 doi:10.20944/preprints202105.0620.v1

The paradox between health and work of the metallurgical complex in La Oroya

Israel Mallma[1], Lita Salazar[2]

[1] Doctor in Mining Safety and Control, Master's in mining management, Faculty of Mining Engineering, Graduate School of the National University of the Center of Peru; israel_minner@hotmail.com

[2] Doctor in Educational Sciences, Master's in educational management, Faculty of Education, graduate school of the National University of the Center of Peru

Resume

The La Oroya metallurgical complex reveals a process of structural or power pathology, where economic and environmental social policies lead to a citizenry without systemic freedom, characterized by environmental contamination (PAMA executed on average 67%, some processes with 0%) and sanitary (plumbosis 8.39 to 10.28 µg / dL), the economic dependence of this industry is also observed, which caused the weakening of the communities to maintain autonomy over their own destinies.

The Doe Run Peru, operated the metallurgical complex, creating added value to the extractive-export chain of mineral concentrate, but also took advantage of the legal loopholes, the little coordination between the State institutions and the little authority of the supervisory institutions to get the most out of it, complying with the law in some cases, but without moral quality in some others, such as health in the oroinos.

Government institutions must have strong links that provide a normative framework with prospects with sustainable development, where the beneficiary is society and not only certain interest groups. The economic benefits of the metallurgical complex operation are multiple, which begin with labor, the purchase and sale of materials and services, the collection of taxes and energy.

Keywords: Doe Run Peru, socioeconomic policy, public health, systemic freedom, La Oroya.

1. Introduction

La Oroya is a city of more than 33,000 inhabitants, located in the central mountain range of Peru, in the department of Junín in the province of Yauli. It is 176 km from Lima and 125 km from Huancayo (capital of the department) and is located at 3,750 meters of altitude.

According (Ramy Wurgaft, 2007) The citizens of La Oroya occupy the sixth position in the ranking of the 10 most polluted localities on the planet, according to a study by the Black Smith Institute in New York published in December 1987.

According to the World Health Organization(WHO, 2019)set a lower limit of 5ug / dl for lead; Above that threshold, a myriad of diseases occur such as anemia, myopia, alterations of the central nervous system, respiratory disorders, decreased hearing abilities, etc.

Studies like that of (Pebe, G., Villa, H., Escate, L., & Cervantes, G., 2008)evaluated 93 newborns RN; the mean blood lead level was 8.84 ± 0.57 µg / dL. 75.3% (70 / NB) had blood lead levels between 6 and 10 µg / dL, and 24.7% (23 NB) had more than 10 µg / dL. Newborns of mothers living in La Oroya Nueva have lower levels of lead than those living in La

 doi:10.20944/preprints202105.0620.v1

Oroya Antigua (p = 0.002). Conclusions. Newborns in the city of La Oroya have high levels of lead in the blood, which is why it is necessary to start prevention programs in pregnant mothers to avoid future damage to the health of newborns.

In an interview(Ramy Wurgaft, 2007)Dr. Hugo Villa Since the foundry passed into the hands of the North American company DOE RUN, in 1997, emissions of gases and heavy metals have increased in gigantic proportions, says the neurologist at the EsSalud hospital, which has been treating patients for 25 years. sick.

In front of it (Renco, 2011), the Renco Group, the main shareholder of DOE RUN, alleges, on the one hand, that it has fully complied with all the obligations imposed by the PAMA, and on the other, that Centromin and the Peruvian government have not rehabilitated the land in the city of La Oroya and its surroundings. . It also points out that the government of Peru has refused to assume responsibility for the claims of the residents of La Oroya regarding the various damages resulting from the environmental contamination produced by the Renco complex, it also alleges that Centromin was subject to lower requirements than Doe Run in relation to the fulfillment of its obligations arising from the PAMA, which constitutes discriminatory treatment contrary to article 10.3 of the FTA

(FIDH, 2013)On April 7, 2011, the Renco Group initiated an arbitration proceeding against the State of Peru, in accordance with the FTA and in accordance with the Arbitration Rules of the United Nations Commission for International Trade Law (UNCITRAL - UNCITRAL). Apparently, the Renco Group claims no less than USD 800 million, claiming to have been the victim of unfair and inequitable treatment, as well as the failure of the Peruvian government to provide full protection and security.

