due to the acute processes of cultural change and social impacts that they entail. The definition of the country's mining areas should be made considering the vulnerability to climate change [60], and given the multiple problems that have been exposed in relation to gold mining and conditions of vulnerability and poverty of Afro-descendant communities in Colombia, governmental actions must be taken to protect such population and preserve its biodiversity.

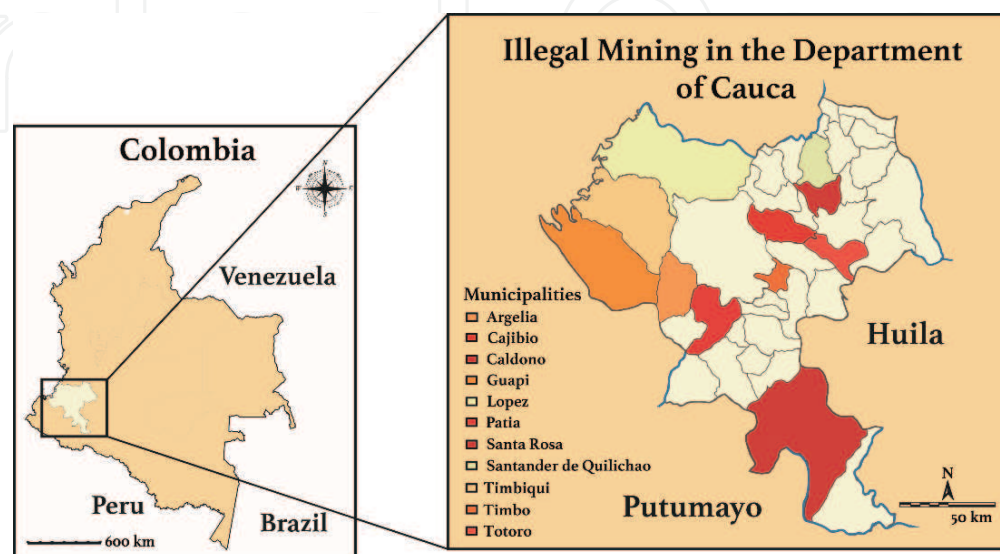


Figure 2.
Map of the Cauca department representing the main illegal mining points. Source: Pares [85].

6. Implications of gold mining on the well-being and quality of life of communities

Mining activity is as old as the history of the earth, it is extremely important for the income of countries that have mineral wealth, especially gold, which acquires an important purchasing power in the market, thus benefiting the individual and collective economy, as well as the state. This constitutes non-renewable natural resources that ideally should be exploited causing minimal or no impact on the ecosystem and human health. The paradigm of wealth accumulation and the power of the market induces deformed ways and styles of life that affect individual and collective health, which undoubtedly affects the well-being and quality of life of the communities involved. Such is the case of the present investigation, in which health problems and socioeconomic impacts related to mining activity have been identified from the moment of exploitation until the process to obtain gold [89].

As suggested by Scarlett and Bish [90], mining must be considered as one of the clearest indicators of the evolution that human beings have experienced since their first steps on earth, starting with the Stone Age, and passing through the Bronze and Iron Ages. Curiously, this nomenclature already perfectly reflects the enormous importance that mining activities have had in evolution. Without mining and the evolution that it entails, human development towards the desired welfare state would be very different from what is currently known.

Mining operations have evolved over the centuries, going from small artisanal activities to the large multinational mining companies that exist today [91]. Although both methods of mining exploitation still coexist, informal mining is considered to be the main responsible for the uncontrolled impact on ecosystems and quality of life, especially in developing areas such as the Department of Cauca. Thus, it is possible to find today, small rafts or dredges where only one or two people can work, or mining companies in which the number of jobs can be hundreds or thousands.

As mentioned, mining is a strategic sector worldwide. A large number of products surrounding daily life comes from mining, either directly, or after having undergone some type of metallurgical transformation. Despite the global relevance of the sector, it is an activity that faces a series of difficulties for its development that make it difficult to guarantee the rights and safety of workers [92]. Given that these mineral resources cannot be mobilized, their location affects certain protected areas, either environmentally or culturally, which makes it a socially controversial activity. For this reason, in recent decades the mining companies that have the respective titles have focused their efforts on obtaining globally sustainable results, combining improvements in production with the search for social and environmental sustainability, all reinforced by the laws that regulate the sector, aimed at combining the activity with the environment that surrounds it in the most appropriate way possible for all related actors [93].

Although gold extractive processes are being increasingly regulated worldwide, the Colombian case still has many aspects to address. The development of Afro-descendant communities that live in areas of great biodiversity, necessary for the exploitation of these resources, has been highly influenced by a series of social aspects. Thus, mining has also unleashed setbacks in the fight against organized crime. Within the framework of these activities, there are five types of conflicts determined by the way in which the illegal armed actors are linked to such activity: Direct exploitation, in which the armed actors are engaged in mining or exploiting miners; exploitation resulting from eviction, which occurs when armed groups displace artisanal, informal or illegal miners; mega-projects, characterized by being located in ethnic territories, threatening not only the environment, but also the

way of life and the rights of the communities; the conflict derived from new oil or mining discoveries in areas recovered by the Government; and finally, the self-defense modality, which takes place when mining companies arrive in the territories accompanied by private security companies, co-opt local politics or pay illegal taxes to the armed groups [94].

