Impact of the Mining Activity on the Environmental Surroundings of the Tailing Gold Community, Ayacucho

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Abstract

The Gold Community Tailing S.A. is an artisanal mining company, located in the district of Pullo, province of Parinacochas, Ayacucho region, produces up to 2 kg of refined gold monthly; carries out its mining exploitation in the context of environmental policies and the application of technology tending to contain the passage of waste to the ground, however, it has not yet achieved sustained results in the environment, affecting the Tailings community, in this lies knowing the impact of the mining activity in the environmental surroundings of Aurelsa.

The results of the study indicate that mining activity is related to the environmental setting (bilateral significance .001749305), considerable positive relationship (Spearman's rho .761); the dimensions of the mining activity are related to the dimensions of the environment, the physical environment (rho .682), the biological environment (rho .774) and the socioeconomic environment (rho .769). Regarding the laboratory results, soil contamination by As, Ba, Cd, Cr, Pb, Hg, Cr and CN have low levels that do not affect human health; while the physical-chemical tests of water indicate average salinity and turbidity levels that do not affect the health of the inhabitants of this community.

It is required that the central and regional governments formulate, develop and apply awareness programs focused on the Comunidad Aurifera Relave S.A. of the Region in order to raise awareness and objectify the physical, biological and socioeconomic impact generated by mining activity and that with a friendly mining activity, impacts can be mitigated.

Keywords: *Mining activity, environmental setting, Tailings, Gold Community, physical environment, biological environment, socioeconomic environment.*

I. INTRODUCTION

Man to enrich the environment that surrounds him has required since his earthly dawn to remodel and tame nature (Bunge, 2013) according to his needs, using the elements available in his environment, such as rummaging the earth's crust either for agricultural activities, housing or mining, the latter to obtain copper, lead, silver, gold among other minerals, that became the right of ownership of land (Serfati, 2013) and the development of mining activity, which is complex, highly exposed, varied, with an impact on other economic sectors, hence it is a very profitable sector (Concha, 2017).

Mining activity is widely undertaken in the world due to its economic and social dimension, as well as the requirement of minerals from the world's major economies – China, Russia, India, Thailand, the United States – to boost their growth. It is an activity that in the world is carried out in different

approaches, in Canada, the United States, Russia, Spain, mining is subject to policies, guidelines, protocols, technologies that protect the human factor and the environment, even regulate economic compensation for CO2 emissions, invest in a project that in its economic activity reduces CO2 emissions into the atmosphere.

In non-developed countries – Peru, Colombia, Ecuador, Panama, Mexico – mining activities are carried out with limited environmental protectionist measures, a mining approach that is harmful to the environment. As for illegal, informal and part of formal mining, policies, laws, regulations are not fully complied with and even governments – national, regional and district – are characterized by mediatized actions, as is the case of informal and illegal small-scale artisanal mining (e.g. in Madre de Dios) that plunder the forests of the jungle, to carry out their mining activity they devastate forests, destroy lagoons, swamps, use machinery and heavy equipment that do not correspond to small-scale mining, dump their tailings into rivers without being sanctioned (De Echave, 2016); in view of the fact that mining activity degrades the environment.

Environmental degradation in the environment of mining extractive activity is a concern because anthropic pollution and environmental degradation have effects on the impoverishment and erosion of soils that affect agricultural and rural activity, water pollution, harmful effects on the living conditions of the population, labor dependence on mining activity, Limited basic infrastructure, services, demographic impact, health, poor urban development, infrastructure and other economic activities.

Environmental liabilities have harmful effects on the environmental, social, economic that decant – on the part of the communities adjacent to the mines – in demands for reparation and fulfillment of committed expectations, which when not addressed or satisfied becomes socio-environmental conflicts (Viana, 2018), to which small-scale mining is not exempt.

