

Environmental Impact Assessment and the controversy of the mining arc in Venezuela

Rodriguez T. Erik A. **, Michinaux A. Andrea **, Awomuti Adeboye **

* College of Environmental Science and Engineering, Tongji University, Shanghai, China

** Institute of Environmental for Sustainable Development, UNEP-Tongji University, Shanghai, China

* Corresponding author: exoerik_337@hotmail.com

DOI: 10.29322/IJSRP.11.04.2021.p11256

<http://dx.doi.org/10.29322/IJSRP.11.04.2021.p11256>

Abstract- The mining arc in Venezuela has been a controversial issue since its official legalization in February 2016 as a National Strategy of Development Zone of the Orinoco Mining Arc, not only for the environmental impact and the disastrous consequences that entails the development of this project, as well as the impact it will have on indigenous communities in the region. Environmental Impact Assessment.

Index: Mining Arc, Environmental Impact, Orinoco, Venezuela

I. INTRODUCTION

Mining is the extraction process of minerals located underground or trapped inside one rock. This activity has several ways to carry out as underground mining, surface mining, and pacer mining, but during these processes, it is generated different types of environmental pollutants of several natural resources as air (release of matter of the mining surface, at the moment of removal of the soil and vegetation, all these particles flies and get mixed with the air), Land and soil (change of the texture of the soil, changing of the hydric regime, contamination due to heavy metals, acidification by accumulation and oxidation of sulfides and acid drainage), Water (wastewater produced in the process ass result, produce different types of pollutants as acid mine drainage, metal contamination, and increasing of sediments in streams, pollution of groundwater and rivers surrounding.) [1]. In Venezuela, mining was practiced illegally and small scale is one of the economic activities of the indigenous group call: CARIBE (E'ñapa, Kari'ña, Pemón, Yabarana, Ye'kuana), YANOAMAMI (Sanema, Yanomam, Yanomami), SÁLIVA (Jodi, Piaroa) [2], but during an economic crisis in the country, in the year 2008, the president Hugo Rafael Chavez Frias, decided that one solution of the crisis is the exploitation of this resource in big scale and was made official in the year of 2016 with the creation of the National Strategic Development Zone Orinoco Mining.

II. DRIVER

What drives mining in the territory of the Bolivarian Republic of Venezuela? On February 24, 2016, appeared published in the Official Gazette 40,855, decree number 2,248 by which creates the

so-called "National Strategic Development Zone Orinoco Mining (AMO)". Employing this regulation the national executive gives in concession for the mining an extension of the national territory. The master will affect a territorial extension of 111,843.70 km², a larger area than Portugal (92,212 km²), Cuba (109,212 km²), Panama (79,569 km²), and which corresponds to 12.2% of the entire national territory.



Figure 1. Orinoco Mining Arc on Venezuela. Source: 2017 OCCRP. Credit: Edin Pasovic [3].

Located in Bolivar State, in an area that extends from the border with the state of Amazonas to the state Delta Amacuro and delimits in the upper part with the states Apure, Guárico, Anzoátegui, Monagas, and Delta Amacuro (figure 1), for the large-scale exploitation of Mineral deposits of gold, coltan, diamonds, copper, iron, bauxite as part of the objectives raised in the so-called "plan of the Fatherland: second Socialist Plan of economic development 2013-2019" [4]. All this impelled to that for many years illegal mining was carried out in the Bolivar state, and with the economic crisis by which is going the Republic, the decision was made to implement the mining as part of these

engines and thus increase the control on the heading and to reduce the exploitation of minerals in an illegal way (Figure 2).

How it was said before the region sectioned and labeled it the Arco Minero (“Orinoco Mining Arc”) represents 12 percent of the country’s territory. To give an idea the Arco Minero is approximately the size of Portugal, spans across the Amazonas, Bolivar, and Delta Amacuro states, and is an area rich in minerals. The area contains bauxite (used for aluminum production), coltan (used in the production of many electronic devices), industrial diamonds, and, most importantly, gold. The region also boasts some of the most biodiverse areas of the Amazon rainforest and borders Canaima National Park, a UNESCO World Heritage site. And besides the areas where legal it is still doing illegal mining across all the area.