(FIDH, 2013) In August 2011, the companies Doe Run, Fluor Corp and AT Massey Coal, were ordered to pay 358.5 million dollars (38.5 million as compensation for exposure to atmospheric emissions of lead and 320 million for damages) destined to compensate the inhabitants, for damages to their health resulting from lead contamination between 1986 and 1994.

(FIDH, 2013)Subsequently, additional victims were added to the file, so that, currently, 1,760 children from La Oroya, born between 1997 and 2009, have appeared in the case. Doe Run considers that it is the responsibility of the Peruvian State to compensate these victims, based on the 1997 share transfer agreement that stipulates, as explained above, that the State of Peru will assume responsibility for any legal claim derived from the activities of the company during the term of PAMA, that is, "it will hold the Doe Run company harmless against third-party claims, compensation, or obligations for which the State has assumed responsibility and obligations."

(Areli Valencia, 2012)It is estimated that Doe Run has an outstanding debt in Peru of more than US $ 500 million, which includes the completion of the PAMA, administrative fines, unpaid taxes, and debt from creditors. Given this, the Renco Group's demand for financial reparation is more than controversial.

2. Methodology

The metallurgical complex of La Oroya is located at 3,750 m above sea level on the eastern slope of the Andes Mountains, on the banks of the Mantaro River, 176 km east of the Peruvian capital Lima. Due to its location in the Andean highlands and its high altitude, the climate is frigid and rainy. It has a total area of 388.42 km². Where large companies dedicated to mining operate, such as Doe Run Peru, Minera Chinalco, Volcán Compañía Minera, Compañía Casapalca, Austria Duvaz, Argentum, among others

For its analysis, a mixed methodology will be used, the quantitative data are given in the health, socio-environmental data, in

 doi:10.20944/preprints202105.0620.v1

the qualitative, a narrative analysis will be made, with the bibliographic review of applied policies that lead to an economic-environmental structure. social-institutional, represented in a system where equal rights and freedoms are sought within La Oroya.

3. The paradox between health and work

(Areli Valencia, 2012)In the context of drastic neoliberal reforms, the La Oroya smelter was privatized and sold in 1997 to the US company Doe Run Resources Corporation / Renco Group Inc. (Doe Run). Those were years in which, for the first time, environmental regulations were introduced to regulate mining and other extractive activities in Peru. Although technically incipient and in many cases below international standards.

The defense of work, in a community where the majority of the population depends directly or indirectly on the foundry company, it was not difficult for Doe Run to obtain the support of union leaders, municipal authorities and, especially, the workers of the foundry and your families. Based on the needs and economic dependence of people, the company developed its ownsocial network to counter the campaign, foundry workers and their families participated in riots and protests, pressuring government authorities to develop a legal strategy to facilitate the extension of the PAMA. This counter campaign successfully led to the approval of Supreme Decree No. 046-2004-EM, which allowed the possibility of a three-year extension for mining investors to complete their PAMA on their projects.

The extension of the PAMA deeply affected the sentiments of community members who had campaigned tirelessly to promote health justice for La Oroya. A sense of disappointment was also widespread among human rights activists at the level, and eyebrows were raised in the international community, which saw the decision as a "prize for pollution."

4. Structural pathology

In his seminal work, Pathologies of Power, (Paul Farmer, 2003)borrows the term "structural violence" to refer to various forms of violence such as relative poverty, inequality and racism, which represent complex processes of human rights abuses. These forms of abuse are generally the product of economically driven conditions

(Juan Laite, 1978)The main result of the changes that occurred in La Oroya has been the creation of a modern industrial location, characterized by desolation and exploitation, instead of an agricultural environment of towns, communities, and farms.

Critics of dependency theorists claim that external factors alone cannot explain the true causes of the unjust structures of underdevelopment in Peru. Elizabeth Dore rightly points out that barriers to economic growth are varied and incorporate a multitude of factors related to the Peruvian economy and society, such as social structures in mining regions and the nature of production processes. In a similar vein, David Becke suggests that the analysis of "underdevelopment" in Peru focuses "on the national basis of elitism and domination", which can sustain and reinforce such unjust structures.

