



**UNITED NATIONS
ENVIRONMENT PROGRAMME**



**Analysis of formalization approaches in the artisanal and
small-scale gold mining sector based on experiences in
Ecuador, Mongolia, Peru, Tanzania and Uganda**

Peru Case Study

June 2012

Disclaimer

The designation employed and the presentation of material in this report do not imply any expression of any opinion whatsoever on the part of the United Nations or United Nations Environment Programme (UNEP) concerning the legal status of any country, territory, city, or area, or any of its authorities, or concerning any delimitation of its frontiers or boundaries. Any views expressed in the document do not necessarily reflect the views of UNEP.

The mention of specific institutions or organizations does not imply that they are endorsed or recommended by UNEP, nor preferred compared to others of a similar nature that are not mentioned. The use of information from this publication concerning proprietary products for publicity or advertising is not permitted.

Material in this publication may be freely quoted or reprinted, but acknowledgement is requested together with a reference to the document. A copy of the publication containing the quotation or reprint should be sent to UNEP Chemicals.

UNEP would like to thank the Government of Norway for their contribution to this work. A formalization analysis document of the artisanal and small-scale gold mining sector has been developed by UNEP to highlight critical elements of formalization process for policymakers.

Five case studies were developed as a means to inform the overall formalization analysis. The case studies are available on UNEP's web-site and were developed by the following regional experts:

- Ecuador – Maria Laura Barreto, ARM/MERG
- Mongolia – Patience Singo, Sustainable Artisanal Mining project (SAM project)
- Peru – Olinda Orozco Zevallos and Frederico Cesar Gamarra Chilmaza, Red Social (Peru)
- Tanzania – Samuel Spiegel, Independent Consultant
- Uganda – Jennifer Hinton, Independent Consultant

The case studies represent the views of the identified expert author. The case studies do not imply any expression of any opinion whatsoever on the part of UNEP or the country studied.

TABLE OF CONTENTS

1. Introduction	4
i. General Characterization of ASGM in Peru	4
A. Overview of the Sector	4
2. Mercury and Other Environmental Impacts of ASGM	7
i. Brief assessment of mercury use and other environmental and social impacts.....	7
ii. National and international initiatives.....	8
3. Key Issues in the ASGM Legal Framework and Lessons Learned	10
i. Mining framework that applies to ASGM.....	10
A. Mining titles.....	10
B. Types of business entities to perform ASGM operations	11
C. Transfer of rights and mining titles upgrades.....	12
ii. Environmental legal framework.....	12
iii. Relationship between small-scale and large-scale mining	16
4. Key Issues of Institutional Aspects and Lessons Learned	18
i. State function and initiatives in the formalization of small-scale mining	18
A. Ministry of Energy and Mines and other executive government institutions.....	18
B. Distribution of responsibilities at the Provincial and Municipal levels.....	20
ii. Role of miners' organizations.....	20
iii. Role of academic, research, and technology centres.....	21
5. Economic Instruments IN the Formalization of THE ASGM Sector	22
i. Fiscal systems and their role in the gold production chain	22
ii. The Role of credit mechanisms and lessons learned	25
iii. Role of ethical market initiatives.....	26
6. Conclusions and Recommendations	27
7. References	30
8. Bibliography	32

1. INTRODUCTION

i. General Characterization of ASGM in Peru

A. Overview of the Sector

In Peru, Artisanal and Small-scale Gold Mining (ASGM) is an ancestral activity that experienced a great surge beginning in the 1980s because of the political and social conditions endured in the country during that decade marked by subversion and internal war, economic crisis, abandonment of rural areas, and migrations.

Artisanal and small-scale mining is mainly of gold, though occasionally there are small groups dedicated to copper, driven by high international prices for that metal, but who return to gold when copper prices drop.

The workers' need for immediate employment initially defines the individual, informal, and temporary nature of artisanal miningⁱ. The later arrival of women with children and the establishment of families will determine the change from camp to mining settlement to mining village.

Artisanal mining is characterized by low-cost investment in basic technology, such as chisels, picks, crowbars, wheelbarrows, etc. Intensive use of labour without measures to safeguard safety, health, or the environment, in addition to a total absence of the State from the mining areas, further defines its context. In both the extraction and the processing phases, the use of mercury stands out as a danger.

In the 1990s this sector began to evolve towards associative production, with the advent of producer associations and community-based enterprises or cooperatives. Their major objectives were to defend and safeguard their work fronts and labourers against invasions and to meet the basic needs of miners' settlements. Among the companies created in 1998 were the Sociedad de Trabajadores Mineros (SOTRAMI), the Comunidad Aurífera Relave (AURELSA) in Ayacucho, and the Victoria Mining Company in Arequipa. These companies were formed under the general regime of the Mining Law of 1992.

In 2002, thanks to the push given by artisanal mining leadersⁱⁱ and the support of the international players involved in the GAMA Project (Gestión Ambiental en la Minería Artesanal), official recognition of the sector was attained through the promulgation of Law 27651 "Law of Formalization and Promotion of Small-scale Mining and Artisanal Mining" and its regulation.

In the light of this law the consolidation of these organizations into companies started to take place and new entrepreneurial or associative organizations arose with the objective of:

- Working legally in concessions belonging to third parties;
- Accessing their own mining claims;
- Avoiding abuses by medium-scale mining companies and defending their own rights;
- Consolidating the work of their associates;
- Improving the technique of their mining work;
- Acquiring training and cleaner and more efficient technologies for processing;
- Collectively addressing the problems of the mining community.ⁱⁱⁱ

Hence, at present many of these mining organizations have their own petitions, have obtained the ownership of the claims and/or have signed formal contracts with the concession title owners. This sector continues to work, however, mostly informally in third parties' concessions without contracts and in concessions of individuals or private medium-sized companies. In some cases they work with

the consent of the mining title holder, to whom they pay a royalty. In other cases they have trespassed against the will of the legal owner.

General characteristics of this sector include the following:

- Exploitation of small magnitude deposits. Artisanal mining exploits low-thickness veins which would not support a mechanised modern investment.
- Immediate economic return.
- Little initial investment.
- Economic revenue higher than in other occupational sectors.
- Uses labour-intensive techniques.
- It is developed in remote locations with difficult access.
- Scarce training and scarce environmental education.
- An illegal market exists for input procurement.
- There also exists an illegal market for the various products that are marketed (ore, tailings, amalgam gold, coal gold).
- Unacceptable environmental practices associated to the intensive use of mercury.^{iv}

Through the work of Red Social^v three categories of ASGM can be identified in Peru.

1. A modern entrepreneurial formal sector of small mining and artisanal mining with its own claims or exploitation contracts, managed with a long-term vision, with professional technical development, and with mine production and processing work conducted with clean technologies. This sector has eliminated the use of mercury, and has substituted cyanidation; in addition, it has attained compliance with the respective environmental licences and with tax and labour obligations demanded by Peruvian legislation.
A great achievement of this sector is having managed to gather all of the production processes into its own hands, up to the manufacturing of the gold bar.
2. A sector in the process of formalization, in permanent negotiation with the holders of the claims where they have their work. These miners have been developing several strategies to become formalized but find significant obstacles.
3. A mostly informal sector, predominantly of artisanal mining.

We maintain that the process of formalization begun with Law 27651 regarding the formation and management of companies, together with the use of cyanidation technologies in gold processing have produced the most successful cases of formal small-scale and artisanal mining.

One of the most important characteristics of this sector is its intensive use of labour. Small-scale mining is made up of two strata: “Small-scale Mining” and “Artisanal Mining”. Though there has not yet been a general census of the sector, it is estimated^{vi} that 81,000 persons in artisanal mining and 4,000 persons in small-scale mining are working in the extraction of gold. It is important to highlight that 300,000 people depend directly or indirectly on this activity. In 2009 artisanal mining produced 28,700 kg of gold and small-scale mining produced 4,700 kg of gold.

The departments of Madre de Dios and Puno host 42.74% of artisanal mining workers with a fine gold production equivalent to 44.04% of the total gold production of this sector. Likewise, the departments of Piura, La Libertad, and Arequipa have 25.93% of workers and 25.37% of gold production. Lima and Ayacucho have 10.52% of workers and 10.31% of gold production, and the remaining departments share the rest in smaller proportions.

The yellow areas on the map (Figure 1) identify those departments with the greatest concentration of ASGM.



Figure 1: Areas of Greatest Concentration of ASGM in Peru

The following chart shows the level of fine gold production in the years 2000 to 2009 by stratum and, in particular, the contribution of small-scale mining and artisanal mining.

PERU	Gold Production (2000-2009) TM Oro Fino										TOTAL
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2000-2009
National Total Production	13.3	138	158	173	173	208	203	170	180	201	1,737
Medium and Large scale Mining	116.2	139	139	153	149.8	181.1	175.9	141	151	167.6	1496
Small scale Mining	0.3	0.3	0.3	1.0	1.2	1.9	2.1	3.0	3.0	4.7	18
Artisanal Mining (Veins plus tailing ponds)	16.5	18.7	19	19	22.0	25	25	26.0	26.0	28.7	224

Reference: Medina, Arevalo, Quea

According to the chart, in the year 2000 artisanal mining (12.41%) and small-scale mining (0.22%) represented nearly 12.63% of the total gold production in Peru. Also, it is observed that small-scale mining (Small-scale mining and Artisanal mining) has grown during this period at a greater rate than have medium-scale mining and large-scale mining.

These data demonstrate the great potential of small-scale mining for contributing to job generation, poverty reduction, local development, obtaining of foreign currency resources and fiscal revenues, while being able to coexist with conventional mining as an activity that can be developed in a sustainable manner and that contributes to national development.

Participation of Women in Artisanal Mining

Artisanal mining operations often involve women in different stages of the production process.

