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Small-scale mining: a new entrepreneurial approach

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Summary

In the second half of the twentieth century some of the Latin American countries suggested a system of stratification for mining activity, which was never actually applied, based on criteria such as the volume of production, the amount of capital invested and the number of workers involved in mineral extraction.

One result of this stratification, which divided the industry into small-, medium- and large-scale mining, was that governments at different times implemented plans and programs in various areas, without any integrated planning between them; some related to the promotion of small–scale mining, or encouraged state investment in mega projects, while others sought to establish an appropriate climate to generate businesses that could obtain foreign investment for large-scale mining.

While this process has been taking place, it has not been possible for a mining development policy to evolve that would attract large-scale national and foreign investment capital and promote the use of technology. What has been observed is the proliferation of forms of production of very poor technical quality, with few legal and financial tools, and a lack of systematic integration, particularly with respect to the lower scale of production referred to as small–scale mining.

In order to conduct an impartial review of the concepts, and also the problems associated with these modalities in the mining industry, a new look must be taken at small- and medium-scale mining. The aim

is to strengthen the business and management structure rather than the scale or volume of the operation as has been attempted in previous years.

This makes it possible to establish a more appropriate definition of small–scale mining and the associated features of mining production, which include: informality, non-productive artisanal developments, illegality, environmental degradation, sociocultural conflicts, and technical and legal problems. State action is evidently necessary on a large scale in order to achieve appropriate economic and social results for those involved in this activity.

This is an important issue as the conglomerate that is grouped together under the title of small–scale mining represents a significant proportion of mining production in the continent, and also of the labour force employed in mineral and metal extraction. It is also important to note that small–scale mining is not a recent phenomenon and that it is a universal activity, that has appeared in all five continents and in countries as different as: Canada, Colombia, Chile, China, Bolivia, England, Peru and Spain.

Although there are no totally reliable statistics available on the extent of this activity, the most recent data provided by the International Labour Organization (ILO), indicate that there may be from 11.5 to 13 million persons around the world engaged in this activity (1.4 to 1.6 million in Latin America and the Caribbean); they receive an average salary of US$ 150 per month, amounting to a sum of between US$ 2.52 and US$ 2.88 billion per year, which becomes part of the region's economic flow. Small–scale mining is thus the sector offering the highest income in many of the districts where it takes place, and such activity makes a significant contribution to stimulating the local economy in various parts of the continent.

This is such an important subject that the United Nations Organization and various bodies of that system such as ILO, the United Nations Conference on Trade and Development (UNCTAD), and the Economic Commission for Latin America and the Caribbean (ECLAC), as well as the World Bank, the conferences of mining ministries of the Americas and of West Africa, and other organizations have begun to study the subject and to seek alternative solutions for achieving harmonious development in this area. This is indicated by the resolutions and recommendations relating to small–scale mining which have resulted from events such as the Fifth Tripartite Technical Meeting for Mines other than Coal Mines, organized by ILO in Geneva in 1990, and the Interregional Seminar on the Development of Small- and Medium-scale Mining held by the United Nations in Harare, Zimbabwe, in 1993.

Similarly, the World Bank convened an International Round Table on Artisanal Mining in Washington in 1995; the National Institute of Small Mines of Calcutta held a Global Conference on Small/Medium-scale Mining in 1996; in the same year, ECLAC convened in Santiago, Chile, a meeting of Latin American experts who proposed alternative forms of management for this subsector to the governments of the region; an expert group of the United Nations Industrial Development Organization (UNIDO) made a statement on mercury contamination at a meeting on small–scale mining held in Vienna in 1997.

More recently, the Conferences of Mining Ministries of the Americas held in Buenos Aires, Argentina in 1998 and in Caracas, Venezuela, in 1999, as well as the Conference of Mining Ministries of the West African Economic and Monetary Union, have made statements on the need to shift the focus of attention to the area referred to as small–scale mining. In addition to those events, there have been numerous national, binational and regional meetings and events that reflect the importance of mining throughout the world, and especially in the developing countries.

In September 1999, a meeting was convened in Washington by the World Bank, and attended by a representative sample of international organizations and public agencies concerned with areas relating to small–scale and artisanal mining. It became clear that there is currently a trend of

accepting the existence of these forms of production as part of the economic situation and that the countries and the mining community need to pause and reconsider the way that this branch of mining activity has been dealt with over the past decade.