The capacity of the authorities(CA), is vital as it places people at the center of the evaluation of development and social progress. In doing so, the competent authority does not ask what people want or have, but whether they really can be and do what they value. This means, as Robeyns recalls, that evaluation and policy should focus on what people can do and be, on quality of life, and on removing obstacles in their lives so that they have more freedom to live the kind of life. the life that, after reflection, they have reasons to value

In the political-economic background of the lack of freedom in La Oroya is based onthe strategic importance of the mining industry in Peru that has historically been facilitated by the servile attitude of the

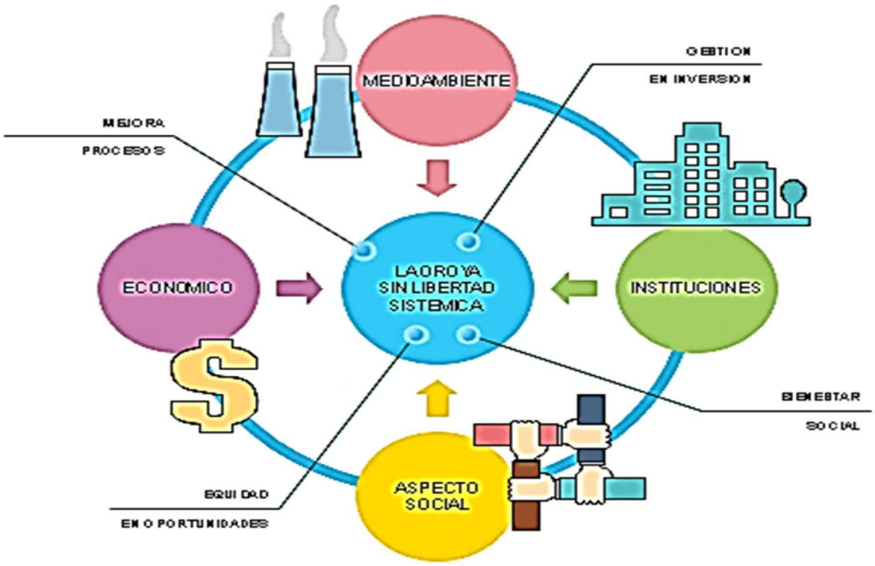
Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 May 2021 doi:10.20944/preprints202105.0620.v1

State towards foreign investment, its strong institutional support (for example, favorable investment laws and favorable tax systems), and above all, its neutralization of the actions of those who want to expose and oppose the systems of oppression and deprivation promoted by this industry. I postulate that these elements of the mining industry in general, and particularly in the context of smelting activities in La Oroya, create an unpromising scenario for those who want to break ties of dependency or resist being submerged in new ones.

The factors that generate the lack of systemic freedom in La Oroya are the problems of uncertainty due to the policy of institutional denial of responsibility for pollution; the inequitable distribution of income in the social issue, the dangersenvironmental and health risks of the Oroinos; that led to clashes between residents due to contradictory interpretations of the contamination.

While all of these issues can certainly convey a recurring pattern of how affected communities cope with and respond to pollution, the case of La Oroya suggests that a deeper investigation of the underlying causes of such patterns may reveal a more complex constellation of factors. interconnected such as the environmental issue, the institutions, the social and economic aspect.

Figure 1 *Lack of systemic Freedom in the context of La Oroya*



Note. Source: self made.

The stakeholder methodology of Mitchell, Agle and Wood (1997), identifying the definitive interest group in order to determine descriptively which interests are considered and which are disregarded in the current management system of the organization.