Small-scale mining cataloguing is heterogeneous in the world; in Colombia it is determined by the volume of production and type of exploitation (open pit or underground), in Argentina, Thailand they take into account the amount of capital invested, for the USA, Chile, Pakistan the number of workers counts; Ghana, Zambia, Zimbabwe counts mining ownership, technological, artisanal application or some degree of mechanization (Chaparro, 2020); in Peru, small-scale mining is the activity carried out by any legal modality that directly exploits and /or produces minerals, and that between complaints, petitions and mining concessions ownsup to two thousand ha and with a maximum installed production capacity of 350 t per day for producers of metallic minerals (Valdés et al., 2019); characteristics that fit Aurelsa.

The Comunidad Aurífera Tailings S.A is a formal artisanal mining company, located in the district of Pullo, province of Parinacochas, Ayacucho region, small mining, has eight mining requests of 1,133.85 ha to exploit them; currently, it only exploits the Fe y Alegría Mining Concession of 100 ha, produces monthly up to 2 kg of refined gold, with a 8 gr/t grade and silver 16 gr/t. The metals in this concession are obtained with the leaching method, which is the absorption of gold through activated carbon, in Lima the desorption and refining service is done, obtaining gold bar as the main product and silver as a by-product.

Aurelsa, has as a philosophy and policy the protection of the environment, applying technology that stops the passage of waste to the ground, in order to avoid contamination in its adjacent area, but still does not achieve sustained results, affecting the community of Tailings. Environmental degradation manifested in water degradation, soil degradation and atmospheric degradation, as well as poor social, economic and urban development are components of the social, economic and environmental problems of the Ayacucho Tailings Gold Community. Problem in which the present research lies, so that the objective of this study is to establish the impact of mining activity on the environmental environment of the Auriferous Community Tailings S.A. of the Ayacucho Region.

II. METHODS

The research is quantitative, applied, correlational. With a random sample of 89 Aurelsa workers, to whom a questionnaire of 32 questions was applied. The indicators of contamination in the environment in Tailings were determined with the analysis of water in the laboratory, with a water sample from an underground pool 10 m from the Huarango River and 1000 m from the town of Tailings. For soil analysis in the laboratory, a soil sample was taken from the soil to the area surrounding the mine, near the Tailings Village Center (Figure 1).

Figure 1 Centro Poblado de Tailings, district of Pullo, Parinacochas, Ayacucho

Pullo District Location in Decimal Degrees (DD): -15.21111, -73.82528

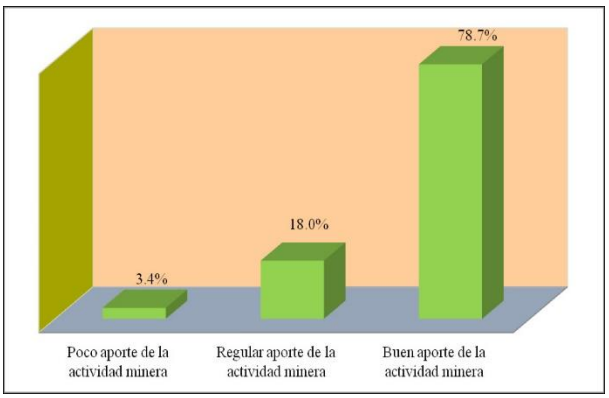
Pullo district location in geographical coordinates (DMS): Latitude 15° 12′ 40"S, Longitude 73 ° 49′ 31"W.

III. RESULTS AND DISCUSSION

Before presenting the results, it is worth mentioning that mining activity in the Tailings Community has not been the subject of any environmental, health, economic or social study that allows comparing or extrapolating the results of this study. The descriptive results of the study variables, their dimensions and the testing of the hypotheses are presented below.

Perception of the contribution of mining activity to community development

Figure 2. Distribution of frequencies and percentages of the variable Mining activity



In Figure 2, 3.4% and 18.0% report that the contribution of mining activity is low and regular respectively to the achievement of the development objectives of the Tailings Community; 78.7% indicate that mining activity makes a good contribution to the achievement of community objectives. In short, mining activity has a good contribution to the achievement of the objectives of the community.