- Supporting tasks related to ore transport from the inside to the outside of the mine.
- Processing of the ore in *quimbaletes*^{vii} for the amalgamation of gold with mercury.
- Ore sorting, or *pallaqueo*, conducted only in vein mining. Valuable minerals are collected and mining waste is sorted for later processing and sale. For women it represents an earning opportunity in artisanal mining villages.

In the middle south, these *pallaquera* women have joined together with the initial aim of better organizing this work by groups, shifts and schedules.

Standing out among these organizations are the Association of Ore Sorters or *Pallaquera* Women of Santa Filomena, “Nueva Esperanza” (“New Hope”) in Sancos-Ayacucho, and the Association of Ore Sorters of Cuatro Horas in Chaparra – Caravelí – Arequipa with 150 members each. These associations have accomplished agreements with SOTRAMI and MACDESA companies respectively in facilitating the disposal of the ore and providing security during its sorting.

2. MERCURY AND OTHER ENVIRONMENTAL IMPACTS OF ASGM

i. Brief assessment of mercury use and other environmental and social impacts

Small-scale and artisanal mining use mercury intensively to recover extracted gold, thus polluting air, soil, and bodies of water, and so damaging the health of humans and ecosystems.

The use of mercury in the amalgamation process, given its relative effectiveness (no more than 50% is recovered) and low cost, is the most widely used method in Peru, preferred and applied by Peruvian artisanal miners and gold washers who conduct operations either in primary deposits (veins) or in secondary “placer” deposits in several districts.

According to a recent study by the Amazon Research Institute and the Ministry of the Environment, UNEP has classified artisanal and small-scale mining of gold as the second-largest source of mercury emissions to the global atmosphere contributing an estimated 18% of the total emissions from all sources.

At present in Peru this mainly informal artisanal mining activity is performed under inadequate working conditions lacking technical supervision and environmental stewardship both in the stages of amalgam preparation and in the stage of burning or “refogado”.^{viii}

The National Health Institute^{ix} in Peru states that there are few sources of information regarding mercury emissions. According to this study^x, the regulation existing since 1996 covers only the maximum levels of emissions of lead, arsenic, and carbon dioxide. No source is obliged to measure gaseous emissions of mercury.

Alluvial Mining

The evidence of excessive use of the heavy metal mercury in gold extraction, and of its devastating environmental impacts, has been appearing mainly in the Madre de Dios region.

The study by the Ministry of the Environment^{xi} calculates that there are over 30,000 miners operating each time with heavier and more sophisticated equipment, such as front-end loaders, trucks and dredgers of various sorts. It indicates that 99% of mining operations are informal and that more than 1,546 mining claims overlap protected natural areas, in buffer zones and in indigenous peoples’ lands. It is calculated that these operations have destroyed over 32,000 ha (79,072 acres) of forest and have seriously contaminated several rivers of the Madre de Dios region with mercury and other pollutants.

Likewise it is estimated that in this region between 16,000 and 18,000 kg of gold are produced per year. Experience indicates that for every kg of extracted gold some 2.8 kg of mercury are used. It is calculated that during the past 20 years more than 3,000 tons of mercury have been dumped into Amazonian rivers.^{xii}

It is important to point out that in the case of Madre de Dios the mining is no longer small-scale but medium-scale.

In this sense, environmental impacts are much more complex and profound. A typical mining operation will first deforest the zone that they intend to use; later they remove the soil, causing large cliffs; then they move the sands through pipes, where the gold remains. Hence black sands are left over which are deposited over areas with vegetation, killing any vestige of plant and animal life. In

the same fashion, the dredgers, or so-called *carrancheras*, etc. (machinery that removes river banks), produce great pollution in bodies of water by depositing solid waste in suspension which destroys the life in water bodies.

This whole operation is carried out without any impact mitigation practice, nor with any reforestation, and even less with practices to avert dumping solids in suspension into bodies of water and, as mentioned above, with an irresponsible use of mercury.

Vein Mining

In the case of the artisanal underground mining that is conducted mainly on the coast and on the mountain range, the most severe environmental problems of mining work are:

- Silicosis, due to the lack of personal protection equipment.
- Gas poisoning, from inhaling toxic gases produced by explosives and/or fumes emanating from the deposit because of the lack of adequate ventilation, ignorance of and/or irresponsibility in applying the norms of mining security and hygiene.
- Ergonomic damage in miners, owing to working under inappropriate conditions, such as small underground pits, with insufficient tools for the volumes moved, among others.

In processing work the main source of contamination is mercury, given that it is the most widely used method for extracting gold from low-grade ore. The sources of contamination are: direct contact, exposure to tailings containing mercury, and mercury inhalation during the amalgam burning or *refogado*.

The risk of contamination affects not only the artisanal miners who are burning the amalgam in their own homes but also members of their families. A study^{xiii} in the mining community of Mollehuaca revealed that 62% of the 102 villagers studied showed mercury measurements exceeding the values of reference. Moreover, in these mining villages of the Middle South it is common to encounter chronic symptoms such as high sensitivity to light, bleeding gums, colic, vomiting, kidney and neurological pathologies.

In some artisanal mining communities a change has started to take place, mainly within formalized activities, because they are using the cyanide leaching processing primarily in ponds and in very few cases with agitation tanks. For cyanidation to be profitable it has to be conducted with larger volumes of ore (40 tons and above), therefore starting from the extraction of the ore, this work has to be performed in association, as opposed to working with mercury, which can be used with smaller quantities of ore. Different environmental impacts of the use of cyanide are found:

- The manipulation of this substance must be performed by highly trained personnel.
- Personal protection implements are not in general use, but should be.
- The tailings leach pads do not comply with the required technical norms, for instance: the ground has not been made waterproof and neutralization is not as exhaustive as it should be.
- In addition, special attention is required in heavy rain zones, where very strict decontamination measures should be considered.

ii. National and international initiatives

Diagnosis studies conducted by the Ministry of Energy and Mines of Peru (1994) determined that there should be a free distribution of retorts and mercury reactivators as a measure to reduce and control the impact of the use of mercury in ASGM.

The artisanal and small-scale mining project, MAPEM, implemented the program that consisted of:

- Adapting models of retorts (of several sizes, locally manufactured, easy to use, and low cost) to the different needs of users and with prior quality control.
- Spreading knowledge of the rules of safe use of mercury, as well as instructions to operate the retorts properly.
- Spreading knowledge of the major symptoms of poisoning by the incorrect handling of mercury, emphasizing its gradual and irreversible effects.

The implementation of retorts for mercury recovery sponsored by the Ministry was satisfactory in the Madre de Dios zone and mediocre in the zone of Ica – Ayacucho – Arequipa and Puno, respectively. The use of retorts increased from 1.9% in 1995 to 60% towards the end of 2000 in Madre de Dios and only 2% in 1955 to 8% to 10% by late 2000 in the remaining zones of the Project.

Barriers to the implementation of retorts can be traced, among others things, to the following causes^{xiv}:

- Magnitude of operations, adopting the wrong criterion that burning “a little amalgam” causes “little damage”, without considering its cumulative effects.
- Cost of energy used in burning the amalgam and time spent in that task.
- The modality of commercializing by colour. Miners give several explanations, some point out that gold turns black; others believe that gold evaporates; others blame it for the gold turning green. This factor is important in commercialization because the buyer takes advantage of those arguments to lower the price of gold.
- The category of the deposit and occurrence of gold: “vein gold” or “washer gold”.

Results obtained in the zones of Ica – Ayacucho – Arequipa and Puno showed that other strategies were required. The so-called “communal retorts” or “*refogado* centers” were adopted. The communal retorts do not represent a significant technological innovation, but rather practical equipment and models bringing tangible results (economic and environmental). They had greater acceptance by users given that these are installations that allow for the burning of amalgam in an open cycle, either by the producer himself or by an operator supervised by him.

This type of technology was implemented by the GAMA Project from the Swiss Agency for Development and Cooperation (SDC) which equipped 15 artisanal miners of the Middle South in 2004. An example of this project’s success is seen in the case of the artisanal Miners Association of Cerro Rico, a central base that recovers 30 kg of mercury on average per month.

It is important to highlight that Law 27651 (2002) that proposes a legal framework for the demand of formalization has been a determining factor for organizations to be in search of cleaner and more efficient ways of processing. Among the clean technologies that small-scale miners are adopting are gravimetric tables, magnetic concentrators, and Knelson concentrators (pressurised water injection), that produce a high concentration to which mercury or cyanide is added in a much lower proportion.

Another approach has been to take the technical experience of large-scale mining and adapt it to small-scale mining. These formalized organizations have developed cyanide leaching processes as an alternative to mercury, as it is cleaner and more efficient, provided that it is conducted in compliance with technical dispositions. This alternative eliminates the use of mercury. Cyanidation recovery can in some cases achieve values of around 90%. This experience has been adopted in the three organizations that are in the process of Fairtrade and Fairmined certification with very good results.

To accelerate the reduction of the use of mercury in ASGM it is recommended that the State develop public policies with the following aspects:

- ✓ Ample dissemination of information regarding the negative effects of mercury pollution on people and the environment.
- ✓ Dissemination of information regarding the technical norms for the correct use of mercury and the use of efficient recovery retorts. Application of these norms should be compulsory.
- ✓ Making available to miner/producers mercury-free processing techniques that are also more efficient in gold recovery: gravimetry, concentrating tables, cyanidation, magnetics. Promoting awareness that the handling of dangerous chemical substances, such as cyanide, be conducted by technically trained personnel.
- ✓ Preparing legal regulations for the control of mercury commercialization.
- ✓ Quantifying the use of mercury in ASGM, emissions, and discharges.
- ✓ Establishing norms to measure gaseous emissions of mercury in metallurgical operations.

3. KEY ISSUES IN THE ASGM LEGAL FRAMEWORK AND LESSONS LEARNED

i. Mining framework that applies to ASGM

The General Law of Mining^{xv}, promulgated in 1992, did not contain any disposition, nor did it recognize the existence of small-scale mining nor of artisanal mining.