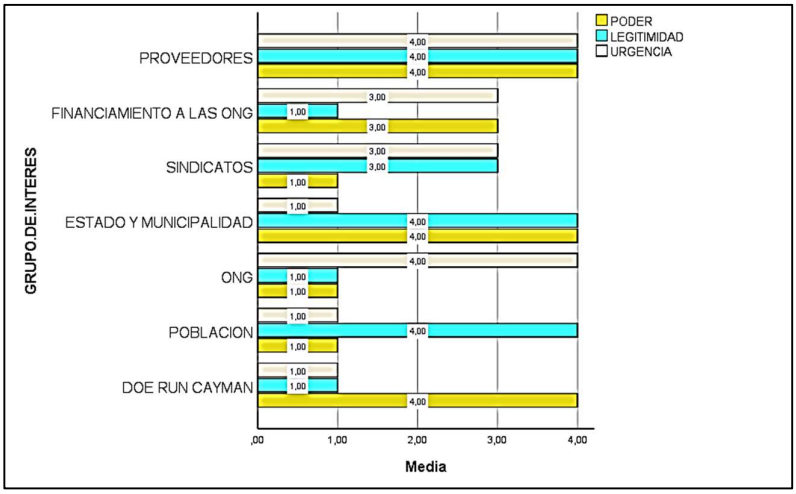
The legitimacy where the value 1 corresponds to the actor's actions being perceived as undesirable and 4 corresponds to the actions being legitimate and highly desirable

The power where the value 1 is assigned to the actor who has very little possibility of obtaining resources and 4 corresponds to the actor who has the facility to obtain material, physical, logistical, financial and technological resources.

The urgency where the value 1 corresponds to non-critical factors, that is, that do not imply losses, and 4 for highly critical factors, which carry losses.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 May 2021 doi:10.20944/preprints202105.0620.v1

Figure 2. *Frequency of the evaluation of the criteria of legitimacy, power and urgency*



Note. (Mendiola A., Aguirre C., Carpio C. Monroy V., Paredes Y., 2017, p. 106) adapted by Israel M.

5. Health impact

(Pebe, G., Villa, H., Escate, L., & Cervantes, G., 2008)When analyzing blood lead levels according to the origin of the Oroya mother, we found that newborns whose mothers came from La Oroya Nueva had lower blood levels (8.39 µg / dL) than those who came from La Oroya Antigua (10.28 µg / dL) (Student's T, p = 0.002). No differences were found between the lead means according to the maternal residence time categorized as 0-5 years,> 5-10 years and> 10 years (ANOVA, p> 0.05).

(International Covenant on Economic, Social and Cultural Rights, 2000)At the international level, in article 12 of the International Covenant on Economic, Social and Cultural Rights, ratified by Peru, which recognizes the right of everyone to enjoy the highest possible level of physical and mental health. The right to health "encompasses a wide range of socioeconomic factors that promote the conditions under which people can lead healthy lives and extends to basic determinants of health, such as food and nutrition, housing, access to clean drinking water and adequate sanitary conditions, safe and healthy working conditions and a healthy environment.

6. Environmental impact

The historical evolution of the original PAMA signed by Doe Run Peru and the Peruvian State for the privatization of the CMLO in 1997. The modifications of the PAMA presented by DRP and approved by Minem are then analyzed.

The La Oroya PAMA proposed by Centromín Peru considered an investment of US $ 129,125,000 before its privatization. By Resolution 334-97-EM / DGM, once the privatization was carried out, the commitment was divided into two parts: Centromín Peru would assume US $ 24.1 million and DRP, as operator of the complex, US $ 107.6 million.

According to the financial statements until 2005, the advance in investments was 66%; This progress, however, was not proportional to the commitments made. The most significant investments had to be made in the last two years of the schedule; As of 2005, only US $ 18,200,000 had been invested, compared to the US $ 38,700,000 assumed.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 May 2021 doi:10.20944/preprints202105.0620.v1

Table 1 *Advance of investments in the PAMA until 2005 compared to the original PAMA of 1997 (in thousands of dollars)*