Another aspect to highlight of the implications that mining activities have on the well-being of the communities is that related to tax avoidance and poverty. The multimillion dollar profits of this market are recorded daily. But this *boom* is not reflected in the producing municipalities. Despite the high dividends produced by the sector, well-being in areas of mining influence is minimal, even the start of these activities represents a deterioration in the health, well-being and safety of the neighbors to the mines. All of the above, without considering the gap that exists to determine who should be responsible for the environmental damage generated by this activity [94].

As indicated, some illegal armed groups have used the mining industry to take advantage of gaps and inabilities to benefit economically. This critical social reality has brought negative effects such as displacement and social conflict. In this sense, since the Colombian Mining Code was approved in 2001, there have been overlapping titles in areas of national parks and *paramos*, as well as violation of the rights of artisanal mining communities, and of those who are settled in implicated territories [95].

Given the implications of mining, it is proposed to generate interdisciplinary educational programs among the direct and indirect actors of the involved communities, who, in consensus, seek to implement a continuous education plan for protection, use of clean technologies and conservation of the ecosystem. This teaching-learning process will allow miners and people who live around the extraction areas to reflect on the dangers generated by informal or artisanal mining activity due to the use of Hg and other chemical substances on human health [89].

7. Conclusions and perspectives

Based on the information obtained from the bibliographic research, regarding the contextualization of organizational aspects of the Afro-descendant communities in Colombia, and the state of mining in these communities, it can be concluded that the Afro-descendant population has been recognized as important members of the Colombian population for many years, representing approximately 10% of the country's total inhabitants.

The departments with the largest number of Afro-descendant communities are: Valle del Cauca, Chocó, Bolívar, Antioquia, Cauca, Nariño, Cesar, Atlántico, Magdalena, Sucre and Córdoba. The titling of the collective territories has been carried out thanks to the formation of Community Councils, which are in charge of ensuring their special territoriality and welfare rights. These communities are part of the culture and daily life of Colombians. For this reason, their inclusion in security and social protection projects is essential for decision-making. In addition, from the legal field at the national level, their rights are recognized, including consultation and integration in environmental management processes.

It is evident that mining is an activity that is carried out in Colombia, to a greater extent, in inadequate technical and technological conditions, which bring with them problems of environmental contamination for natural resources, and put the health of the communities at risk, especially for the Afro-descendant communities, main inhabitants of mining areas. These activities are mainly distributed in the departments of Antioquia, Chocó, Bolívar, Nariño, Caldas and Cauca.

In addition, it is important to highlight that gold mining activities have an economic-social impact with benefits and damages. Some studies argue that mining represents the only livelihood for the inhabitants of the regions in which it is carried out. However, its development does not offer any security or training for workers.

Due to the unlimited number of impacts that mining has, it faces several challenges that must be addressed as a priority, especially those related to tax avoidance and poverty.

The well-being of native populations that inhabit areas of ecological and cultural importance is undoubtedly affected by the development of these extractive activities. For this reason, the social implications of informal mining should be highlighted, conditions in which the majority of people who engage in artisanal mining find themselves. With these illegal processes, the possibility of guaranteeing the progress of the communities is evaded, and, on the contrary, such poverty conditions are promoted so that these areas are a source of inequality, exclusion and violence.

One of the main solutions to implement to make mining a business that benefits the country and is sustainable with the development of the communities, could consist in the creation of an institution that is responsible for repairing, as far as possible, the environmental damage that are derived from mining, that only use suitable areas for this activity and do not endanger natural parks, *paramos* and special areas. Likewise, this institution could be in charge of technifying the processes in the areas of mining influence and, above all, that it produces well-being in the quality of life of the inhabitants of these areas.

It is important to promote the creation and development of government policies for the protection of these informal miners. In all their aspects, it is evident the risk of exposure to pollution and the need in the context of sustainable development. In addition, informal mining brings with it corruption, violence and armed conflict that delay peace processes.

Finally, in the environmental framework, gold mining activities also have a strong negative impact, especially as a result of the use and contamination of ecosystems with Hg. This environmental risk is supported by studies that show that pollution of water, soil, air, flora and fauna ends up affecting the health of vulnerable populations. Thus, the prevention of exposure of Afro-descendant communities should be considered a national priority, since the areas of greatest mining exploitation coincide precisely with the collective territories of those communities.

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Conflict of interest

The authors declare no conflict of interest.

Appendices and nomenclature

Hg	mercury
MeHg	methylHg


UNDP	United Nations Development Program
BCDP	Black Communities Development Plan
SIMCO	Colombian Mining Information System
DANE	National Administrative Department of Statistics
JAC	Community Action Board
ASCOBA	Association of Community Councils and Organizations of Bajo Atrato
NGOs	non-governmental organizations
UNESCO	United Nations Educational, Scientific and Cultural Organization
SAISOL	San Andrés Isla Solution
SOS	Sons of the Soil
INFAUNAS	Independent Farmers United National Association
KETNA	The Ketlena National Association
PCN	Black Communities Process
% based	percentage based
GDP	Gross Domestic Product
USD	American Dollar
FOB	Free on Board
WHO	World Organization of the United Nations
µg/g	Micrograms/grams
T-Hg	Total- mercury
km	kilometers
km ²	square kilometers.
ha	hectares
CURPAQ	Páez-Quinamayo River Basin

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