Perception of the benefits of mining exploitation in the community

Table 1 Frequencies and Percentages of the Exploitation Dimension

Alternativa	Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Muy en desacuerdo	1	1.1	1.1	1.1
En desacuerdo	4	4.5	4.5	5.6
Neutro	17	19.1	19.1	24.7
De acuerdo	56	62.9	62.9	87.6
Muy de acuerdo	11	12.4	12.4	100.0
TOTAL	89	100.0	100.0	

Note. Prepared by the researcher based on the research matrix

In table 1 it is necessary that themining activity in terms of its dimension Exploitation 62.9% of the participants reported being 'in agreement' and 12.4% are 'very much in agreement' with the benefits of the exploitation of the mining activity. From the results obtained, it is concluded that with exploitation, most of the participants assure that with the mining exploitation the objectives of the Tailings community can be achieved.

Perception of the benefits of the benefit of mining activity in the community

Table 2 Frequencies and Percentages of the Mining Activity Variable, according to the Benefit Dimension

Alternativa	Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Muy en desacuerdo	0	0.0	0.0	0.0
En desacuerdo	1	1.1	1.1	1.1
Neutro	9	10.1	10.1	11.2
De acuerdo	46	51.7	51.7	62.9
Muy de acuerdo	33	37.1	37.1	100.0
TOTAL	89	100.0	100.0	

Note. Prepared by the researcher based on the research matrix

In table 2, 51.7% and 37.1% 'agree' and 'strongly agree' respectively with the benefits of the Profit activities of the mining activity. Concluding, that for the majority, the benefit is given the conditions for the achievement of the objectives of the community.

Perception of the benefits of transportation of mining activity in the community

Table 3 Frequencies and Percentages of the Variable Mining Activity, according to the Transport Dimension

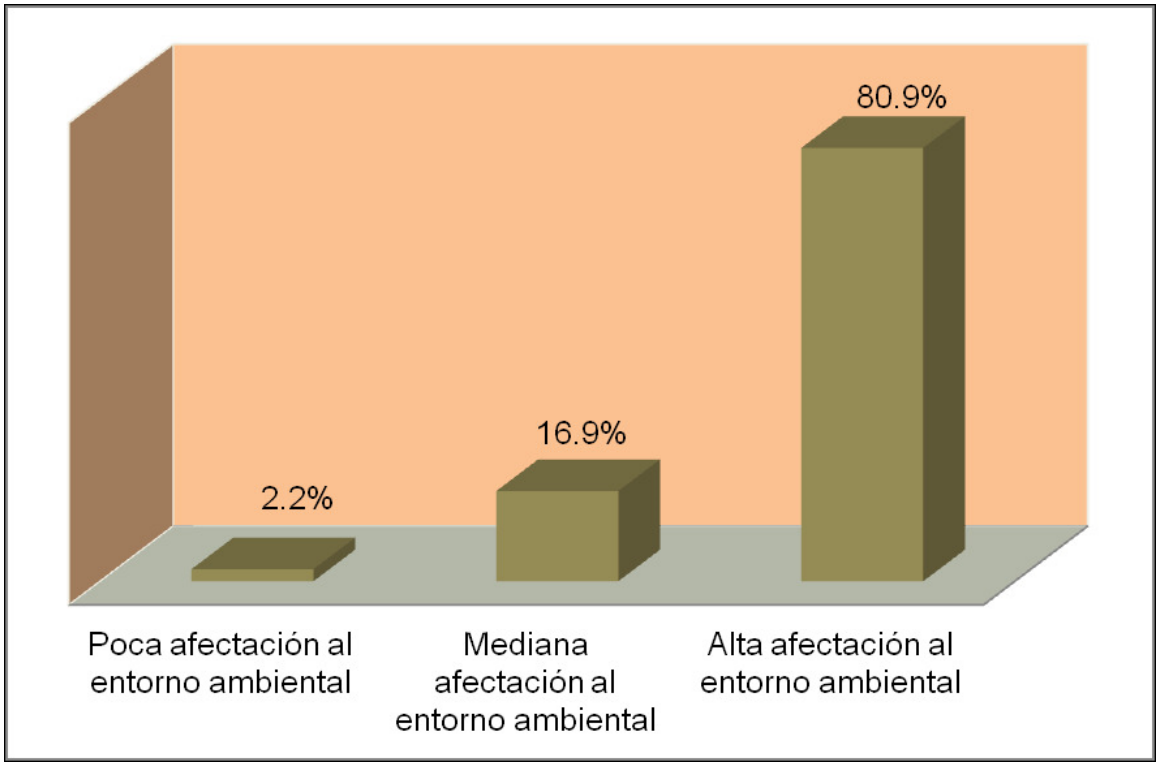
Alternativa	Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Muy en desacuerdo	1	1.1	1.1	1.1
En desacuerdo	2	2.2	2.2	3.4
Neutro	22	24.7	24.7	28.1
De acuerdo	57	64.0	64.0	92.1
Muy de acuerdo	7	7.9	7.9	100.0
TOTAL	89	100.0	100.0	