Figure 2. Illegal mining extends far beyond the Mining Arc. Source: Center for Strategic and International Studies [5].

However, according to article 12 of the current Constitution of the Bolivarian Republic of Venezuela, the property of the mining and hydrocarbon deposits for the first time in one of its provisions "are goods of the public domain and, therefore, inalienable and Imprescriptible" [6]. The inalienable goods cannot be marketed, whereas the concept of imprescriptible is that the juridical figure by which the state of right is consolidated of situations; Therefore, the commercialization of these goods are not permitted in the Constitution of the Bolivarian Republic of Venezuela.

III. RESULTS

The impact of this project is on a large scale and gradual, the impact on one of the "lungs of the world" is impressive, bioremediation perhaps could not recover these ecosystems, will be lost completely species. A group of scientists from the Institute of Zoology and Tropical Ecology of the Faculty of Sciences of the Universidad Central de Venezuela, consider it important to request information about the phases and procedures of the mining arc [7]. Due to the ignorance of the mitigation and recovery plans of the areas that will be affected by the activity of the mega-miner, information that until the moment is unknown to the citizens of the

nation. Besides, these researchers emphasize the devastating effects of the project which would be:

The fragmentation of the ecosystems of the area, mostly forests (Figure 3), will cause a significant loss of species of flora and fauna, some of which are already vulnerable. Remarkably, many of the species in the area are endemic, i.e. they are not found anywhere else in the world. The southern part of the Orinoco River, which is one of the longest rivers in South America at 2,140 kilometers. Its drainage basin, sometimes known as the Orinoquia, covers 880,000 square kilometers, with 76.3 percent of it in Venezuela and the remainder in Colombia. It is the fourth largest river in the world by discharge volume of water. The Orinoco River and its tributaries are the major transportation system for eastern and interior Venezuela and the llanos of Colombia [8].

It is estimated that more than half of the fauna species of the country inhabit this area of the national territory, including emblematic species such as the manatee, the pink rose, the Orinoco Cayman, and the Arrau turtle. Species that are already vulnerable. The inevitable loss of species of fauna that will be produced to carry out this activity in the proposed extension in this project will make difficult the recovery of these ecosystems since they will be eliminating species that fulfill important functions in nature.

Continuous forests that remain standing will be at risk of progressive degradation given the severe conditions that the deforested areas have, which lead to local droughts, a greater effect of the wind that will favorite the continuous fall and death of trees that remain exposed. Massive deforestation would impact the oldest region of the planet, which has taken more than 4 billion years to develop without possible recovery.

The type of mining raised will produce land modification and soil loss. This activity generates an enormous amount of sediments that will have in turn pollutant compounds as in the case of cyanide, which will become an environmental liability.

Atmospheric contamination by volatile organic compounds and suspended particles, resulting from blasting and land removal, would produce respiratory and cardiovascular diseases, as well as increased migraines, gastroenteritis, skin diseases, and cancer risks in different vital organs. Another important factor to note is that suspended particles will be deposited in the leaves of the plants, preventing photosynthesis and producing damage in the local trees as well as in agricultural areas of the country due to aerial dispersion, affecting Food security in different parts of the nation.

Health will also have catastrophic effects. For example deforested areas and where water wells are generated will represent suitable conditions for the species of mosquitoes *Anopheles darlingi* and *Anopheles marajoara* transmitting Malaria disease who is caused by the parasite of the genus *Plasmodium* [9] most cases are due to *P. vivax*, followed by *P. falciparum* and *P. malariae*. According to the World Malaria Report, published by WHO in 2016, for

many years this region of Bolivar State has been endemic to malaria.

the dispersion of pathogens product of pollutants of anthropogenic origin, causing massive mortality of fish in the region.