Institutional support and strengthening of civic education for the persons involved in mining could become a very effective tool. Civic education, together with other forms of training in areas such as income distribution, social investment and fiscal discipline, could strengthen the development and peace processes in those areas where extraction activities are damaging the environment, reinforcing a cycle of poverty, and leading to problems and violent social conflicts over the ownership, management and use of the mines.

I. General considerations

A. Historical overview

Metal extraction and use is an activity that is as old as humanity, as indicated by the names that social researchers have given to certain periods in human development - stone age, bronze age and iron age.

The expansion of human settlements was made possible by the use of tools and weapons made from minerals, which were first collected and later intentionally sought for, and also by the development of technology for obtaining elaborate and finished mining products: pebbles and rocks for blunt instruments, sticks and pieces of flint to make sparks, and obsidian for knives. With the discovery of metals there followed bronze, iron, metallurgy and, consequently, the development of nations.

After the fall of the western Roman empire, there were no significant changes in mining development, except for the role played by the alchemists in the Middle Ages, that today might be considered a model of sustainable development, based on feudal organization. The progress made in maritime navigation, and the conquest and colonization of the American territories changed the economic panorama of Europe. The capitalist expansion increased the demand for metals, which was a fundamental factor for the development of the mining disciplines; an example of this are the works of the German Scholar Georgius Agricola, who, in his two main works: "De re metallica" and "De natura fossilium", collected, classified, illustrated

and described the techniques for mining prospecting, development and operation, the working of minerals and metals and metallurgy.

In seventeenth-century England, at the time of the Stuarts, James I prohibited the burning of coal extracted from the so-called "bell mines" because of the air and environmental pollution they caused. This led to an accelerated process of deforestation of the English countryside, owing to the need for heating during the island's prolonged cold periods. This process came to an end when coal began to be used at the beginning of the eighteenth century, first in steel production and later in power generation.

The European *conquistadores* did not bring mining to America, although they did bring the techniques described by Georgius Agricola. The various American peoples had developed their own mining techniques and had made surprising advances in techniques and skills in metallurgy, carving, stonework and quarrying; they had also made progress in astronomy, civil engineering and other scientific disciplines, and had established technical procedures for filigree work and gold soldering. Tenochtitlan (Mexico) and Machu Pichu (Peru) could not have existed without basalts and andesites. Nor could the jewellery of the Quimbaya and Tayrona cultures (Colombia) have been made without gold alluvial mining. Once the Spanish had settled on American soil, a new body of regulations and provisions was developed, known as the *Ordenanzas de Nueva España* issued by the *Casa de Contratación de Sevilla*, which regulated mining activity from 1584, in the reign of Philip II, until 1783 in the time of Carlos III.

There is no doubt that the industrial revolution was the trigger for today's large-scale mining. Obviously the large operations did not appear overnight, but the small mines gradually expanded along with the increasing demand for raw materials in a world that was taking the industrial path of economic development.

Mining production was not flexible enough to cope with the enormous and sudden increases in demand, because of the specific features of the deposits, their size and metallurgical problems, and a specialized search for new deposits was therefore needed. Once new deposits were found, new engineering ideas were applied with the aim of optimizing production and reducing costs as far as possible. Environmental considerations were certainly not a matter of concern to the miners of that time. Two typical examples of the period are the 1848 gold fever in California and nickel prospecting in Canada and New Caledonia.

The sudden appearance of mining operations of increasing size helped to develop economic geology as a discipline, but this did not relegate the empirical seekers and explorers to a secondary level. On the contrary, those were the persons who brought the most information and the greatest number of discoveries, which initially were almost always associated with rudimentary mine workings, sometimes for the purpose of taking pilot samples for industrial production, sometimes to cover the cost of prospecting, and in most cases with the idea of personal gain.

This situation made it possible to continue to open, develop and operate new mines; many of them were expanded and improved with the advent of new techniques. In the industrialized countries in particular, the growing development of the market increased the demand for production and brought about a quantitative and qualitative change which relegated, small-scale operations to a secondary level, for reasons of cost management.

The same did not happen in other regions of the world, especially in the colonies. The domestic markets did not allow large-scale development of the mining industry and local demands were met to some extent by modest local producers or by the leftovers from larger operations that supplied the big cities. From then on the mines that worked the largest deposits had a clear export mission. It was the precious metals that attracted attention and hence large-scale private investment, as did certain other metals such as zinc, tin and copper; these were all processed in the colonizing

countries and returned as manufactured products from the former colonizing powers or countries with emerging economies such as the United States of America.