Note. Prepared by the researcher based on the research matrix

With respect to transport in mining activity, 64.0% (Table 3) and 7.9% reported 'agreeing' and 'strongly agreeing' respectively with the benefits of transport. In short, the majority report that transport has the conditions to achieve the objectives of the Tailings community.

Perception of the impact of mining activity on the environment

Figure 3. Percentage distribution of the environmental environment variable



In Figure 3, 2.2% of the participants report that mining activity affects the environment little; while 16.9% maintain that mining activity moderately affects the environmental environment and 80.9% indicated that mining activity greatly affects the environmental environment of the Tailings community. In conclusion, participants perceive that mining activity affects the environmental environment of the community.

Perception of the impact of mining activity on the physical environment of the environment

Table 4 Frequencies and Percentages of the Environmental Environment according to the Physical Dimension

Alternativa	Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Muy en desacuerdo	0	0.0	0.0	0.0
En desacuerdo	2	2.2	2.2	2.2
Neutro	17	19.1	19.1	21.3
De acuerdo	61	68.5	68.5	89.9
Muy de acuerdo	9	10.1	10.1	100.0
TOTAL	89	100.0	100.0	

Note. Prepared by the researcher based on the research matrix

Table 4 shows that 2.2% 'disagree' that the physical environment of the environment is affected by mining activity in Tailings, while for 19.1% it is in a 'neutral' position, then

68.5% indicate that they 'agree' with the damage suffered by the physical environment and 10.1% indicate that they 'strongly agree' with the affectation. From these results the participants have to 'agree' in the sense that the physical dimension (of mining activity) affects the environmental environment of the Tailings community.

Perception of the impact of mining activity on the biological environment of the environment

Table 5 Frequencies and Percentages of the Environmental Environment according to the Biological Medium Dimension

Alternativa	Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Muy en desacuerdo	0	0.0	0.0	0.0
En desacuerdo	2	2.2	2.2	2.2
Neutro	16	18.0	18.0	20.2
De acuerdo	43	48.3	48.3	68.5
Muy de acuerdo	28	31.5	31.5	100.0
TOTAL	89	100.0	100.0	

Note. Prepared by the researcher based on the research matrix

Table 5 shows that 2.2% 'disagree' that the biological environment of the environment is affected by mining activity in Tailings, while for 18.0% it is in a 'neutral' position, then 48.3% indicate that they 'agree' with the damage suffered by the biological environment and 31.5% indicate they 'strongly agree' with the affectation. From these results it is necessary that the participants tend to appreciate being in an intermediate position between 'agree' and 'strongly agree' that biological environment is affected by mining activity in the area of the Tailings community.