Figure 3. An aerial photo of a mine near Angel Falls in Bolivar state, Venezuela. Where is possible see the deforestation and the result of the mining in the area. Source: <https://venezuelanalysis.com/news/13875> [10]

The damage to aquatic ecosystems in the region, due to forest logging, soil erosion, sedimentation in watercourses, and alteration of the fluvial regime by reservoirs and irrigation districts will inevitably affect aquatic biodiversity and Continental fishery resources of the country.

All the sediments and chemicals produced by mining would lead to the Atlantic Ocean and the Caribbean Sea through the Orinoco Delta, which will cause important implications in other marine and ocean ecosystems, both inside and outside our Borders, reaching the southern Caribbean region (not only our coast and oceanic islands but could reach the Netherlands Antilles) and the Eastern Caribbean (from the Lesser Antilles to Puerto Rico).

Much of the high fishing productivity in the northeastern part of the country is due to the influence of the Orinoco River and its nutrient-enriched waters. However, if micronutrient concentrations are significantly increased by anthropogenic inputs, as expected with mining activities, a collapse of the coastal system would occur with high consequences on the country's fishing marine resources. Mining activity is expected to generate a high sedimentary discharge that would bring negative changes in fish production in the Eastern Caribbean region. Even without the project of the mining arc, it has been reported that in the period of abundant rainfall there are significant decreases in salinity and significant increases in temperature, which generate high susceptibility in fish to bacterial infections [7]. Also, it has been reported that through the discharge of the Orinoco River can occur

Villamizar et. al. (2016) concludes with this message "the safeguard and responsible management of the riches of Venezuelan Guyana would allow not only Venezuela but the planet the balance and the possibility of sustainable development that guarantees the Future generations a healthy environment and the possibility of living in a society in equilibrium, in peace and with equal opportunities. "

IV. CONTAMINATIONS SOURCES

Although cyanide is thought to be less polluting than mercury, since this compound can naturally decompose in the environment by giving non-toxic products, this could only occur if cyanide is in low concentrations and conditions of a neutral medium with enough sunlight. It is well known from the experience of other mining activities in the region that to dissolve gold, 350 mg of cyanide per liter of water is needed, and in a project of this magnitude it would take thousands of liters of water and in case of a cyanide spill accident, natural decay may be unlikely as extensive areas of the Orinoco Basin are dark and very murky areas that would impede decomposition [7]

V. ACTION BY THE GOVERNMENT

In the 159th session of the Inter-American Commission on Human Rights (IACHR) held in December 2016 in Panama City, in the context of the Orinoco mining arc, the Venezuelan state acknowledged that it has still carried out the environmental impact

study that Order the Constitution. Villamizar et. al. (2016) points out that the development of this project loses the opportunity to:

1. Take advantage of a region rich in biodiversity of species, ecosystems, and cultures that would allow the development of tourism.
2. Take advantage of endemic species with great value for the pharmaceutical and agri-food industry,
3. To be an example of a development that empowers its communities and makes them come out of dependence and poverty.
4. Retain one of the planet's large carbon reservoirs.

VI. CONCLUSION

Legalizing mining is not an effective method to control, or decrease illegal mining, many studies report that by militarizing those extensions of land the companies practicing illegal mining in that area, will move to other areas, covering more territory than before. Another detail discussed extensively is the environmental impact, many experts in Venezuela had called it the "greatest ecocide of our history", because for many years in the southern zone of the Orinoco, in the Bolivar state, had been highly contaminated by all the previous waste produced for many years of illegal mining, to recover this area that for years had been affected by the mining, will be a hard job, it will need a big investment of time and money. But due to the exploitation now legally and indiscriminately that had reaching affect all the ecosystem in more than 12% of the National territory and one of the world's main lungs, the work needed for recovery all the ecosystem in the future will be harder than before.