In some European countries and in some states of the American union, mining production was expanding in terms of the number and size of the mines, volumes of production and the degree of mechanization, and thus large-scale operations were possible. In the countries of Latin America, Africa and Asia, in contrast, the development of mining was based on the intense use of very cheap manpower or slaves, first of all the indigenous population and later the first African slaves.

When in the nineteenth century some countries of Latin America obtained their independence, slavery was almost immediately abolished. At the same time the first investments were made for mineral extraction, with English, Belgian and subsequently United States capital. The development of large-scale mining in Latin America and the Caribbean, which is contemporary with oil development, was thus limited to foreign investment for working deposits with special characteristics, such as a high value and favourable location.

National investment, in view of the low level of finance and technology, focused on exploring known deposits, with little prospecting activity, and increasing the existing number of small mining operations. It did not allow for expansion by working underground at greater depth or working over larger alluvial areas, which was possible for United States and European companies which had the necessary human and financial resources. In contrast, the South American countries were increasingly overrun by illegal operations, without any form of private or state control.

With the advent of the second world war, the military efforts of the countries involved relegated foreign mining investment in the region to a secondary position and legislation appeared which gave special emphasis to a policy that is still applied today: the promotion of small-scale mining. The various national legislations of Hispanic America, which were based on legislation that originated in the official documents of the New Spain, were later inspired by the Napleonic Code, and later became the very specific and individual codes and jurisprudence such as that of Chile. In general the picture began to change at the beginning of the 1940s. A similar sequence of events, with obvious differences, took place in Asia and Africa.

Since the end of the first half of the twentieth century, small-scale mining has come to be seen as an undesirable and damaging part of extraction activity, causing great social, technical, economic and environmental problems. Accordingly, two clear but opposing options have been proposed as a solution: either its elimination, or, strange as it may seem, its promotion, despite the fact that the model is worn out after fifty years, and the situation with regard to small-scale mining in the countries is still more or less the same as in 1829, when Bolívar suggested developing mining in Greater Colombia, "using science, association, and simple and direct regulations which would preserve it from all harm" (see box 1).

From a different perspective, the view has emerged that mining should no longer be classified on the basis of volume. Instead, there should be a clear policy of entrepreneurial promotion, offering growth options to those small business units that have the legal, geological, mining and economic potential for competitive mining, irrespective of their size. Similarly, those who do not have this combination of elements should have the opportunity of appropriate, healthy and productive jobs in areas associated with mining, without a requirement that their assets include mining property, a deed or ownership. Specially-designed technical assistance programmes and stable funding would be needed in order to generate employment opportunities in association with or as an alternative to mining.

This proposal was discussed at the Conference of Mining Ministries held in Buenos Aires in November 1998. In the conclusions of the conference, the Latin American mining authorities are

urged to promote the development of business forms related to small-scale mining in the context of the instruments indicated, such as for national mining development plans[1] (see box 2).

Box 1

NATIONAL MINING DEVELOPMENT PLAN OF GREATER COLOMBIA

In October 1829, a little before the collapse of his political dream of American integration, the Liberator Simón Bolívar issued a supreme decree on the industrial development of mining in Greater Colombia.

The test of the decree reflects the genius of Bolívar, as well as the experience of that age and the present one. The reasons stated in the preamble to this regulation include:

"That mining has been abandoned in Colombia, although it is one of the main sources of public wealth;

That in order to promote it some earlier provisions should be rescinded, that have been a frequent cause of disputes and arguments between the miners;

That the ownership of the mines should be safeguarded from any attack and from the possibility of disturbance or loss;

That the scientific knowledge of mining and its mechanics should be promoted, as well as the spirit of cooperation and enterprise in order to reach the high level of perfection required for the prosperity of the State...".

Source: Republic of Colombia, *Decreto Supremo*, 1829. Mining and Energy Planning Unit (UPME), Bogota, Colombia, October 1997.

There is a series of organizational similarities in relation to small-scale mining when the Latin American and African mining sectors are compared (Andrews, 1999). At least this is the case according to the conclusions and recommendations of the statements made at the recent Conferences of Mining Ministries of the Americas (CAMMA), held in Buenos Aires, Argentina in November 1998 and in Caracas, Venezuela in November 1999.

Those events have emphasized two issues of great interest: (a) enhancing information management in order to promote mining investment, through the creation and updating of databases, and of networks for exchanging and sharing information to promote mining activity; and (b) creating regional mining observatories.

In addition to the above, there is regional integration and cooperation, with the Chilean-Argentine integration treaty playing a special role, which could be extended to other areas and to other countries, such as Colombia and Venezuela, and in Central America and the Caribbean.