Perception of the impact of mining activity on the socio-economic environment of the environment

Table 6 Frequencies and Percentages of the Environmental Environment according to the Socio-Economic Medium Dimension

Alternativa	Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Muy en desacuerdo	0	0.0	0.0	0.0
En desacuerdo	1	1.1	1.1	1.1
Neutro	14	15.7	15.7	16.9
De acuerdo	40	44.9	44.9	61.8
Muy de acuerdo	34	38.2	38.2	100.0
TOTAL	89	100.0	100.0	

Note. Prepared by the researcher based on the research matrix

Table 6 shows that 1.1% 'disagree' that the socio-economic environment of the environment is affected by mining activity in Tailings, while for 15.7% it is in a 'neutral' position, then 44.9% indicate that they 'agree' with the damage suffered by the socio-economic environment and 38.2% indicate that they 'strongly agree' with the affectation. From these results it is necessary that the participants tend to appreciate that it tends to

'strongly agree' that socio-economic environment is affected by mining activity in the area of the Tailings community.

Laboratory Results on Environmental Pollution: Soil Contamination

Table 7 Results of Soil Analysis

Assay: LAS01-SD-22-00013								
Sample: Sediment								
Sampling date: 03 June 2022								
Sampling time: 11 am								
Sample reception conditions: Sediment in sealed plastic bag								
Test date: 04 June 2022								
Place of collection: Zone: Visitadoras; district: Pullo; province: Parinacochas; region: Ayacucho								
Sampling point and/or coordinates: UTM coordinates. East / North: 200 meters from Crushing Plant - Aurelsa and 700 meters from the village of Tailings.								
Results								
Sample Name	*7046 As MT mg/Kg	*7046 Three MT mg/Kg	*7046 Cd MT mg/Kg	*7046 Cr MT mg/Kg	*7046 Pb MT mg/Kg	*7048 Hg mg/Kg	*7040 Cr VI mg/Kg	*7043 Free NC mg/Kg
Visitors - Aurelsa	1 680	88,2	20,331	[a]<0,32	668,76	15,72	[b]<0,05	0,17

Note. Results of the soil test carried out at the Southern Analytical Laboratory

The results of the soil analysis (Table 7) indicate that soil contamination by As, Ba, Cd, Cr, Pb, Hg, Cr and CN have low levels that do not affect human health, none affect the food chain (Nordberg, 1998) and lead is far from the high impact found in Oroya (87%) of the standard for commercial soils, industrial and extractive (Arce and Calderón, 2017).

Laboratory Results on Environmental Pollution: Water Pollution

Table 8 Water Analysis Results

Ensayo: LAS01-AG-AC-22-00208
Sample: water sample from a water intake, 1000 meters from the village of Tailings
Sampling date: 03 June 2022
Sampling time: 15:40
Sample reception conditions: Cooler refrigerated
Test date: 04 June 2022
Sampling location: Zone: Huarango; district: Pullo; province: Parinacochas; region: Ayacucho
Sampling point and / or coordinates: Underground pool 10 m from the Huarango River and 1000 meters

from the Tailings village.							
Sample matrix: Natural water – Groundwater – Spring water							
Name of the sample: Huarango - Aurelsa							
Results of the Physical-Chemical Test							
*781	*783		*804		*806	*809	*810
Salinity	CR	T	Smell	Taste	Color	CaCO3 Acidity	Alkalinity CaCO3
g/L	mS/cm	ºC	Dilution factor at 25ºC	No drive	Pt Co	mg/L	mg. CaCO3/L
0,53	0,830	19,4	Acceptable	Acceptable	[a]<2	[b]<0,80	225