Proyectos	1998	1999	2000	2001	2002	2003	2004	2005	2006	Total
Planta de ácido sulfúrico	161	248	503	426	2,696	4,010	4,910	1,400		14,354
Planta de tratamiento de agua madre	1,342	20		242	381	511	589			3,085
Planta de tratamiento de aguas industriales	653	2,541	2,783	1,941	2,619	1,544	4,888	8,300		25,269
Manejo de escorias de plomo y cobre	813	1,975	5,990	930						9,708
Depósitos de escorias de Huanchán	230			266	201	358	36			1,091
Depósitos de trióxido de arsénico de Vado	115	300	1,369	627	8					2,419
Remediación del depósito de ferritas de Huanchán				254	1,249	228	373			2,104
Basura y desagüe (1)	250	36	73	424	786	554	504			2,627
Basura y desagüe (2)		8	47	36	50	38	1,375	4,500		6,054
Estaciones de monitoreo	328	234	65							627
Otros nuevos proyectos								4,000		4,000
Total invertido original	3,892	5,362	10,830	5,146	7,990	7,243	12,675	18,200	0	71,338
PAMA original	2,700	3,612	4,963	3,300	3,000	3,800	2,775	38,700	44,725	107,575
	144%	**148%**	**218%**	**156%**	**266%**	**191%**	**457%**	**47%**	**0%**	**66%**

Note Information Center DRP-La Oroya, 2015.(Mendiola A., Aguirre C., Carpio C. Monroy V., Paredes Y., 2017, p. 130)

In the execution of the PAMA project in La Oroya until 2015, most of the projects were executed, and were operating normally. The only two projects that were only completed up to 50% by 2015 are the sulfuric acid plant of the copper circuit and the modernization of the copper circuit, so the entire copper circuit was suspended in 2009, when DRP paralyzed its operations. The most significant environmental project with the greatest environmental impact did not materialize after 12 years of operation under DRP's administration (assuming they operated until 2009). Regarding the environmental impact matrix, we can see that the handling of gases and particulate matter has a rating of 9, as does the extraction of aggregates, which were not met.

Table 2 *Summary matrix of environmental impact*

	CANTERAS		OPERACIÓN DE CIRCUITOS											
FACTORES AMBIENTALES	Extracción de agregados	Carguío y transporte	Preparación de lechos de	Proceso de tostación	Fundición hidrometalúrgic	Moldeo	Refinación	Manejo de Gases y polvo	Manejo de efluentes	manejo de residuos solidos	manejo de efluentes	Manejos de residuos solidos	Total
Clima								X					1
Usos de suelos	X				X			X	X	X	X	X	7
Erosión	X							X					2
Calidad de suelo		X	X		X			X	X	X	X	X	8
Calidad de aire	X	X	X	X	X		X	X					7
Confort Sonoro	X	X	X	X	X	X	X	X					8
Calidad de agua superficial	X				X				X		X		4
Calidad de agua subterránea	X								X	X	X		4
Cantidad de Agua			X	X	X	X	X	X	X	X	X	X	10
Fauna	X	X											2
Hábitats faunísticos			X	X	X			X					4
Flora	X												1
Flora y fauna acuita (hidrobiolog	X							X	X		X		4
Factores con impacto	9	4	5	4	7	2	3	9	6	4	6	3	62
PAMA Ejecutado (%) al 2015	0%	0%	67%	67%	67%	67%	67%	79%	100%	100%	100%	100%	

Note. (Mendiola A., Aguirre C., Carpio C. Monroy V., Paredes Y., 2017, p. 141) *adapted by Israel M.*

7. Boost for the restart of the La Oroya metallurgical complex

The Ministry of Energy and Mines confirmed that it will provide technical and promotional support to the Board of Creditors of Doe Run Peru so that the adjudication of the La Oroya Metallurgical Complex to its workers is carried out within the legal term and as quickly as possible.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 May 2021 doi:10.20944/preprints202105.0620.v1

Figure 3 *La Oroya metallurgical complex*

Note. Source Dipromin (2020), retrieved on June 18, 2020 from: https://www.dipromin.com/noticias/nueva-la-oroya-planes-que-se-contemplan-para-el-complejo-metalurgico-a-arca-del-2021/

The State announced, through the Energy and Mines portfolio, that it will support in the awarding of the La Oroya Metallurgical Complex to its workers and that it will intervene in the procedure of the sale of the Cobriza Mining Unit to an investor who will put it into operation .

According to IGAC, a valuation was given to the metallurgical complex, which includes with the application of the corrective environmental management and without the environmental application, it is detailed in 57.9 million dollars with the application of the management of the environmental instrument and 397.5 million dollars without the application of the management of the environmental instrument. It should be noted that this should include debts to creditors, which in sum are 524 billion dollars.