The exploitation of mineral resources in the country is carried out through the entrepreneurial activity of the State and of civilians through the concessions regime,^{xvi} except for exploration and prospecting, which do not require a mining title.^{xvii}

Law 27651, promulgated in 1992, “Law of Formalization and Promotion of Small-scale Mining and Artisanal Mining”, outlines the norms and conditions for this sector, as well as its obligations and rights. Most importantly, it establishes objective parameters for ranking miners as small or artisanal producers.

The legal acts to be taken into account are, in chronological order, the following: the General Law of Mining of 1992; the Political Constitution of Peru of 1993, and the Law 27651 of 2002, “Law of Formalization and Promotion of Small-scale Mining and Artisanal Mining”, with its regulation and other modifying and complementary dispositions.

A. Mining titles

The introduction of the General Law of Mining states that: “The State protects and promotes small mining and artisanal mining, as well as medium-scale mining, and it promotes large mining”^{xviii}. Then, it establishes in an objective manner the terms which should be taken into account to rank a miner either as a small-scale mining producer or as an artisanal mining producer, taking into account the extension of the mining concession and its processing capacity.

Small-scale mining producers are defined as those who:

1. Possess any title for up to two thousand (2,000) hectares (4,942 acres).
2. Possess any title for an installed capacity of production and/or exploitation of 350 metric tons per day, with the exception of placer gravels of gold and detrital heavy metals in which the limit will be an installed capacity of production and/or exploitation of up to three thousand (3,000) cubic meters per day.

Artisanal mining producers are those who:

1. As an individual or set of individuals or legal entity is fully employed in the exploitation and/or direct production of minerals, performing their activities manually and/or with basic equipment.
2. Possess any title for up to one thousand (1,000) hectares (2,471 acres) or have signed agreements or contracts with mining title holders according to what the regulation in the Law establishes.
3. Possess any title with an installed production and/or processing capacity of 25 metric tons per day, placer gravels of gold, and detrital heavy metals in which the limit will be an installed capacity of production and/or processing of up to two hundred (200) cubic meters per day.

This legal device, in force since 2002, has been used to gradually formalize ASGM, with 66,622 concession titles existing as of March 2011, many of which involve several miners organized as legal entities.

And yet, sectors interested in delaying this process have convinced the Executive Power to submit a bill of law with an urgent nature to Congress which would reduce the artisanal mining producer's holding from 1,000 hectares to 200 hectares and would lower the daily production capacity from 25 metric tons per day to 15 metric tons per day. This bill is currently at the Mining Commission of Congress, and guild organizations of the sector, such as SONAMIPE, have voiced their opposition to it.

Were this bill of law to pass, it would mean greater difficulty for the formalization process. Those having more than 200 ha (494.2 acres) would be transferred to the general regime of the Mining Law and hence the amounts they would be charged for rights of operation, fees, fines and penalties would rise, they would face greater environmental demands, greater minimum production, and costlier and more exacting supervision.

This amounts to a mechanism for these miners to lose their concessions as they cannot meet those conditions. It also works against the informal artisanal miner because by imposing small concessions, it would no longer be profitable to create community-based entrepreneurial organizations. Successful formalization experiences have occurred precisely in situations in which miners were able to organize in companies, production cooperatives, mining associations, or any other form of productive organization permitted by the General Corporate Law.

B. Types of business entities to perform ASGM operations

The exploitation contract is a new form of mining contract that the Law 27651^{xxix} introduced which establishes the contractual modality as one of the formalization alternatives for the artisanal miner. It consists of the agreement between the holder of a mining title (provided that such individual is not an artisanal miner)^{xxx} that authorizes individuals or legal entities to perform artisanal mining in all or part of their mining concession, in exchange for compensation in money or in mineral.^{xxxi} These contracts should be registered in public mining registries and the responsibility for environmental violations shared between the title holder and the artisanal miners.

The creation of legal entities with the purpose of becoming holders of a mining concession has provided a boost to the process of formalization, given that mining is a productive activity and it is necessary to undertake it from within a for-profit organization.^{xxxii} Associations are different in that they are not-for-profit entities, generally created with the purpose of representation and defence, and are not appropriate for productive activities.

The mining concession can be granted to an artisanal mining producer who can be:

- An individual.
- A set of individuals. In this case they can request a mining petition and the Ministry of Energy and Mines gives them a term to create a legal entity; if they do not accomplish that,

the corresponding ministry defines them as a Mining Association of Limited Responsibility and continues with the titling process.

- Legal entities created by individuals. Legal entities can be constituted which are considered by the General Corporate Law, that is to say, associations by shares can be formed (closed corporations, or publicly traded corporations) and Associations of Limited Responsibility, the limitation being that they should be made up of individuals.^{xxiii}
- Mining Cooperatives.^{xxiv}

C. Transfer of rights and mining titles upgrades

The artisanal mining producer can make a cession or transference of his/her concessions to other artisanal miners. But if he/she transfers his/her concessions to another title holder who is not an artisanal mining producer the former will lose his/her artisanal mining ranking.

Other Relevant Requirements

There are several limitations and conditions to become entitled to the ranking of small producer and artisanal mining producer. The most important are:

1. **Adjacent provinces:** artisanal mining may have up to 1,000 hectares as the Law stipulates, but these should be in a single province or in adjacent provinces.^{xxv}
2. **Minimum production:** the artisanal miner is obliged to attain a minimum production by the tenth year of a value equivalent to 5% of the UIT^{xxvi} (the value of the UIT is 3,600 soles, approximately US \$1,285) per year and per hectare. As an example: for a concession of 1,000 ha, the minimum production per year that must be accredited is 180,000 soles (equivalent to US \$64,285).
3. **Registration as an artisanal miner and a small-scale miner:** “The condition of small-scale mining producer or artisanal mining producer will be accredited by the General Director of Mining through a biannual sworn declaration”.^{xxvii}

ii. Environmental legal framework

The Political Constitution of Peru establishes that natural resources are the heritage of the Nation and that the State determines the environmental policy and promotes the sustainable use of its natural resources. The State is also obliged to promote the conservation of biological diversity and protected natural areas and promotes the sustainable development of the Amazon.^{xxviii}

Holders of mining titles are obliged to perform their work with systems, methods, and techniques compliant with the mining safety and hygiene and environmental sanitation in force. In the General Law of the Environment No. 28611, the rights and principles ruling the State’s environmental policy are established.

Environmental Licences and Other Instruments

In Law 28611, norms are established about a wide variety of environmental topics, applicable to all the mining strata. The role of the State in environmental issues is defined, national policy on the environment guidelines are established, as is the National System of Environmental Impact Management. Rules for the preparation of environmental impact studies, the programs of environmental adequacy and stewardship (PAMA), and the plans for mine closures are outlined. The criteria for the Standard of Environmental Quality (ECA), and the Maximum Allowed Limit (LMP) (all acronyms by their Spanish initials)^{xxix} are defined.

An important aspect of this Law is that it takes into account the mechanisms by which the citizen has a right to receive environmental information, and most of all has the right to participate in the approval of environmental licences.^{xxx}

For the development of a mining activity it is necessary to apply for an Environmental Licence, for which approval is received from the Regional Government in the case of small miners and artisanal miners.

Initially, the appropriate authority classifies the project according to its magnitude and establishes the category to which it belongs and the corresponding environmental study which should be presented. These categories for ASGM are the following:^{xxxi}

- Category I – Declaration of the Environmental Impact (DIA) for projects which do not generate negative environmental impacts of a significant nature. The majority of studies for artisanal mining fall into this category.
- Category II – Semi-detailed Environmental Impact (EIA) for projects with moderate environmental impact, the effects of which can be controlled easily. Some small-scale mining projects and artisanal mining projects are in this category.

The difference between categories lies in the depth of the study and the degree of specific detail that the project should have, but the studies in all categories should address the same topics and the standards of the maximum allowed limits are the same. All of the studies should have a social, environmental, and geological baseline, a description of the mining project, measurements of the environmental impacts, and detailed plans for participation by the community. Also, they should describe the plans for mitigation and remediation of these impacts, the corporate social responsibility actions, the manner of permanent environmental monitoring, and a procedure for mine closures.

In the case of small-scale mining whose projects are generally in Category I, requiring the submission of the Environmental Impact Declaration (DIA), there is a pre-existing form which should be completed by a competent professional. In contrast, the environmental studies required by Categories II and III should be carried out by a team of multidisciplinary professionals.

The mining company's prior ranking and the approval of its assertions and environmental impact studies are in the charge of the Regional Directors of Mining, and that is where some difficulties are found. There are considerable differences between regions and in the rates that they charge for the right to legal processing (from 360 soles in Arequipa to 1,600 soles in Ayacucho). In addition, there are no objective criteria to determine into which category of study it should be submitted; relying on the subjective criterion of the officer leaves the process open to wrongdoing. Afterwards it undergoes a series of objections, which in many cases are arbitrary. Finally, the bureaucratic process is slow and tedious.

It is important to underscore that even though, as we have pointed out earlier, there is no specific legislation for the use and management of mercury or cyanide, it is in the environmental studies that the management, use, and disposal of those polluting substances should be described thoroughly to ensure the study's approval.

Pollution Control Measurements

Use of mercury and control measurements

The commercialization and use of mercury is not regulated and it can be legally acquired and also bought from informal sellers who travel to the town or mining camp to sell it.

The emissions of solid, liquid or gaseous waste, which can pollute the continental or maritime waters of the country are quantified. The Maximum Allowed Limits of mercury for Class I and II are ^{xxxii}: 2 mg/m³; Class III: 10 mg/m³; Class V: 0.1mg/m³; and Class VI: 0.2 mg/m³. For workplace determinations the occupational regulation is used: 0.001mg/m³ NIOSH.

The Ministry of Mines has published a guide for the use of mercury in small-scale mining, but due to the lack of a legal disposition, it is up to miners themselves to become aware and change their practices. Its application should be legally enforceable for stricter compliance, extending the environmental capacities and competencies of local governments to monitor those aspects in coordination with the Regional Government and other environmental authorities.