Note. Results of the soil test carried out at the Southern Analytical Laboratory

The results of the chemical-physical analysis of water (Table 8) indicate that the salinity levels (0.53 gr/l) of water for domestic, irrigation and mining use in the Tailings village are good; the organoleptic parameters of the water – smell and taste – of the sample have normal characteristics, which make it acceptable for human consumption; while the color (through platinum-cobalt, Pt-Co) is Pt Co a<2 implies that there is no health risk to the Tailings community. The report of the physical-chemical analysis indicates that the turbidity of the tailings water is NTU <0.50 – the WHO indicates that it must be less than 5NTU (Gesta Agua, 2006) – so that there is no risk to the human health of this community. The hardness of the water given by the presence of Mg and Ca dissolved in the water, the results of the total hardness CaCO3 mg / L 336.0, is less than 500 mg / L indicated in the national standard, so the hardness of the tailings water indicates that it is consumable without any risk to human health.

Results of the correlation between Mining Activity and Environmental Environment

The results of the statistical analysis (Table 9) refer to a relationship r = . 761 between the variables Mining activity and Environmental environment, indicating that the relationship between the variables is positive and a considerable level of correlation. The significance of Sig.= . 001749305 shows that Sig. is less than 0.01, indicating that the relationship is significant. There is a positive and significant relationship between mining activity and the environment in the Rel ave S.A. Gold Community.

Table 9 Spearman's Correlation Coefficient of the Variables: Mining Activity and Environmental Environment

			Mining activity	Environmental environment
Rho de Spearman	Mining activity	Correlation coefficient	1,000	*r* = . 761**
		Sig. (bilateral)		Sig. = . 001749305
		N	89	89
	Environmental environment	Correlation coefficient	*r* = . 761**	1,000

		Sig. (bilateral)	Sig. = . 001749305	
		N	89	89

**. The correlationis significant at the level. 01 (bilateral).

Note. Prepared by the researcher based on the research matrix

Results of the correlation between mining activity and physical environment

The results (Table 10) show the existence of a relationship r = . 682 between mining activity and physical environment, positive relationship and average correlation level. The significance of Sig.= . 000709406 shows the acceptance of the hypothesis. It is concluded that there is a significant and significant relationship between mining activity and the physical environment in the Comunidad Aurífera Tailings S.A.

Table 10 Correlation between the Variables: Mining Activity and Physical Environment

			Mining activity	Physical environment
Rho de Spearman	Mining activity	Correlation coefficient	1,000	*r* = . 682**
		Sig. (bilateral)		Sig. = . 000709406
		N	89	89
	Physical environment	Correlation coefficient	*r* = . 682**	1,000
		Sig. (bilateral)	Sig. = . 000709406	
		N	89	89

**. The correlationis significant at the level. 01 (bilateral).

Note. Prepared by the researcher based on the research matrix

Results of the correlation between mining activity and biological environment

The results (Table 11) indicate r = . 774 between mining activity and biological environment, positive relationship and mean correlation. The significance Sig. = . 001750846 allows us to affirm that the relationship is significant. It is concluded that there is a significant and significant relationship between mining activity and biological environment in the Gold Community Relave S.A. of the Ayacucho Region.

Table 11 Correlation between the Variables: Mining Activity and Biological Environment

			Mining activity	Biological environment
Rho de Spearman	Mining activity	Correlation coefficient	1,000	*r* = . 774**
		Sig. (bilateral)		Sig. = . 001750846

		N	89	89
	Biological environment	Correlation coefficient	*r* = . 774**	1,000
		Sig. (bilateral)	Sig. = . 001750846	
		N	89	89

**. The correlationis significant at the level. 01 (bilateral).

Note. Prepared by the researcher based on the research matrix

Results of the correlation between mining activity and socioeconomic environment

The results (Table 12) indicate r = .769 between mining activity and socioeconomic environment, positive relationship and considerable correlation. The significance of Sig.= . 000070564 indicates a significant relationship. It is concluded that the logical and significant relationshipbetween the mining activity and socioeconomic environment of the Gold Community Relave S.A. of the Ayacucho Region.