The meeting of African ministers consistently recommends the regional harmonization of mining laws and tax regimes with the aim of reducing disparities between countries, promoting investment, increasing the security of mining rights and enhancing the conditions that would allow the mining sector to make a greater contribution to the economies of the countries that signed the declaration[2].

Although different views were expressed at the two conferences with regard to the definition of small-scale mining, at both there was emphasis on the need to train small-scale entrepreneurs so that they can make their operations feasible in technical, economic, social and environmental terms, and to encourage entrepreneurial change in the administrative and technological aspects.

1 These suggestions were particularly clear in the CAMMA Declaration of Buenos Aires in November 1998.

2 ECLAC, from Craig Andrews, "Integración Regional de los Sectores Mineros en Africa Occidental y América Latina", World Bank, Washington, March 1999.

Box 2

MAIN CONCLUSIONS OF THE CONFERENCES OF MINING MINISTERS OF THE AMERICAS AND WEST AFRICA (1998-1999)

The ministers of mining of the Americas meet at the Annual Conference of Mining Ministries of the Americas (CAMMA). At the third meeting, which took place in Buenos Aires, Argentina, on 9 November 1998, agreement was reached on various points, including the following:

"12. To adopt, implement and communicate management policies aimed at continuous improvement within their countries and to promote the safe use of minerals and metals, regionally and internationally, taking into account the conclusions of the experts who attended the Pan-American Workshop on the Safe Use of Minerals and Metals held in Lima, Peru.

"13. [To] promote training of mining companies, with a view to establishing a model for ... technical, economic, social and environmental aspects that, irrespective of size will lead to viability as a business unit.

"14. [To] seek alternatives for small mining companies or promote their technological and management transformation to increase competitiveness and meet the aforementioned viability criteria.

"15. To promote the transfer of technology and linkages among scientific and technological organizations to increase the competitiveness of the industry, protect the environment..."

One year later (November 1999), at a meeting of CAMMA held in Caracas, Venezuela, it was stated, *inter alia*, that:

"Each country will adopt its own model of mining management in accordance with its circumstances and level of development.

Mining contributes to the economic development of countries and generates related industrial activities - such as physical infrastructure for common use, services, communications, and opportunities for local and regional development.

Information regarding product standardization, manufacturing, processing to increase value, reduction of production and commercialization costs, and the demand projections become significant factors to foster the development of non-metallic mining.

Human Resources are the most important asset in a mining operation, therefore zero tolerance for accidents should be the goal in the mining industry.

Training staff at all corporate levels is vital for occupational health and safety in mining.

Health care systems should consider local geographical conditions and associated risks."

The ministers of mining of West Africa met in Ouagadougou, Burkina Faso, on 26 October 1999, to study the potential for development and improvement of the mining industries in seven countries of that region.

The main elements of the Declaration of the seven African ministers include the following:

" There is insufficient development and management of artisanal mining and small-scale mining, owing to the lack of an adequate legal and regulatory framework."

Later in the text, the Ministers state that one important aspect of the effort needed to enhance mining standards, regulation and legislation is:

"...To encourage the development of an integral mining industry, including mineral substances such as phosphates, limes, bauxite and construction materials."

For this purpose they agreed on the:

"...Need to improve financial flows for the development of mining activities within the area of WAEMU".

Specifically, the ministers of mining of West Africa stated that: "...Although artisanal mining and small-scale mines do not constitute a homogeneous group, they nevertheless have an important role both in the sociocultural history of some of the countries in the region, and in the attempt to evaluate the mineral resources of all States" (members of that organization).

Box 2 (conclusion)

There is no universal strategy for artisanal and small-scale mining, and it is not possible to adopt universal strategies to deal with it, although this type of mining does have a clear impact on the value of production.

Artisanal and small-scale mining have terrible consequences for the environment, health and safety. They are also a potential source of conflict between the artisanal miners and the local communities on the one hand, and between the artisanal miners and the mining companies on the other."

On the basis of the above considerations, the ministers of WAEMU agreed that the following actions should be taken with respect to artisanal mining and small-scale mining:

"Develop a juridical and regulatory framework for artisanal mining and small-scale mines

To move forward with a technical and economic study of artisanal mines and small-scale mines in the region.

- Encourage the exchange of experiences;
- Establish intra-regional cooperation;
- Facilitate access to financing;
- Establish an appropriate and permanent financing system;
- Strengthen the development of the capacities of artisanal miners:
- Give artisanal workers a professional status;
- Encourage interest in semi-industrial production;
- Define the scope of artisanal mining."