Recently in the Madre de Dios region a series of problems related to the use of mercury by medium- and large-scale mining activities has generated a debate about illegal mining and rekindled discussions of what is ASGM and what is illegal mining.

Operations in River Beds: The Case of Madre de Dios

In the Madre de Dios region informal mining operations have been conducted with a painful environmental balance for several years. This has become one of the areas of great deforestation in the country, with great alterations in the shape of soils, discharge of black sands causing the deforestation, much mercury pollution, and an increase of solids in suspension in the rivers. Additionally, waves of migrants come in and establish themselves in settlements in the worst living conditions in exchange for an income that they cannot find in another activity.

There are about 3,000 miners holding titles among small-scale and artisanal miners who do not have environmental licences; added to them are thousands of workers (estimated between 15 and 20 thousand miners). These title holders have allowed for the entrance of “partners” that through large investments have deployed machinery to move large volumes of mineralized material (it is calculated to be about 450 m³ per day) and they are causing a great environmental assault. The largest pieces of machinery are the dredgers, which move volumes that are above the limits of the ranking of artisanal miners and small-scale miners.

Confronted with this situation, in February 2010 the Government, upon the urging of the Ministry of the Environment, issued the Urgency Decree No. 012-2010 with the following actions:

- 1. Suspension of new miner petitions.*
- 2. Establishment of mining exclusion zones.*
- 3. Prohibition of the operation of dredgers and similar machines in rivers.*
- 4. Strengthening of regulation about where mining can be carried out with a prior environmental licence.*
- 5. Recovery of zones degraded by informal mining in the charge of the Ministry of the Environment.*
- 6. Support to the Regional Government in complying with its functions in relation to small-scale mining and artisanal mining.*

This decree had a 12-month term. Under the authority of this device 12 dredgers were confiscated in police and military operations with a significant display of force. The Miners’ Federation, backed by the owners of the dredgers, organized an ineffective strike.

On February 4th, 2011, the Government extended the term of the measure for an additional 12 months. Another police-military operation was carried out, resulting in the seizure of 19 more dredgers. In other regions dredgers continue operating stealthily.

The use of cyanide and control measures

Sodium cyanide is not a regulated product either, therefore its sale and commercialization is free all across the country. Cyanide is a very effective substitute for mercury given its greater gold recovery rate which can reach from 90% to 95%.

To install a plant that uses cyanide, either of ponds or of agitated leach, a concession for exploitation has to be requested and an environmental study must be presented (semi-detailed Declaration of Environmental Impact) as determined by the corresponding classification given by the authority according to the environmental impacts of the project.

The dangerous nature of cyanide – a slight error may cost the life of the operators and other persons in proximity – requires responsible handling and management by a qualified technician with adequate equipment. To dispose of it safely it is necessary to build a tailings pond, the base of which should be covered by a geomembrane to prevent leaking to the ground. The tailings should be oxidised by adding hydrogen peroxide, which decomposes cyanide and converts it into cyanate. There is no regulation on the use of cyanide.

Other Relevant Requirements

Social licence and participation by communities

Small-scale mining is required to have a social and environmental licence and when it has displayed poor practices that has caused conflicts. Communities neighbouring the mining projects are propelling changes in public policies and environmental legislation against bad mining practices and unacceptable pollution levels with legal actions and protests. These actions are much more effective when they have the support of the government. For instance, in the case of the artisanal mining cooperatives of the Ananea in Puno, which were denounced for polluting the Ramis River, the only tributary of Lake Titicaca, the Ministry of Energy and Mines stopped those operations so their practices and impacts could be remedied.

An important characteristic of these changes is related to the participation of communities in the environmental impact studies. The State approves the study of Environmental Impact but the communities have the right to make observations of what the company should correct in order for them to get approved. Communities can participate throughout the process of elaboration, approval, and application of the environmental monitoring.

Mine closures

“Mine closures” refers to the set of activities with the purpose of fulfilling the environmental and social objectives of the closure of a mining project. It includes the dismantling of installations, physical and chemical stabilization, soil recovery, revegetation, and rehabilitation of aquatic habitats. The starting point is a plan for initial closure, then a final plan is arrived at according to the changes in activities and the impacts, which will require constant updating. Its norms are established by Law 2809 and its regulation.

It should consider:

- ✓ Temporary closure activities
- ✓ Progressive closure activities
- ✓ Final closure activities
- ✓ Post-closure activities

Medium-scale and large-scale mining operations are required to open a bank account into which they are to make regular deposits as instalments towards the cost of the mine's closure. This requirement is not demanded of small-scale mining (small and artisanal miners), who in their study of environmental impact (DIA or EIA) indicate the steps to follow for closing the mines of each project.

The process of mine closure is initiated at the start of the exploitation when it is decided which method of explosive mining will be used, and a continuous process of exploitation and closure is established. In the case of alluvial deposits, clear measures for mine closures are not yet established for environmental impact studies to be approved and for miners to be able to complete their formalization process.

Use of Explosives

Authorization for the use of explosives is obtained from the Director of Control of Services of Security, Arms Control, Ammunition and Explosives of civil use (DICSCAMEC).^{xxxiii}

The authorization establishes the number of explosives that the miner will use during the year, according to a technical report prepared on the work to be performed, plus the Study of Environmental Impact and the certificate of mining operation. There has to be coherence among the environmental impact studies, the research work conducted, and the labour engaged with the monthly advances that are declared to the Ministry of Mines (Estamin) and with the sales of gold and their tax declarations.

iii. Relationship between small-scale and large-scale mining

The developing relationship between small-scale and medium and large-scale mining operations is being reflected in legal devices, such as in the case of exploitation contracts; however, there are still some aspects requiring greater regulation, such as that of commercialization.

The most frequent forms of relationship among the various scales of mining operations are:

- In Law 27651 (2002), it became possible for an exploitation contract^{xxxiv} to be signed between a mining title holder and artisanal miners (as was mentioned earlier in this document), this contract being one of the ways for the artisanal miner to become formalized. In spite of having been in force for several years, it has not been used much yet, mainly because of the lack of trust on the part of medium-sized companies to sign those contracts with artisanal miners, and also due to the lack of knowledge of the Law and of the benefits of formalization on the part of artisanal miners. This situation has led to having, in many cases, private or *de facto* agreements, but without giving them the form of an exploitation contract.
- When the mining company negotiates with the community the use of the above ground terrain and the measures of social responsibility, and in addition some community members practice informal mining in this concession, then as part of the agreement with the community the formalization of these miners is considered.
- The medium-sized mining companies having a processing plant buy their mineral from miners, formal or informal, in onerous conditions. They may apply a lower gold content than the real one, have lower recovery rates, and exaggerate contract manufacturing costs (*maquilas*),^{xxxv} which can reach as much as US \$400 per metric ton, abusing their control of the market and of the fact that the majority of small-scale miners are informal.
- Some of these companies support informal miners who participate in invasions of third-party concessions providing input in exchange for the mineral being sold to them. They supply them in advance with explosives, water, and fuel, all of which is settled when the mineral is sold. The cost of freight is also discounted at the moment of sale.

Two particularly relevant cases illustrate the benefits of formalized contracts for the parties involved:

The Cession Contract Between the Garfio Mining Company (RETAMA) and the Cuatro de Enero S.A. – MACDESA Mining Company

The Garfio Mining Company, which represents RETAMA, a medium-scale Peruvian mining company, is the title holder of the concessions where the MACDESA artisanal mining company works, representing 329 miners.

In 2007, a Cession Contract was signed between Garfio and MACDESA with a term equal to the useful life of the mine. MACDESA became responsible for the necessary environmental licences, and assumed all responsibility in the case of accidents and other events that might occur during the term of contract.

In compensation, MACDESA pays Garfio a monthly royalty equivalent to 6% of the mine's production, less the expenses incurred in the extraction. This contract has allowed the MACDESA artisanal miners to become formalized and provided a good base for the development of their project; they have reinvested in the mine, installing an agitated cyanide leaching plant, thus completely eliminating mercury from their operations.

The MACDESA company is being certified with the Fairtrade and Fairmined international ethical label, a Fair Trade seal for gold from small-scale mining for community-based organizations.

The Poderosa Mining Company, in the Pataz Zone, of the La Libertad Region

The Poderosa Mining Company has been operating for the past 30 years in the Province of Pataz, in the region of La Libertad. It processes on average 387 metric tons of ore per day with an average daily gold content of 5.33 kg of gold. It is certified with several international quality-certification seals: ISO 9001, ISO 14001, and OHSAS 18001.

A sector of its concessions was invaded by informal miners, 90% of whom were born or live permanently in the zone; they process their material with mercury but they do not have a good recovery ratio (no more than 50%) and in addition they generate severe environmental impacts with their activity.

The Poderosa company has undertaken a process of formalization with these miners, using Law 27651 to sign the agreements for exploitation, by means of which miners operate the mine under the technical direction of the company and sell it their unprocessed ore. The company in turn quotes a larger recovery ratio for them (of 90%) which improves the miners' income.

This agreement is favourable for the community because the sale of the mineral is formal, taxes are paid, and the district's windfall tax collection increases (an income tax is paid which to date is equivalent to some US \$15,818,353. That translates into an increase in revenues for the local government in the form of a windfall tax collection of US \$7,909,177). There are also positive environmental impacts from refraining from the use the mercury that was previously disposed of in the form of tailings and mercury gas emissions.

4. KEY ISSUES OF INSTITUTIONAL ASPECTS AND LESSONS LEARNED

i. State function and initiatives in the formalization of small-scale mining

Congress

The Congress of the Republic is the representative organ of the Nation and its main functions are the production of laws, the permanent supervision and political control of the country oriented to its economic, political, and social development, as well as possible reforms to the Constitution, plus other special tasks. The Congress of Peru is organized into 22 ordinary working commissions, taking into account the structure of the Peruvian State to which 130 congressmen and congresswomen work together. One of these commissions is that of Energy and Mines.