Table 12 Correlation between the Variables: Mining Activity and Socioeconomic Environment

			Mining activity	Socio-economic environment
Rho de Spearman	Mining activity	Correlation coefficient	1,000	*r* = . 769**
		Sig. (bilateral)		Sig. = . 000070564
		N	89	89
	socio-economic environment	Correlation coefficient	*r* = . 769**	1,000
		Sig. (bilateral)	Sig. = . 000070564	
		N	89	89

**. The correlation is significantat the level. 01 (bilateral).

Note. Prepared by the researcher based on the research matrix

The results obtained in this study are peculiar to Comunidad Aurífera Tailings S.A. , to the extent that there are no previous similar studies or environmental, economic, social, labor, mining or health exploitation, so extrapolating the results of this research with other studies carried out in Tailings is unlikely. This germinal scope of the present study relieva its importance that should be a reference to motivate to continue with other studies that contribute to know through space and time to know better the reality of Tailings.

In the results presented it has to lto bilateral significance (. 001749305) points out that the dimensions of the mining activity are related to the dimensions of the environmental environment of the Comunidad Aurífera Tailings S.A. of the Ayacucho Region and this

relationship is considerable positive (rho de Spearman = . 761), with similar correlational indicators for physical environment (rho .682), biological environment (rho .774) and socioeconomic environment (rho .769). These results are corroborated by Vento (2017), specifying that illegal gold mining in the Madre de Dios region has negative impacts on the sustainable development of this region, since this type of activity is causing serious damage to the ecology, the environment, population and the economy.

The results of mining activity in the physical environment indicate a relationship between them (r = .682), denoting a positive and significant relationship between mining activity and the physical environment in the Tailings Gold Community S.A. of the Ayacucho Region. This result is consistent with what was found by Castillo (2019), who determined that the environmental impact of illegal and informal mining in Madre de Dios is devastating, indicates that deforestation and desertification leads to the disappearance of animal and plant species, changes in the water and soil cycle expose the biodiversity of the jungle to danger; while the emission of large amounts of mercury that contaminates rivers and soils. Corcuera (2015) indicates that in Cerro Toro the soils are affected by mining activity, by clearings, as well as by cyanidation pools without retaining walls or drainage system. In the same direction, Ramírez (2017) specifies that the relevant environmental impacts identified in the Inambari sub-basin, in the physical aspect is manifested in the loss of soil, alteration of the water table, air quality, alteration of water courses, accelerated water erosion, movement of surface soil, water turbidity, tailings, sediments and mercury pollution. These results constitute an alert for Tailings in case its explicit environmental policy is not strengthened by applying waste containment technology to the soil as technological progress is made, environmental contamination could be complicated by the use of mercury that is deposited in the soil, in the blood of human beings, which is cumulative over time and harmful to the health of the Tailings population.

Regarding the mining activity and the biological environment with a correlation coefficient of r = .774 between the mining activity and biological environment, it indicates that existe positive and significant relationship. Corroborated by Armendáriz (2016) when finding a direct and significant relationship (Pearson coefficient = .844) in the presence of concessions and the decreed area of ANP, where the contamination risk indicators range from low threat (1.5) to high threat (6.0). Castillo (2019) indicates that gold mining impacts the lives of animals, plants and entire ecosystems, also affecting the inhabitants of nearby villages. Ramírez (2017), specifies that the relevant environmental impacts identified in the Inambari sub-basin, in the biological aspect, are the movement of vegetation cover, the displacement of wildlife, the affectation of tree species and the alteration of ecosystems.