Source: ECLAC, on the basis of documents produced by the Conference of Mining Ministers, Buenos Aires, Argentina, November 1998; Caracas, Venezuela, November 1999 and the Conference of Ministers of Mining of West Africa, Ougadougou, Burkina Faso, 26 October 1999.

In the Declaration of Ougadougou (Burkina Faso), ministers and organizations recognized the importance of small-scale mining as a vital component of the fight against poverty. Technical assistance was also advocated, to increase production and output, reduce environmental damage and generate the confidence needed for financial intermediaries to provide fresh capital for mining operations. The African and Latin American countries, through their ministers of mines or mining, recognized the conflicts and the potential for a revival of small-scale mining. They agreed that the following were necessary:

- To overcome the institutional weakness of the mining authority
- To strengthen geological organizations and services
- Technical and administrative training for civil servants.

The Declaration of Ouagadougou goes further and recommends the adoption of specific measures such as the provision of suitable stimuli or incentives for public personnel, while also referring to the need to strengthen the institutional framework by enhancing the level of technical knowledge of civil servants and improving working conditions.

To sum up, small-scale mining clearly has deep historical roots, and is an established part of the culture and economy of the American nations. It is the product of specific historical and economic conditions. Small-scale mining has made it possible to generate employment, which has developed in irregular forms of mining, where rudimentary, artisanal and illegal activities have masked the huge economic and social potential that small-scale mining operations could have if well-managed.

B. Characteristics of small-scale mining

The basic characteristic of what is referred to as "small-scale" mining is the impossibility of defining it according to any universal parameters. One way that it can be defined is by its geographical distribution, national legislation and mining policy implementation, and there are also other characteristics to define it more specifically, see table 1.

In this context, efforts have been made, counter-productively in the author's view, to use aspects such as the volume of production (Colombia), the amount of capital invested (Argentina and Thailand), the number of workers involved (Chile, Pakistan and the United States), or the granting of mining title or ownership (Ghana, Zambia and Zimbabwe). Some countries reach the sophisticated level of classifying small-scale mining by the volume of production according to the tonnage produced underground or at the surface (Colombia), and others opt for describing an operation as artisanal or with degrees of mechanization.

Table 1

CHARACTERISTICS OF SMALL-SCALE MINING

• Intense use of manpower	• Precarious safety and health conditions	• Takes place worldwide
• Low level of technological development	• Social and legal conflicts	• Generates local production chains
• Supplying local markets	• Low production costs	• Encourages geopolitical development
• Wide range of products	• Many stakeholders involved	• Encourages larger projects
• Environmental damage	• Variable volume and size according to the mineral and the region	• Explores new deposits
• An employment option in poor areas	• Stimulates local economies	• Widespread geographical distribution

Source: ECLAC, on the basis of various official publications.

There is an interesting reference in the ILO report TMSSM/1999, "Social and labour issues in small-scale mines" to the fact that in some countries foreigners are prohibited from engaging in small-scale mining. There is also the prohibition of any form of mining by foreigners in border areas (Bolivia). Some frontier areas have a very high potential for conflict, such as the gold-bearing area between Brazil and Bolivia, or the border area in the Orinoco basin where there are Colombians, Brazilians and Venezuelans working in gold and diamond mines.

There is a distinct global trend for classifying or defining the work involved in small-scale mining. The ILO report referred to mentions some of the more obvious features of this activity, such as intensive use of manpower, which implies a very modest or basic level of mechanization, as well as low production. Other aspects include a high environmental impact, a high degree of legal informality and a lack of business organization, the generation of low-quality employment and a low level of tax income for the States.

Mines covering a low surface area but with a high technological level, as in the industrialized countries, have also begun to operate in Latin America. Such mines are entirely excluded from the category of small-scale mining, because of the large scale of investment in specific projects, which are usually for developing deposits such as disseminated gold. In these cases, it is obvious that concepts of business management have been applied to ensure success of the projects, which clearly contrasts with the endemic lack of organization of traditional small mines. There is as yet no classification or legislation which describes small-scale mines according to parameters of business development, such as the level of coverage of social security systems

among the workers, the numbers of work contracts signed, and the degree of tax compliance among the mining operators and other parties concerned.