Table 3 *Valuation of Doe Run Peru*

Valorización del complejo metalúrgico de la Oroya	Con IA (millones $) *	SIN IA (millones $)**
Aplicación del Instrumento Ambiental (IA)	57.87	397.47
Deudas - Créditos laborales y previsionales	15.37	15.37
Deudas - Proveedores PAMA	22.21	22.21
Deudas - Proveedores concentrados	100.92	100.92
Deudas - Acreencias gerenciales	222.50	222.50
Deudas - Crédito especial del Minem	163.13	163.13
TOTAL	**582.00**	**921.60**

* Con la aplicación del instrumento de gestión ambiental correctivo

** SIn la aplicación del instrumento de gestión ambiental correctivo

Note. (Mendiola A., Aguirre C., Carpio C. Monroy V., Paredes Y., 2017, pp. 163-164) *adapted by Israel M.*

Among the objectives of the Ministry of Energy and Mines is basically that the sale of the Cobriza Mining Unit allows it to meet part of the payment of the labor debt and protect the rights of its workers. To achieve the goals, the Minem invoked the peoples and localities of influence to support the objectives set, to achieve the common good throughout the region.

The process for the start of operations, considering that the complex is paralyzed, the first thing that is planned is to start with the maintenance of all the equipment, which will take a month and a half. Subsequently, it will begin with the reactivation of the three circuits to transform polymetallic mineral. It will start with thelead circuit, which is made up of agglomeration plants, foundry, refinery

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 May 2021 doi:10.20944/preprints202105.0620.v1

and sulfuric acid plant. Then, it will go through the reactivation of the zinc circuit, made up of two production lines. The first is the main zinc production line comprising the plants of: TLR roasting (lurgi roaster), sulfuric acid, leaching, purification, electrodeposition, melting and molding; and the second, which is the secondary line, made up of the plants of: ferrite flotation, ferrite fading, hydrometallurgy, indium, zinc dust and zinc sulfate. Finally, it will be decided to reactivate the copper circuit.

We also detail that the refining of the metals in copper, lead and zinc without the Oroya complex is shown in the table below and its percentage variation.

Table 4 *Proportion of refined mineral as of 2013*

	Refined / mine (%)	
Metallic product	**CMLO**	**without CMLO**
Copper	25.36%	20.35%
Lead	45.86%	0%
Zinc	27.02%	23.69%

* CMLO: La Oroya metallurgical complex

Note: Fountain Minen, 2013. Adapted by(Mendiola A., Aguirre C., Carpio C. Monroy V., Paredes Y., 2017, p. 99)

Another of the points that will be reactivated will be the maintenance workshops, equipment repair and preparation of everything that the large mining companies require. He explained that in 2000, the La Oroya complex was maintaining Centromin mines, a state-owned company that grouped mining operations in the center of the country. Along these lines, he said that it has the capacity to serve large-scale mining companies. That is to say, we are going to open the panorama for all the regions of the center, it will no longer be necessary to bring engines, equipment or spare parts to Lima, if not, to La Oroya. The part of workshops for large mining is the north,

The economic impact of the restart of operations in La Oroya will generate an added value of US $ 500 million per year for the export of refined metals. "Currently, the mines in the center of the country export their production in the form of concentrate, which has less value in the market because it includes impurities (such as arsenic) that only the CMLO can clean," he explains. According(The trade, 2015) mentions:

The La Oroya complex, once operational, will demand materials, spare parts and services for US $ 135 million per year (80% of national origin). It will boost the metalworking and industrial sectors.

The CMLO used to bill US $ 160 million in annual sales of zinc, lead and copper to domestic manufacturers.

It will increase the competitiveness of Peruvian mining, by cleaning the minerals that they produce in the center of the country of impurities. It could process some of the ore from the Toromocho mine, which is high in arsenic.