Regarding mining activity and socioeconomic environment, a positive and significant relationship (r = .769) was found between mining activity and socioeconomic environment of the Auriferous Community Tailings S.A. of the Ayacucho Region; results supported by Corcuera (2015), indicating that mining activity generates negative impact on socioeconomic issues. Kianman (2017) in his study of the influence of mining activity in the province of Cajamarca found that it has positively impacted the improvement of the quality of life of the inhabitants of San Nicolás by 85%, Polloc 94%, Yanacancha Greande 38% and Progreso by 35%; on the other hand, in the district of La Encañada, the inhabitants of Rodacocha and Sogoron Alto do not perceive improvements in their quality of life, 100%; Nuevo Triunfo in 95%, Chanta 99% its

surroundings. Ramírez (2017), specifies that the relevant environmental impacts identified in the Inambari sub-basin, in the socioeconomic aspect are the conflict over land use, sources of economic income, affectation to public health, occupational, crime.

IV. CONCLUSIONS

1. With the bilateral significance test (. 001749305), the mining activity is related to the environmental environment of the Rel ave S.A. Gold Community of the Ayacucho Region in a positive and significant way (Spearman's rho = .761). The results of soil analysis indicate that the levels of content of As, Ba, Cd, Cr, Pb, Hg, Cr and CN in the land surface of Tailings are low and do not represent any danger, for the moment, to human health and the food chain and this is consistent in that the Health Post in this Populated Center does not report No case of poisoning of contents of these minerals in the population of this community. The chemical-physical analysis of tailings water reports salinity levels (0.53 gr/l) apparent for domestic, irrigation and mining consumption, while the organoleptic parameters of the water indicate normal characteristics, which is acceptable for human consumption; similarly the color (Pt Co a<2) indicates that it is suitable for health; the turbidity of the tailings water is NTU <0.50, indicative of the absence of risk to human health; and finally, in the total hardness of the water CaCO3 mg / L 336.0 was found, indicating that this water can be consumed without risk to human health.

2. The mining activity is related to the physical environment of the environmental environment in Comunidad Aurífera Tailings S.A. of the Ayacucho Region, because the bilateral significance is .000709406, and the relationship is considerable positive (Spearman's rho = .682). This relationship is evidenced because with the mining activity the population of this community observes that in some areas of Releve the fluvial dynamics have varied (loss of water mass, variation in the water table), the waters show contamination with heavy metals, they observe soil erosion, deforestation, loss of fertile soil, destabilization of slopes, alteration of the water table (water accumulated in the subsoil). Thesolid emissions (dust emitted) by the mining exploitation has affected the variation of the air, containing aerosols with toxic substances that affects the health of the inhabitants of Tailings, also indicate that the variation of the air by the removal of wind (wind) that moves compounds of high toxicity such as sodium cyanide for the extraction of gold, It affects the population of this community.

3. The . 001750846 of the bilateral significance test indicates that mining activity is related to the biological environment of the environmental environment in Comunidad Aurífera Tailings S.A. of the Ayacucho Region; and, it is a considerable positive relationship (Spearman's rho .774). The results indicate that the community members observe that the flora is scarce due to the ruggedness of the geography and must be subject to afforestation plans to mitigate pollution; it is also necessary that the use of land in Tailings is limited due to the ruggedness of its geography, space that is mostly used by mining, This situation is due to the fact that its sloping topography and a dry ravine hinders the use of land for agriculture and with a high risk of huaycos in the rainy season and that mining cannot alleviate.

4. The mining activity is related to the socioeconomic environment of the environmental environment in Comunidad Aurífera Tailings S.A. of the Ayacucho Region, depending on the fact that the bilateral significance testof . 000070564. This relationship is based on the fact that the community of Tailings is typified as a

population in extreme poverty, with lack of public services, low quality of life that mining still fails to satisfy; its urban growth is spontaneous, disorderly and informal, mixing its housing, commercial and mineral treatment space; they also point out that the Tailings mining has an impact on the improvement of infrastructure and health care, which occurs in activities such as the prevention of mercury pollution and the preventive promotion of better health care and nutrition for children and pregnant women; and that mining activity in the Tailings Village Center has improved health care, as the promotion of hygiene and occupational health.

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