The ILO study referred to above proposes an additional subdivision, which could rather be considered as an intrinsic characteristic of the activity. It is the reference to open-cast mining, which supplies local markets with industrial and construction minerals. It is generally considered as a second-class level of mining, has been studied very little, and understood even less. Meanwhile, it is subject to rules and regulations, which can form the basis of legal actions, and ignoring or non-compliance with which can provoke strong reactions in urban communities. This segment of production should be the subject of special attention, especially in the processes of land use planning, urban planning and social projects for restructuring the urban social network.

There is a second type of open-cast mining that is apparently highly profitable, producing precious metals and precious stones, which, owing to the limited purchasing capacity of the majority of the producing nations are clearly intended for export and thus constitute a potential foreign currency generator for the economies concerned.

In addition to this attempt to find characteristics that identify this segment of mining production, numerous efforts have been made to quantify the most recognized aspect of small-scale mining activity which is employment, or the human resources involved. For this purpose the Committee on Natural Resources of the United Nations in 1996 stated in relation to small-scale mining that: "the number of people active in small-scale mining worldwide exceeds 6 million - more than 20 per cent of those active in the industry as a whole. If it is assumed that there are on average four additional family members per worker (a conservative assumption), then over 30 million people depend directly on artisanal and small-scale mining for their economic livelihood. if nine additional family members per worker are assumed as an upper estimate, the total increases to over 60 million people".[3]

It should be emphasized that these figures are described by their proponents as conservative estimates, and are based on figures from ILO and the World Bank (see table 2). Jennings notes that in Peru in 1993 there were 20,000 small-scale miners; Zoila Martinez[4] refers to a figure of over 80,000 direct jobs in small-scale mining in the same country, which shows an interesting contrast among the most reliable figures available at the time. There are also significant differences between the information in table 2 and that in table 3, which is based on ECLAC figures, despite the fact that the general conditions have not changed significantly since the time of publication of the second set of figures.

The figures for 1996 are expanded and described in a detailed manner in the 1999 ILO report, which refers to a series of facts which should be of interest to the governments of developing countries, especially in Latin America and the Caribbean. The figures for the thirty-five countries surveyed in Africa, America and Asia indicate substantial increases since 1993 in the number of small mines, which in some cases amount to 700 per cent and in most countries is from ten to twenty per cent. There are also other important issues such as the need for programmes to regulate districts that have high illegality indices because of a lack of mining rights to support and authorize operation of the production units.

Accordingly, in the mid-1990s, the number of people in Latin America depending on this activity for their subsistence is estimated at between 10.9 and 12.5 million. This is a very high

[3] United Nations (1996) "Report on the Committee on Natural Resources", third session. Developments in small-scale mining, report E/C.7/1996/9.

[4] Verbal information provided by the expert on small-scale mining at the international seminar on sustainable development and environment in artisanal gold-mining, Copiapó, Chile, from 31 March to 02 April 1999.

figure, bearing in mind that in Geneva the same multiplier was used to calculate that there are 100 million persons worldwide making a living from small-scale mining.

This subject is therefore quite relevant for the Latin American region. It is important to resolve the large number of associated technical, social, and environmental problems and make use of the opportunities for economic development and growth, as if those issues are not tackled they will exacerbate the existing political and social imbalances in the continent.

Table 2

SMALL-SCALE MINES AND EMPLOYMENT IN SOME DEVELOPMENT COUNTRIES

Country	Number of Mines	Illegal mines (%)	Employment
Argentina	670	Y	5.800
Bolivia	1.000	10-20	100.000
Brazil	10.000	" 90	250.000-100.000
Burkina Faso	35-60	" 20	60.000-70.000
Burundi	Y	Y	10.000
Rep. Centroafricana	Y	Y	45.000
Chad	2.000	Y	10.000-15.000
Chile	7.000		
China	250.000	" 80	4.300.000
Colombia	9.600	" 70	100.000-200.000
Rep. Dem. del Congo	Y	Y	150.000
Côte d´lvoire	Y	Y	10.000-25.000
Cuba	300	" 10	5.000
Dominica	73	-	125
Rep. Dominicana	Y	Y	2.000-3.000
Ecuador	400	Y	60.000
Ethiopia	Y	Y	100.000
Guyana Francesa	Y	Y	5.000-10.000
Ghana	400-700	10 50	50.000-10.000
Guinea	Y	" 80	40.000
Guyana	3.500	" 30	10.000-20.000
Haiti	50	" 80	4.500
India	10.000	10-60	1.000.000-
Indonesia	77.000	Y	300.000-500.000
Jamaica	140	" 5	1.200
Kenia	50	" 10	30.000-40.000
Madagascar	83	Y	5.000-20.000
Malaysia	83	-	4.600
Malí	Y	Y	100.000
Mexico	2.000	" 50	20.000-40.000
Marruecos	Y	Y	5.000-10-000
Mozambique	150	" 95	700-100.000
Myanmar	50-120	" 5	14.000
Namibia	20	" 15	5.000-10.000
Nepal	45	" 5	500
Nicaragua	Y	Y	3.000-6.000
Nigeria	Y	Y	10.000-20.000
Niger	150	95	440.000
Pakistan	2.400-	5-20	90.000-370.000
Panama	Y	Y	3.000-4.500