It will make possible the return of the 30 thousand Oroinos that according to the INEI have left the city due to lack of job opportunities. It will initially employ 1,300 workers. But it will generate 16 thousand indirect jobs.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 26 May 2021 doi:10.20944/preprints202105.0620.v1

Figure 4 *The socioeconomic importance of the CMLO for La Oroya*

Note. Own elaboration

8. Conclusions

Seek the development of the society of La Oroya and the central region, in the sense that it implies economic and social development, seeking a balance between both. Due to technological growth, respect and intelligent use of natural resources is now also taken into consideration. The mining industry that is extractive is one of the most important contributors. of economic growth in labor and trade in goods and services. The economy is providing the means to dream, perhaps for the first time, with the prospect of a more progressive society. However, legitimate aspirations for a better life do not justify persistent social blindness to the significant costs to human well-being of achieving such economic growth.

It is proposed to strengthen the legal framework in order to hold private actors responsible in case of damage to human rights and the environment, including the possibility of suspending the activities of companies to prevent damage to the environment and human rights.

Carefully review investment contracts and agreements, as well as free trade agreements, in light of their international obligations in the field of human and environmental rights.

Ensure the protection of human rights defenders and respect the right to freedom of expression and peaceful association for those who protest against the impact of investment projects.

9. Recommendations

Closely supervise the activities of the La Oroya metallurgical complex in order to ensure that the population is not exposed to emissions of harmful substances that exceed national standards, through continuous monitoring of air and water quality in the surroundings of the Oroya. Make the appropriate and quality investments before authorizing any current or future operator of the complex, the resumption of the activity of additional circuits of the metallurgical complex (lead and copper circuits).

The protection of the environment and human rights constitute a key element in any international bidding process, and that no type of exemption or immunity is granted to any new operator. Immediately take measures to rehabilitate the soils of La Oroya, as originally envisaged by the PAMA, and fully and fully comply with the precautionary measures requested by the Inter-American Commission on Human Rights. Initiate a comprehensive epidemiological study in La Oroya to

assess the health condition of the population and provide specialized medical care for those affected by respiratory conditions and contamination by heavy metals, particularly lead, where children should be a priority.

10. Conflict of interests

The authors declare that this article was written in the absence of commercial or economic relationships that could be interpreted as a possible conflict of interest.

11. Expressions of gratitude

The authors wish to thank the reviewers for their valuable comments, aimed at improving the communication, effectiveness, and overall quality of this manuscript.

12. Bibliographic references

Areli Valencia. (2012). Human Rights Trade-Offs in a Context of Systemic Unfreedom: Work vs. Health in the. Oroya: University of Victoria.

Trade. (2015). Learn about the 10 benefits that launching La Oroya would bring. Obtained from https://elcomercio.pe/economia/peru/conoce-10-beneficios-traeria-ipos-marcha-oroya-186979-noticia/

FIDH. (2013). La Oroya Metallurgical Complex - Where investment is protected above human rights. Find information concerning. Retrieved from www.fidh.org

Juan Laite. (1978). Process of industrial and social change in the Peruvian highlands - Peasant Cooperation and Capitalist Expansion in Central Peru. University of Texas Press.

Mendiola A., Aguirre C., Carpio C. Monroy V., Paredes Y. (2017). Prospects for restructuring the La Oroya Metallurgical Complex through an environmental and economic analysis. Esan Editions, 225.

WHO. (2019). Lead poisoning and health. World Health Organization .

International Covenant on Economic, Social and Cultural Rights. (2000). The right to the enjoyment of the highest possible level of health - General Comment No. 14. CDESC.

Paul Farmer. (2003). Pathologies of Power. Paulus Editor. Retrieved from https://books.google.com.pe/books?id=QVkYtgEACAAJ

Pebe, G., Villa, H., Escate, L., & Cervantes, G. (2008). Blood lead levels in newborns from La Oroya, 2004-2005. Peruvian Journal of Experimental Medicine and Public Health.

Ramy Wurgaft. (2007). La Oroya, where children are born with lead in their blood. Oroya: elmundo.es.

Renco. (2011). Renco commences arbitration against Peru in first case under US FTA. Retrieved from http://justinvestment.org/2011/04/renco-commences-arbitration-against-peru-in-first-case-under-us-fta/80. ibid

Renewable Resources at Mines Tracker. (November 11, 2018). Rocky Mountain Institute.