REFERENCES

- [1] "Mining - water, effects, environmental, disasters, United States, impact, EPA, soil, chemicals, industrial, toxic, human, sources, disposal, use, life, health", Pollutionissues.com. [Online]. Available: <http://www.pollutionissues.com/Li-Na/Mining.html>. [Accessed: 02- Apr- 2021].
- [2] "Arco Minero del Orinoco: Mega-minería amenaza la Amazonía venezolana", Arcgis.com, 2017. [Online]. Available: <https://www.arcgis.com/apps/Cascade/index.html?appid=18e425a6057945af9ad56e8af989a656>. [Accessed: 07- Jul- 2020].
- [3] É. López, "Gang Lords Rule the Orinoco Mining Arc - OCCRP", OCCRP, 2017. [Online]. Available: <https://www.occrp.org/en/goldandchaos/gang-lords-rule-the-orinoco-mining-arc>. [Accessed: 07- Feb- 2019].
- [4] "Estado reconoce en CIDH que no ha realizado estudio de impacto ambiental para Arco Minero", Derechos.org.ve, 2016. [Online]. Available at: <https://www.derechos.org.ve/actualidad/estado-reconoce-en-cidh-que-no-ha-realizado-estudio-de-impacto-ambiental-para-arco-minero> [Accessed 18 Nov. 2018].

- [5] M. Rendon, "Illegal Mining in Venezuela: Death and Devastation in the Amazonas and Orinoco Regions", Csis.org, 2020. [Online]. Available: <https://www.csis.org/analysis/illegal-mining-venezuela-death-and-devastation-amazonas-and-orinoco-regions>. [Accessed: 11- Jan- 2021].
- [6] Contreras J. M., (2002). El derecho de propiedad de los hidrocarburos en venezuela: origen y tradición legal. Rev. Venez. de Econ. y Ciencias Sociales, vol. 8 n° 2, pp. 219-235.
- [7] Villamizar E., El Souki M., Villalba L., Herrera A. T., Yranza, A., Toro M., Grillet M. E., Griffon D. & Rodríguez D. UCV "Consecuencias ambientales del Proyecto Arco Minero", Derechos.org.ve, 2016. [Online]. Available at: <https://www.derechos.org.ve/actualidad/ucv-consecuencias-ambientales-del-proyecto-arco-minero> [Accessed 18 Nov. 2018].
- [8] W. Denevan, "Orinoco River | river, South America", Encyclopedia Britannica. [Online]. Available: <https://www.britannica.com/place/Orinoco-River>. [Accessed: 15- Feb- 2021].
- [9] R. Cruz-Coke, *Mendel en la historia de la medicina.*, vol. 101, no. 3. 1973.
- [10] C. Pascual Marquina, "Orinoco Arc Drops 17 Tons of Gold into Venezuela's Coffers as Ecologists Question the Project", Venezuelanalysis.com, 2018. [Online]. Available: <https://venezuelanalysis.com/news/13875>. [Accessed: 09-Apr- 2020].

AUTHORS

First Author – Erik A. Rodriguez-Torres. Mechanical Engineer, Universidad Central de Venezuela (2017). Master Degree Candidate, in Environmental Sciences and Sustainable Development. Tongji University (2021). College of Environmental Science and Engineering, Institute of Environmental for Sustainable Development, UNEP-Tongji University, Shanghai, China. E-mail: exoerik_337@hotmail.com
Second Author – Andrea Michinaux A. Bachelor's in Biology, Universidad Central de Venezuela (2018). Master in Environmental Sciences and Sustainable Development. Tongji University (2020). College of Environmental Science and Engineering, Institute of Environmental for Sustainable Development, UNEP-Tongji University, Shanghai, China. E-mail: andmich_1012@outlook.com.

Third Author – Awomuti Adeboye, Master Degree Candidate, College of Environmental Science and Engineering, Institute of Environmental for Sustainable Development, UNEP-Tongji University, Shanghai, China. E-mail: boyesky@yahoo.com

Correspondence Author – Erik A. Rodriguez-Torres. Mechanical Engineer, Universidad Central de Venezuela (2017). Master Degree Candidate, in Environmental Sciences and Sustainable Development. Tongji University (2021). College of Environmental Science and Engineering, Institute of Environmental for Sustainable Development, UNEP-Tongji University, Shanghai, China. E-mail: exoerik_337@hotmail.com