Table 2 (Conclusion)

Papua Nueva Guinea	Y	Y	15.000-20.000
Peru	1.550	" 50	25.000-50.000
Filipinas	700	" 80	200.000
Rwanda	Y	Y	5.000-15.000
Senegal	Y	Y	3.000
Sierra Leona	Y	Y	30.000-40.000
Sudáfrica	5.500	Y	10.000
Suriname	Y	Y	15.000-20.000
Rep. Unida de Tanzania	4.000	40-50	450.000.600.000

Source: ECLAC, based on OIT, United Nations organizations, World Bank and technical magazines, 1999.

Table 3

SMALL-SCALE MINING AND EMPLOYMENT IN LATIN AMERICA

Country	Economically active population (EAP)	Mining active population (MAP)	(EAP/MAP)	Census Year
Argentina	12.368.328	47.430	0.38	1991
Bolivia	2.429.716	50.156	2,06	1992
Chile	4.622.018	106.599	2,31	1992
Colombia	8.660.906	139.570	1,61	1993
Ecuador	3.359.767	20.870	0,62	1990
Mexico	23.403.413	99.233	0,42	1990
Peru	7.109.527	72.170	1,02	1993
Venezuela	5.642.543	79.965	1.42	1990

Source: ECLAC, United Nations. *"Anuario Estadístico de América Latina y el Caribe"*, 1996.

The value of mining production should also be considered. In Colombia, for example, around ninety per cent of recognized gold production comes from this kind of industry, which represents approximately US$ 200 million, while in this same country the value of emerald production from this form of industry could amount to US$ 250 million. Additional figures for other countries may be found in the ILO report referred to above.

Small-scale mining and the various artisanal forms of operation have always been vulnerable to the vagaries of the market and hence to prices that fluctuate according to the demand or oversupply of products. In the latter situation, the small-scale mining sector almost always responds by closing down formal operations and reducing investments. It is interesting to consider some comments from experts who state that the mining markets, and especially the metals markets, are structurally unstable. For a country's mining industry to change and make progress as a productive sector, it must follow the general guidelines of the national economic plan.[5]

It is clear that when the markets fail, the first reaction of the producers is to control their costs as far as possible in order to stay in the market. If this situation continues for a long time, the losses become unmanageable, and formal operations, beginning with the smaller ones that cannot make economies of scale, close down and dismiss their workers. The workers, when they see the mines abandoned, take over their former work areas and, without any capital and without other markets, try to derive a subsistence income from the same deposits.

[5] De Echave, José (1997), "Reactivación en el sur y comportamiento de empresas canadienses en el Perú: una consulta comunitaria" in Cooperación acción solidaria para el desarrollo. Lima, Perú.

Another significant factor in Latin America is the forced displacement of economic activities owing to natural phenomena such as droughts and seismic and volcanic events, which bring immediate poverty to large sectors of the population. There are also social phenomena such as violent groups that force whole villages to abandon their homes, resulting in a search for some form of subsistence activity.

One such activity is informal mining, which is constantly attracting "new miners" who are ready to settle in areas of potential or proven mineral wealth, usually in the form of gold, precious stones, coal, stones or construction materials typical of the marginal areas forming poverty belts around the capital cities. In that connection, a few comments have been made by German researchers which, although based on studies in Africa, are similar to the observations and experiences of the author in many Latin American cities where "mining" settlements are the subject of continuous environmental debate.

C. Displacements and uprooting

In many parts of the world, the incidence of forced displacements and uprooting is increasing very rapidly. There are many causal factors, such as climate phenomena, demographic pressures, widespread poverty and land speculation. There is also an increasing incidence of armed physical violence whereby rural communities are forcibly displaced towards the urban centres, or to remote places seeking some kind of subsistence activity, which in many cases is small-scale mining.