In the mining sector, this commission in its legislative function has the objective of studying the bills of law referring to the updating of the mining legislation in order to adapt it to current circumstances, environmental stewardship, and the promotion of social responsibility.

Inside this Energy and Mines Commission there is a working subcommission for artisanal mining which organizes and receives proposals for a better regulation of this sector. Generally, the various guilds of artisanal miners have public and group audiences with this commission in order to address the range of problems facing this sector.

In 2001, this commission welcomed the initiative of artisanal and small-scale gold mining producers, a proposed law for artisanal mining, and in 2002 Congress approved Law 27651 “Law of Formalization and Promotion of Small-scale Mining and Artisanal Mining”.

The Energy and Mines Commission also performs the following supervisory functions:

- Follow-up of the evolution of mining investments.
- Evaluation of the operating capacity of Regional Governments to supervise the environmental regulations of small-scale mining and artisanal mining.
- Follow-up of the application of environmental commitments assumed in the Studies of Environmental Impact (EIA) and the Programs of Environmental Adequacy and Management (PAMAs) on the side of mining companies.
- Evaluating the impact and results of mining companies.
- Evaluating the impact and results of the Organ of Supervision of Investment in Energy and Mining (OSINERGMIN) in terms of surveillance of the mining activity.
- Follow-up of the multisectoral commissions.

A. Ministry of Energy and Mines and other executive government institutions

The Ministry of Energy and Mines is the executive power organ which regulates and promotes the mining investment in the country. It is in charge of granting titles to exercise mining activity and of establishing an adequate legal framework for this activity to develop legally and productively.

Until 2002, the Ministry did not develop any policy for ASGM because there was no legislation for this sector, which has contributed to its informality.

Starting in 2002 in its role of promoter it was assigned the responsibility of preparing a development plan for artisanal mining, something which it has not yet done. The result is that the Ministry has had a role of little relevance for this sector and in 2006 the supervision function was diverted to Regional Governments and Regional Directors of Energy and Mines.

Nonetheless, the current director^{xxxvi} of the Ministry recently declared its policies and objectives for the Small-scale Mining and Artisanal Mining sector in the following challenges:

1. Formalize the Small Mining Producer and the Artisanal Mining Producer (and progressively eradicate informal mining).
2. Encourage Small-scale Mining and especially Artisanal Mining to develop their activities with high technical standards in terms of safety and environmental stewardship.
3. Assist Small-scale Mining and Artisanal Mining to become instruments of social inclusion and of poverty reduction, by promoting their sustained development.
4. Insist that the activities of the Small Mining Producer and the Artisanal Mining Producer be performed in a rational manner and with techniques oriented to environmental stewardship, respecting the rights of communities and promoting well-being.
5. Modify the legal norms, orienting them to make feasible and strengthen the formalization process.
6. Optimize supervision procedures.
7. Propose and support discussions between the mining title holder and the informal miner in the cases in which this is feasible.
8. Support the strengthening of the technical, legal, social, and environmental management and training of the Directors of Mining of Regional Governments in these strata of mining activity.
9. Create awareness in Regional Governments about the importance of paying attention to the Small Mining Producer and the Artisanal Mining Producer in their respective regions.

To accomplish these objectives the Ministry of Energy and Mines has established International Cooperation agreements for ASGM through the following projects:

- PERCAN: (Peru – Canada Agreement) “Project of Reform of the Mining Resources Sector of Peru” signed in 2003, in effect until the year 2011; its objective is to strengthen competencies within the Regional Governments.
- APOGORE: (Support to Regional Governments). Signed in 2009 it started to operate in 2010 and is intended for a period of four years, in association with the United Nations Development Program (UNDP) and the Swiss Cooperation (COSUDE). The project consists of supporting the Regional Governments in the formalization of artisanal mining and small-scale mining, giving priority to the regions of Arequipa, Madre de Dios, Piura and Puno. From another angle, it aims to strengthen the capacities of artisanal and small-scale miners so they may develop their mining activity in a sustainable manner, in addition to contributing to the process of State decentralization.

Ministry of the Environment

This Ministry was created in 2008 and its function is to design, establish, execute, and supervise the national policy and the environmental sectoral policy of the country.

In relation to ASGM it has the function of promoting the formalization of informal mining as a means to improve its environmental management and facilitate its effective control.

In this sense, the ministry has participated in a multisectoral work group which was convened by the Presidency of the Council of Ministers, in order to propose actions that will allow for improving the development of artisanal mining within the framework of the regulation currently in force.

But the most important action that this ministry has taken was the Urgency Decree 012 of 2010, by means of which a mining exclusion zone was designated in the Madre de Dios Department, establishing norms for the ordering of the mining work in said zone.

B. Distribution of responsibilities at the Provincial and Municipal levels

At the provincial and local levels, the work with ASGM comprises establishing zones of physical space and territorial conditioning. Also, environmental protection and conservation is a goal with the formulation, execution, and monitoring of environmental policies for the mining communities within its jurisdiction.^{xxxvii} Nonetheless, these competencies are limited by scarce budgets, and by lack of technical resources and relevant skills.

In 2006, functions and competencies were transferred from the Ministry of Energy and Mines to the Regional Governments and Regional Directors of Energy and Mines (DREMs), concerning the supervision and environmental evaluations of small-scale mining and artisanal mining. However, these functions are not performed on a permanent and homogeneous basis because in reality there is not a sustained and consistent policy for artisanal and small-scale mining, which is predominantly informal. Contributing greatly to the situation of informality is the absence of a development plan for artisanal mining, mentioned above, which is considered in Law 27651.

The transfer of competencies and functions to these organs has not been accompanied by the respective resources and budgets required. The personnel responsible for enforcing these regulations lack the knowledge and specific capabilities for their application, in addition to the bureaucratic hurdles and excessive and differentiated costs existing in the different regions for the same procedures and paperwork. All this makes the access to formality difficult and slows the process. Given the tough geographic locations of the artisanal mining work its supervision is further complicated.

ii. Role of miners' organizations

Associations as organs of representation and defence of artisanal miners' rights have been created since the 1980s as first-degree community-based organizations of the different artisanal mining centres.

Since 2002, when Law 27651 came into force, several second-degree associations – regional and national guilds of artisanal miners – have been created. The first important guild was the Miners Producers of the Middle South and Center of Peru (AMASUC) which gathered associations of producers from the Middle South of Peru (Ayacucho, Arequipa, and Ica in 2002).

Later on the National Federation of Artisanal Miners (FENAMARPE, 2005) was created, mainly by miners of the Department of Ica; its directors are predominantly from Nazca. In Madre de Dios there is the Federation of Artisanal Miners of Madre de Dios (FEDEMIN).

In 2009 a national guild was established, the Small-scale Mining National Association (SONAMIPE), which has AMASUC as its base. This guild is made up of ASGM companies, either formal or in the process of formalization, and its orientation is towards the creation of mining companies. Its directors represent the interests of the different regions of Peru.

Miners' organizations, especially AMASUC first and later SONAMIPE, have played a very important role in the development, formalization, and progress of artisanal miners. Many first-degree organizations transformed into community-based organizations, mining societies, and production cooperatives, in order to be able to confront the challenges that the process of formalization entails. They have acted as schools, training miners in new aspects of technology, environment, and production, in entrepreneurial management, commercialization, accounting, and taxes, among others,

widening the scope of objectives, and serving as bridges to access the services that the State offers to this sector.

Also importantly, second-degree organizations such as SONAMIPE continue to have a fundamental role, because they have direct knowledge of the concrete problems of artisanal miners, proposing to authorities at different levels public policy measures, devices, and initiatives that facilitate their formalization processes, the application of technologies, and the development of markets, expansion, and growth.

In this sense, SONAMIPE, which has a clear history of dialogue with authorities, has proposed a platform of changes in public policies. They highlight the need for a series of promotional measures, such as more intense campaigning and mentoring in the formalization processes, improved access to credit lines, improved access to new technologies, and the change of some dispositions.

There are also some artisanal mining organizations, such as FENAMARPE, which demand State assistance to the sector, requesting that the State assume all the expenses of formalization and environmental studies, that the concessions be confiscated from formal miners who do not work on them and granted instead to the informal miners for free. These sectors have managed to have the government produce a so-called Formalization Plan, which is a plan for registration and supervision of the sector, without actual measures for promoting formalization.

iii. Role of academic, research, and technology centres

Scientific and technological research, mainly in the areas of geology and mining, has been conducted in Peru by the Geological, Mining and Metallurgic Institute (INGEMMET), and the Schools of Geological Engineering and Mining Engineering of the various universities of the country.

INGEMMET is a decentralized public institution of the Energy and Mining Sector of Peru, the purpose of which is to prepare and disseminate the knowledge of geology across the country. This includes information regarding its mineral resources, the phenomena of geological risk, and environmental geology, with the aim of promoting mining investments, the development of infrastructure, and to provide the necessary geoscientific information that shall contribute to the territorial ordering and development of the country. This institution implemented the georeferential system based on a system of grids used for the granting of mining concessions at the national level.

Considered among the most important development strategies of scientific research in geology and mining is that of placing greater emphasis on efficiency and pollution reduction in the strata of small-scale mining and artisanal mining. For example, using clean technologies in the processing of gold ores in large volumes, through cyanide heap leaching or gravimetric technologies, allows for reducing the use of mercury in gold processing.

In the realm of academia, several universities have been conducting scientific and technological research in this field. Among the most important are: Universidad Nacional de Ingeniería, Universidad Nacional Mayor de San Marcos, Universidad Nacional San Agustín de Arequipa, Universidad San Luis Gonzaga de Ica, and the Pontificia Universidad Católica del Perú, among others.

Researchers at the School of Mining and Metallurgy of the Universidad Nacional Mayor de San Marcos have been conducting research in ASGM in a constant search for strategies to prevent further damage to the environment during the processes of ore extraction, while taking into consideration the low levels of gold recovery obtained in artisanal mining. They designed and constructed, at low cost, portable gravimetric equipment for the recovery of valuable metals. This device works through a hybrid system which acts depending on the mineralization in which the gold is found. This innovative equipment works with the gravimetry and centrifugation methods, as well as with the conventional or chemical system (cyanidation).

It is also important to highlight the cooperation agreements that exist between the artisanal mining guild SONAMIPE and the School of Mines of the Catholic University to conduct topographical studies for several artisanal mining companies such as AURELSA and SAN LUIS ALTA, MISKY, etc.

On the side of private institutions, there is the technological proposal from the German agency GTZ to recover gold from placer deposits of Madre de Dios through the use of gravimetric methods to reduce the use of mercury. Also known along these lines is the proposal made by engineer Carlos Villachica, an independent researcher who is developing a prototype to recover gold on the basis of a system of magnets that produces a concentrate of that metal. The proposal has been presented to MEM.

Another proposal known in the commercial circuit offered by a company from Canada (Falcon Concentrators Inc.) is that of a small-scale gravimetric concentrator. It processes two tons per hour and produces a polymetallic concentration that can be sold to smelting plants or to which mercury or cyanide can be applied to extract gold.

5. ECONOMIC INSTRUMENTS IN THE FORMALIZATION OF THE ASGM SECTOR

There is a generalized idea that to be informal in small-scale mining is an opportunistic option taken by miners to avoid paying taxes or the costs of formalization. In reality, informality is quite expensive due to all the relationships of dependency that the producer needs to establish in order to produce without being duly legalized.

The cost of input materials comes down significantly when they are bought legally. In the case of explosives, when buying them in the black market they have a price of US \$1.4 (approximately), whereas when legally bought the cost does not exceed US \$0.60. The cost of explosives is a large component of the cost structure of the mining operation.

But when the legislation takes into account the economic reality of ASGM, the costs invested in the formalization process are quickly recovered in several ways. By being formal, they can find better prices for their product, given that they are in a better position to negotiate. Likewise, formalization allows the miner to become entitled to fiscal credit and if he/she is later able to export it is possible to have access to export incentives.

A direct impact that has been observed in several instances, is that once the formalized miners no longer sell mineral they exit the cycle of mercury use and they pass on to cleaner and more efficient technologies, such as cyanidation, under the direction of a professional.

An analysis of the importance of economic instruments in the formalization of this sector follows.

i. Fiscal systems and their role in the gold production chain

Fiscal Regime

Formal organizations, including mining companies of all strata, are subject to the general corporate income tax regime (3rd category) which levies a 30% tax on annual net income. This tax payment is made at the end of every fiscal year.

In addition, mining companies, again from all strata, must discount 8% of pre-tax income annually to distribute as profit-sharing among their workers. On the other hand, Peru's VAT or General Sales Tax (IGV by its Spanish initials) of 18% on all commercial transactions exempts gold commercialization, both for sales within the country and for exports.

Gold exports are granted tax relief in the form of a tax reimbursement to the miner, administered by the National Superintendence of Tax Administration (SUNAT), equivalent to the IGV on expenses incurred to produce the exported gold.

Medium-sized and large mining companies also have to pay royalties, but the royalty does not apply to ASGM.

One of the points of debate in the country is the possibility of legislating a tax on mining profits (windfall tax), resulting from the elevated prices of metals, especially of copper and gold. In response to this debate, upon the initiative of companies an agreement with the Government was signed, called the Mining Program of Solidarity with the People (Voluntary Contribution) through which they pledged to contribute 5 thousand million soles (US \$1,785 million) within a 5-year term; this contribution is equivalent to a 2% tax, but it only applies to 39 companies that have signed this agreement and does not include ASGM.

Right of Validity

Right of validity is the payment that each holder of a mining concession title makes every year to have the right to continue to be the legal owner of the title, paid according to a scale. In the case of the small mining producer the right of validity is US \$1.00 per year, per requested or granted hectare; in the general regime the payment is US \$3.00 per year per requested or granted hectare; and in the case of the artisanal mining producers, the right of validity is US \$0.50 per requested or granted hectare.^{xxxviii} When the right of validity is not paid for two consecutive years or three alternate years the mining concession is lost and the title holder cannot request the same concession again.

Through Law 29169 revenue proceeding from the payment of the right of validity is distributed as follows: 75% to the District Municipality, 20% to the Geological Mining and Metallurgic Institute (INGEMMET), and 5% to the Ministry of Energy and Mines.

Regional Governments receive the rights of validity and penalties from small-scale mining and artisanal mining.

Revenue for the State over the past few years has been:

RIGHT OF VALIDITY/YEAR	AMOUNT IN NEW SOLES	AMOUNT IN US\$ (approximate)
2004	90,176,747	32,205,981
2005	69,779,708	24,921,324
2006	120,657,963	43,092,130
2007	129,409,619	46,217,721
2008	156,018,411	55,720,861
2009	151,437,425	54,084,795

Source: Ministry of Energy and Mines: 2010 Annual Report.

Minimum wage and labour benefits

The minimum mining wage is set higher than the legal minimum wage because mining is a high risk activity. This wage is S/850 soles (approximately US \$303.57) per month. In addition, the worker has the right to receive two bonuses per year, equivalent to a monthly salary each, which the miner receives in July and December.

For each year of accumulated work the miner is paid an amount for the time of service (CTS) that the employer deposits in a bank account in the name of the worker. The miner has the right to paid vacation equivalent to 30 calendar days. He/she is covered by a social security system selected by the worker, either private or belonging to the social system, which includes health coverage for the miner, the spouse, and children under 18 years of age.

The employer has to hold life insurance for each worker, for cases of death or permanent disability, and there is a special retirement regime which requires the worker to have worked at least 15 years and to have reached at least the age of 45 years. Finally, the mining worker receives profits, coming from the payment of 8% of the company's earnings, which are distributed in a manner proportional to the salary and the days worked per year.

There is no special regime for artisanal mining. ASGM organizations that have advanced in their formalization and development are adopting the general systems that the law empowers allowing the miners and their families access to healthcare services and social security and also to accumulate contributions to their pension fund. Initially the paperwork and the social security enrollment fees were seen as burdensome and unnecessary, however, the number of miners now seeing this as a reasonable requirement is growing.

On the other hand, relative to the corporate law that regulates all companies from all strata, it should be noted that it is conceived for shareholders that do not work in their own company and whose sole interest is that of obtaining profits. In this sense, some difficulties arise in the case of artisanal miners when they form their companies, because for them companies have a double interest: having a stable job with decent salaries and earning profits. In the corporate law top directors (members of the Board of Directors) cannot be on the payroll and earn a salary, instead they must be under the regime of stipends paid on the basis of meetings held.

Mining windfall tax fund

"Canon minero"^{xxxix} is the fund that the State obtains from the payment of the windfall tax on the income of mining companies of all strata which corresponds to 30% of their earnings. The mining windfall tax fund is distributed in the following way:

- 50% for the Central Government
- The other 50% is distributed as follows:
 - 10% goes to local governments where the mining activity takes place.
 - 25% goes to provincial governments.
 - 40% goes to local governments of the departments which do not have the mining concession.
 - 25% goes to the region^{xl} (20% to the region plus 5% to the universities of the region).

Over the past few years on account of the windfall tax on mining the State collected increasing royalties:

- ✓ 2008: 5,065 million soles (US \$1,808 million)
- ✓ 2009: 4,156 million soles (US \$1,484.28 million)
- ✓ 2010: 44,158,977 soles (US \$15,771,063) up to 5-31-2010.

This money is allocated for investment spending. There are no studies evaluating the specific impacts that these amounts of investment by the regional and local governments would have, only that assess

the impact of the improvement in terms of unsatisfied basic services, education and healthcare quality and infrastructure.

We can observe in the following chart the evolution of projects in Regional Governments.

Projects of Regional Governments according to type, amount, and number 2004-2009, in %

Range	2004	2005	2006	2007	2008	2009
Type IV (greater than S/ 8 million)	6%	3%	18%	40%	48%	53%
Amount (million soles)	1,238	1,643	2,404	3,606	7,048	6,810
Number of Projects	1,551	2,102	2,904	3,280	2,989	2,244

The above chart shows the increase in spending between 2004 and 2009 on projects of the Regional Governments. In 2009, approximately 53% of the 2,244 projects were worth more than 8 million soles each. Projects were valued at 6,810 million soles (US \$2,467 million approximately) in total.

ii. The Role of credit mechanisms and lessons learned

To access formal credit mechanisms, compliance with the norms of formalization is necessary. Banks generally set the following requirements: a bank account through which purchase and sale operations are conducted, minimum turnover volume, annual audited balance sheet, income and loss statement, cash flow, description of project to which the loan will be applied, and recovery plan. This is in addition to the documents of formalization, such as those of the company's incorporation, the titles of the concessions, and the powers granted to the executives.

As a positive example there is the case of the Artisanal Mining Company, AURELSA, which in two instances has accessed a bank loan, fulfilling all the requirements for a project of expansion of its mining operations, and installation of machinery in the production plant for US \$20,000 each loan, at an annual rate of interest of 18.6%. These credits were paid off in a timely fashion.

The experience of the Miner Bank (Banco Minero del Peru) was not positive. It was created for the State to have the monopoly over gold commercialization, and to be the source of credit and promotion for mining projects, but eventually it was managed by powerful interests of mining entrepreneurs. As an example, the Miner Bank did not have refining capacity for the gold it purchased and so entrusted that service to private refiners who were supposed to return the gold to the State after performing that work. When the Miner Bank was closed there was a list of refiners owing the bank significant amounts, long past-due. None of the refined gold was returned.

This bank existed in the country until the year 1992 but because of fiscal spending adjustment policies it was closed. Even though it is true that at the time of its operation there was no formal artisanal mining, it was not a dynamic factor for the economy. It was the only institution in charge of commercializing gold, and producers had to sell it their gold production. The purchasing price was closely related to the international price and it was not possible to determine the gold content nor the other factors involved in the purchase.

A central problem with this situation is the high interest rates that banks charge in the financial market on their credit; even on capital loans rates correspond to an oligopolistic management that does not allow for them to descend to reasonable levels. Another important topic is that few financial institutions know the mining sector and they are very demanding in relation to the collateral that they request in order to grant a loan.

All these conditions affect mainly medium-scale, small-scale and artisanal mining because large companies are subsidiaries of transnational firms which provide them with financing from abroad.

It is important to point out that informal credit is much costlier and it is set at the mining center itself or with the buyers. Generally, monthly rates are charged between 4 and 8% and the dollar is used for the calculation. This is the type of credit that most artisanal miners and small-scale miners access to finance their operations.

Liberalizing the Gold Market: Advantages and Disadvantages

Between 1972 and 1991, Law 1882 was in force which decreed that the only gold merchant in the whole national territory was to be the State. In 1991 it was decreed that the sale of gold would from then on be free. This disposition is still in force.

When the State was the sole buyer, it set the price itself and did not necessarily respect the international price; yet there was more confidence in the gold content and in the other factors important in commercialization.

The liberalized system has the advantage of taking as reference the international price of gold, however, there is high mistrust regarding the gold content and the other factors.

To calculate the gold content three samples are taken, one for the purchasing plant, another for the producer that sells who will take it to a private laboratory, and a third for a possible conflict to be settled. Often the producer does not send his sample to be analyzed (given that sometimes the amount does not justify that expense) and the buyer imposes his *ley*^{xii} or gold content; on other occasions the buyer, that is to say the storage plant, imposes restrictions, for instance, that it only accepts results from a few select laboratories in Lima.

There are other factors that are taken into account in the commercialization such as the humidity, weight, and most of all the *maquila*,^{xiii} which is totally arbitrary. It is an estimate of the discount for the sum of all those factors, and it has been as much as 50% less than the amount that should have been paid.

The gold storage plants and the gold purchase plants buy the gold, ore and/or tailings in both legal and illegal ways. Since good supervision or monitoring on the side of the State over these processing plants is lacking and they can declare any gold content for the material that they process, these can turn into open channels for gold coming from illegal activities, such as drug trafficking or others, and to launder that money.

iii. Role of ethical market initiatives

Internal commercialization in the country and exporting are regulated by the rules of the free market. In the internal market gold can be commercialized in all the forms that it undergoes during its processing.

Even before any processing occurs, there are buyers for the ore that comes out the mine, the mercury amalgam, the tailings of the process itself, the gold and/or polymetallic concentrate, and the gold from cyanidation in any of its methods.

Each one of these sales has its own commercialization factors, which are settled through a direct negotiation between buyer and seller. The selling market of the gold production from small-scale miners is dominated by eight companies nationwide which, being formal companies, buy the formal and informal gold across the whole territory of the country.

Exporting is a free (legal) activity. A legally established company having the capacity to export according to its bylaws can do it, it has only to meet the requirements of customs registration and later follow all the protocols for packaging, shipping and insurance. In this sense, producers can legally export their production.

An important and unprecedented initiative in the gold market for small-scale mining is that which the Alliance for Responsible Mining (ARM) has been leading since the year 2006 and that is developed in four countries of Latin America. It consists in the certification of ethical gold coming from artisanal and small-scale miners' organizations that are community based, with the Fairtrade and Fairmined standards.

One of these countries is Peru, which has a defined legislation for small-scale mining and has allowed for the development of mining with social and environmental responsibility. Three pilot projects of the Fairtrade and Fairmined standard for Fair Trade exist there: Sociedad de Trabajadores Mineros (SOTRAMI) and Comunidad Aurífera Relave (AURELSA), from the Ayacucho Region; and the Empresa Aurífera Cuatro de Enero (MACDESA) in the Arequipa Region.

The work has been led by the Red Social NGO which, as part of the ARM network, has participated in the preparation of the standards, the participative consultation workshops, in the application of tools to support the certification of miners, and in the preparation of these organizations for the certification audit that would allow them to obtain the Fairtrade and Fairmined gold trademarks.

At present the SOTRAMI company has been certified Fairtrade and Fairmined and it has made its first export to the London market. AURELSA and MACDESA have already entered the certification process.

6. CONCLUSIONS AND RECOMMENDATIONS

1. Artisanal small-scale mining in Peru has grown in the last decade encouraged mainly by the following factors: the existence of the resource of gold ore in deposits that are appropriate for small-scale exploitation, the rise in the international price of gold that allows for offering higher wages than in other activities, the lack of job opportunities in other sectors, and the excess supply of unskilled workers in the labor market. The growth of ASGM has been primarily informal.
2. The promulgation of Law 27651 and its Regulation in 2002 constitute a fundamental step in the process of formalization of the sector. This law opened the way for the formalization process of ASGM because it provides the illegal miner with a route for legalization and establishes objective criteria for the ranking of small-scale and artisanal miners. The dispositions of the law have established a set of benefits and differentiated treatment for small producers, such as: lower rates for the right of validity; penalties suited to the size of the mining project; minimum mining production; simplified environmental permits; training programs on environmental topics and on mining health, security and hygiene, among others.
3. The most successful cases of formal artisanal mining are those that have been produced with the impulse given by Law 27651 related to the creation and management of community-based companies and of mining associations, with the incorporation of clean and lucrative technologies in gold processing.
4. To boost the formalization process the various levels of Government must develop, in an articulated, coherent and sustained manner, a set of public policies with clear objectives and strategies, as follows:
 - a. Strengthening of the capacities of the Regional Directors of Mining who supervise and handle the different legal procedures of ASGM. Responsible officers should be trained and provided with budgets, personnel, and technical implements appropriate to such responsibility. Access to this responsibility should be given through public bidding so as to avoid constant turnover of qualified personnel.
 - b. Simplifying the administrative procedures that miners must complete for formalization.

- c. Conducting of Territorial Management studies by the Provinces.
 - d. Involving regional and local governments in the tasks of participative environmental monitoring and developing environmental awareness in the community as a shared responsibility.
 - e. A more active policy of training, orientation, and participation of informal artisanal miners, developing with them concrete and adequate formalization strategies.
 - f. Standardizing the services rendered to small-scale miners by Regional Governments, especially in rates, the amount of time that the legal procedures take, requirements demanded of them, and interconnection with the national database.
 - g. Improving access to clean processing technologies.
 - h. Improving access to more reasonable financing sources.
5. Also required is for the artisanal miner/producer to have a role as an active participant, so that that the miner will not be a mere spectator of the decisions leading to formalization. Costs and procedures of formalization should be made uniform and adapted to the reality of the size of the mining venture so that producers will see it as an investment. To achieve this, it is necessary to create concrete stimuli for formalization and policies for creating awareness, disseminating the benefits of formalization, highlighting successful experiences, and most of all constructing, in a participatory manner, a vision of formalized small-scale mining as socially and environmentally responsible that will serve as the basis for the development of miners, their families, and the community.
 6. Aspects of law and regulation that can be improved should be discussed with all stakeholders, with an adequate framework for those changes to advance in a positive direction.

The legal dispositions in force constitute a general framework that should be developed, considering the diversity of the small-scale mining operations in each region.

Basic norms for mining each type of deposit should be established, with clear norms of mitigation of environmental impacts, clearly indicating poor practices and highlighting good practices in mining.

The current Peruvian legislation could be modified to become a more effective instrument in encouraging formalization. For instance, the regulation stating that an artisanal miner (being either an individual or a legal entity) cannot sign an exploitation contract with other artisanal miners, because that would bring about the loss of his ranking, is unnecessarily limiting. This prevents productive chains from forming, in which more advanced organizations can support the formalization of the least organized ones. In reality, this manner of work has been taking place, but it cannot become formalized.
 7. There should be mechanisms of dialogue established with the representatives of artisanal miners, and all stakeholders, with the various entities of the government, so that demands, inquiries and proposals of those interested can be communicated effectively.
 8. To strengthen the necessary capacities in this sector, it is essential to foster synergies between the State (at its different levels) with international cooperation, non-governmental organizations, universities, and the ASGM organizations themselves.
 9. The unregulated use of mercury causes the main problems of pollution in the sector, to the detriment of human health and the environment. A strategic national plan aimed at reducing, and eventually eliminating, the use of mercury in small-scale mining should be established at the state level and with the participation of all actors involved.

10. Diverse technological alternatives to the use of mercury, such as gravimetry, concentration and/or cyanidation, etc., should be considered to determine which are the best suited to each situation, taking into account the producers' organization, its level of training, present and future environmental impacts, and profitability. As well, all of these factors should be weighed from a perspective of sustainable development of communities.
11. Large-scale mining in Peru has not created production chains with artisanal and small-scale mining. There are several actions that can be taken to strengthen that relationship, bearing in mind that similar activity occurs in the mining practices of all strata. The major possible actions would be:
 - a. Legalizing the relationship of companies that buy mineral from small-scale miners, establishing a fair treatment in terms of gold content (*ley*), weight, *maquila* (expenses incurred when processing the mineral), etc., and in all other factors involved in the purchase.
 - b. Promoting the transfer of technology and equipment that has been disposed of but that can be used in small-scale mining.
 - c. Training in technical aspects, mainly in entrepreneurial mining management.
 - d. Supporting some segments of the commercialization chain, for instance gold exporting.
12. The organization of unions of artisanal and small-scale miners is a fundamental aspect to advance the process of their formalization, production, development and representation. The first level of organization is that of a productive organization of an entrepreneurial nature, that allows the miner to have an active entrepreneurial role, enabling him/her to confront the challenges and difficulties of formalization, production and development of small-scale mining. The second level of organization, such as the Sociedad Nacional de Mineros en Pequeña Escala (SONAMIPE), plays an important role in relation to their constituents and respective organizations, because it makes it possible to deliver miners' requests, demands, and questions to the authorities. The second level of organization also allows for exchanging experiences among producers from different latitudes, professionals, and NGOs, and allows them to be transformed into programmatic proposals. The mechanism of dialogue between all actors and the preparation of programmatic proposals are the foundations needed to gradually consolidate the small-scale mining sector as socially and environmentally responsible.
13. The process of certification of Fair Trade gold with the "Fairtrade" and "Fairmined" standards is an opportunity to improve the working and living conditions of ASGM in a socially and environmentally responsible way. The benefits of Fair Trade are: formalization, social security, paid vacations, productivity improvement, use of clean and lucrative technologies, improvement in entrepreneurial management, better prices, the possibility of exporting, and receiving a fair-trade premium equivalent to 10% or 15% over the usual selling price. Organizations already certified should become leaders and promote other organizations in their community to undertake Fair Trade. Likewise, the State should support among its public policies the growth of this opportunity, which is ^{xliiii}feasible and real.

7. REFERENCES

- ⁱ Investigación en Red sobre Organización e Institucionalidad en la Minería Artesanal y en Pequeña Escala (MPE). (Network Research on Organization and Institutionalism of Artisanal and Small-scale Mining - ASM) IIPM –IDRC- 2004.
- ⁱⁱ Managers of Madre de Dios, Puno and the Middle-South of Peru create the Coordinadora Nacional de Mineros Artesanales (CONAMA).
- ⁱⁱⁱ Investigación en Red sobre Organización e Institucionalidad en la Minería Artesanal y en Pequeña Escala (MPE). (Network Research on Organization and institutionalism of Artisanal and Small-scale Mining - ASM) IIPM –IDRC- 2004
- ^{iv} Red Social and AMASUC. *Global Diagnostic: Leadership and Artisanal Gold Mining Women Organization*. GAMA Project, 2005.
- ^v Red Social is a Peruvian NGO that has been working since 2004 to support the formalization process of this sector.
- ^{vi} Medina, Guillermo. *Minería Artesanal e ilegal. Impactos económicos, sociales y ambientales. (Artisanal and illegal mining. Economic, social and environmental impacts)*. Lecture in La Paz in 08/10/2010. UNEP Peru – Bolivia Regional Project.
- ^{vii} *Quimbaletes*: Artisanal grinders made of stone, where the amalgam of mercury with gold is produced. They are used intensively in ASGM in Peru.
- ^{viii} *Refogado*: Applying fire to the mercury and gold amalgam by means of a burner.
- ^{ix} Instituto Nacional de Salud – CENSOPAS. *Niveles De Exposición a Mercurio en Población de Huepetuhe-Madre de Dios y Factores de Riesgo de Exposición 2010*. (Levels of Exposure to Mercury in the Population of Huepetuhe – Madre de Dios and Risk Factors of Exposure – 2010 Lecture”.
- ^x INS-CENSOPAS. Ibid. 2010.
- ^{xi} Amazon Research Institute. Ministry of the Environment. Ibid. 2011.
- ^{xii} Amazon Research Institute. Ministry of the Environment. Ibid.
- ^{xiii} Dirección General de Salud Ambiental (General Direction of Environmental Health), 1996.
- ^{xiv} PEMA. Medina, Guillermo. *Minería Artesanal e ilegal. Impactos económicos, sociales y ambientales (Artisanal mining and illegal mining. Economic, social and environmental impacts)*. Lecture in La Paz 08/10/2010. Peru-Bolivia UNEP Regional Project.
- ^{xv} Law whose text (TUO by its Spanish initials) was approved through DS 014-92 EM.
- ^{xvi} Preliminary Title II. DS 014-92-EM.
- ^{xvii} Preliminary Title VII. Ibid.
- ^{xviii} Art. 4° of Law 27651.
- ^{xix} Art. 11° of Law 27651.
- ^{xx} Art. 24° of DS 013-2002. Regulation of Law 27651.
- ^{xxi} Art. 18° of DS 013-2002. Regulation of Law 27651.
- ^{xxii} Its profits can be shared among its members.
- ^{xxiii} This latest limitation was introduced in the LD 1040.
- ^{xxiv} Art. 3° of the Legislative Decree 1040 of 06-25-2008.
- ^{xxv} Art. 10° of DS 013-2002. Regulation of Law 27651.

^{xxvi} Tax Imposition Unit (UIT by its Spanish initials) – A unit of reference used by the tax authority to: fix taxes, fines, penalties, etc.

^{xxvii} Art. 10° of Law 27651.

^{xxviii} Art. 66°, 67°, 68° and 69° Political Constitution of Peru.

^{xxix} ECA is a measure that establishes the level of concentration or the degree of elements, substances or physical, chemical, and biological parameters present in the air, water, or soil, and their condition as recipient body, which does not represent a significant risk for the health of people or the environment.

LMP is a measure of the concentration or the degree of elements, substances or physical, chemical, and biological parameters that characterize an effluent or an emission, that when surpassed causes or may cause damage to human health and well being and to the environment.

^{xxx} CONAM: National Council on the Environment.

^{xxxi} Law 27446 and modifiers. Art. 4°.

^{xxxii} The concept of class makes reference to the type of use of the waters: I - domestic consumption with simple treatment; II - domestic consumption with complex treatments; III - watering of vegetables; IV - recreational zones; V - fishing; VI - conservation zones. More information about classification and the Environmental Quality Standards for water at: DS 261-69 AP-Mod by DS 007-83 and DS 003-2003 SA.

^{xxxiii} Decree of Law 25707.

^{xxxiv} Art. 11° of Law 27651.

^{xxxv} *Maquilas* are the expenses incurred to separate the gold from the sterile material. These expenses are charged to the producer in the form of a quantity per ton (for example: US \$300 per ton) and they rise according to the gold content. The greater the gold content, the higher the *maquila* that is applied.

^{xxxvi} Presentation by Engineer Víctor Vargas, General Director of Mining of the Ministry of Energy and Mining during the event called: “*Proyecto Regional (Peru-Bolivia) en América del Sur sobre la minería de oro y de Pequeña Escala*” (Peru-Bolivia Regional Project in South America on gold mining and Small-scale Mining). La Paz, August 10, 2010 – UNEP – SAICM Project.

^{xxxvii} Law 27972. Organic Law of Municipalities.

^{xxxviii} Art.7° of Law 27651.

^{xxxix} According to Law 27506.

^{xl} Region: political division of the country into 25 regions.

^{xli} *Ley* is the content of the metal in the mineral lot. It can be expressed as the quantity of grams per metric ton or also in percentage of ounces per metric ton.

^{xlii} *Maquila*: see Reference number xxxvi.

8. BIBLIOGRAPHY

Documentary assets of the MINEM, INGEMMET and MAPEM and PEMIN Projects of the Ministry of Mines and Energy. Retrieved from www.minem.gob.pe

Documentary assets of the projects of the Swiss Cooperation GAMA-PEMA, which publishes the studies of its consultants and its own studies. Retrieved from www.geco.mineroartesanal.com

Gamarra Chilmaza, Federico. *Socio Labour Study in Population Centres of La Rinconada and Cerro Lunar Puno*. IPEC-ILO, 2005.

General Corporate Law 26887. 19/11/1997. El Peruano Newspaper.

General Direction of Environmental Health. *Evaluation of the exposure to mercury of informal workers in gold mining*. Nazca 1997.

General Law on the Environment 28611. 10/13/2005. El Peruano Newspaper.

General Law on Mining. Single Ordered Text DS 014-92 EM. 2 /06/1992. El Peruano Newspaper.

Institute of Amazon Studies. Ministry of the Environment. *Gold Mining in Madre de Dios and Mercury Pollution: A Time Bomb*. 2011.

Law of formalization and promotion of small-scale mining and artisanal mining 27651. 01/21/2001. El Peruano Newspaper.

Law of the national system of evaluation of environmental impact 27446. 04/20/2001.

Medina, Guillermo. *Artisanal and illegal mining. Economic, social and environmental impacts*. Lecture in La Paz on 08/10/2010. UNEP Peru –Bolivia Regional Program.

Medina, Guillermo; Arévalo, Jorge; Que, Felipe. *Research Study on illegal mining in Peru*. Entrepreneurial Conference XXVIII Mining Convention, 2007.

Medina Cruz Guillermo /Oscar Medina Acuña. *The mining activity and its environmental impact in the Vilcabamba –Amboró corridor –Peru Sector*. 2003.

Ministry of Energy and Mines. APOGORE Project. 2011.

National Health Institute – Centre of Occupational Health and Environmental Protection for Health. *Levels of Exposure to Mercury in the Population of Huetuhe-Madre de Dios and Risk of Exposure Factors*. 2010.

Network Research on Organization and Institutionalism in Artisanal and Small-scale Mining (ASM) IIPM – IDRC. Ekamolle. 2004.

Organic Law of Municipalities 27972. 05/27/2003. El Peruano Newspaper.

PERCAN Project. *Baseline of Small-scale Mining*. Nov. 2010.

Poderosa Mining Company. *Contributions of the Poderosa S.A Company to the formalization of informal mining*. Workshop for the Exchange of Experiences Dec. 8 and 9. 2010.

Political Constitution of Peru. El Peruano Newspaper. 1993.

Red Social-AMASUC. *Global Diagnosis: Leadership and Organization of artisanal gold women miners*. GAMA Project, 2005.

Study on informal mining and the environment -Ica-Arequipa: GRADE 1995.

Study on informal mining and the environment -La Libertad: IDESI 1995.

Study on informal mining and the environment -Madre de Dios: Grade 1994.

Study on informal mining and the environment -Puno: IDESI 1995.

Vargas, Víctor. Lecture: *Regional Project (Peru-Bolivia) in South America about gold mining and small-scale mining*. La Paz, August 10, 2010 – UNEP – SAICM Project.