Owing to problems caused by the deterioration in social control mechanisms and the weak state presence, the formerly passive resistance of the population in some areas has become active. Illegal acts and behaviour have increased in an environment that confers on them a certain degree of legitimacy and they have become so well-established that the State has serious difficulties in eradicating them. In this situation, the ownership of mining rights or of mining property is a permanent subject of dispute between the authorities, the formal entrepreneurs and the informal miners (Nkner, 1998).

Although it may have occurred earlier, this phenomenon has particularly increased over the past twenty years, and as a result, large numbers of Latin Americans have become involved in the operation of small-scale mines.

Political violence has brutally uprooted thousands of people from the countryside, and the displaced persons, as they seek to ensure physical security for themselves and their families, are faced with two options. They can (a) join the poverty belts around the cities or move to other rural areas and look for a new occupation; or (b) seek the protection of armed groups that control parts of the country and offer access to resources. Such groups help to evade national taxes, and impede the control work of the mining authority, by imposing their own charges and providing armed protection against rival groups or against State action. This latter option is one of the most typical examples of how uncontrolled subsistence mining actually begins and grows, as in areas such as Sur de Bolívar in Colombia, or as in the case of the "Las Cristinas" deposit in Venezuela a few years ago.

Information relating to the discovery of precious metal deposits in alluvial layers almost always attracts large numbers of unemployed people and fortune-seekers who hope to resolve their economic problems by rapidly acquiring wealth in the form of gold or precious stones.

Sudden rushes for gold, precious stones, or other resources cause upheaval in the countries of the continent. Brazil, Colombia, Ecuador, Peru and Venezuela have experienced this situation. On some occasions, once the formal companies or local governments have completed their exploration work, the local inhabitants have begun operations on a very small scale, expecting to

find certain wealth, because of the State's incapacity to control those areas. One example was in central Colombia, where the government made contracts with companies of three different nationalities for coal explorations. When the drills were withdrawn, small operations very soon appeared at each site where a well or probe had been sunk.

Formal companies that have mining rights and are interested in optimizing their cost structure, sometimes sublease areas of land and buy directly from their sub-lessees. This practice and its many variations lead to a number of problems. The selling by sub-lessees of their own output leads to a deterioration in the quality of the mines, as the sub-lessees reduce their costs by working in poor conditions, while the companies make higher profits at their expense.

Once this process has been established, the companies do not always manage to maintain control of the area and soon the sub-lessees may begin to sell their output to third parties; when this happens a process of invasion may begin which is extremely difficult to manage, or else a process of smuggling, as is the case in some regions of Chile with the gold *pirquineros* (see box 3).

Box 3

MARKETING OF GOLD IN SMALL-SCALE AND ARTISANAL MINING IN CHILE

The marketing routes or channels used for the sale of minerals depend on the legal situation of the property. There are also other variables, such as the distance from the purchaser or who pays the best price for the mineral. The most frequent marketing channels are:

- ENAMI (the National Mining Corporation)
- Individual plants
- Other producers
- Traders

In the case of gold marketing, there are clearly intermediaries involved. Usually, the artisanal miner processes the mineral in ore crushers and then amalgamates it with mercury, obtaining metallic gold rapidly but gold of low value.

This gold is sold, at less than the market price, to traders from urban areas who may be: jewellers seeking to reduce their production costs, or intermediaries who are avoiding taxes. In this way, the miner does not have to account for his output if he is working illegally. Whoever buys the metal is then on the borderline of legal. In a survey conducted to find out about marketing modes, questions on this subject were avoided as the replies were likely to be unreliable. Nevertheless, the unofficial view is that about 90% of the gold produced in the small-scale mining sector is traded through this mechanism.

Source: ECLAC, based on Pablo Saez, La pequeña minería en Chile: Análisis, diagnóstico, relación con la economía del país y comparación con otros países latinoamericanos, Santiago de Chile, 9 February 2000, unpublished.

Special national studies to determine the extent of this phenomenon would be very useful, as they would help to improve understanding of the pattern of production, the general associated costs, and the effectiveness and validity of mining rights.

This situation occurs for various reasons: (a) mining geology - the mineral is very abundant as in the case of construction materials or calcareous minerals, deposits are very extensive and usually the mineral is relatively inexpensive, which leads to a proliferation of producers, coal being an example in some countries; (b) commercial - when prices fall, this generates attempts to form cooperatives, initially in order to defend the price, but subsequently the purpose of the cooperative becomes self-defence against the owner of the mining rights, who by that time has already lost control and has to appeal to the authorities to expel from his property the invaders that he brought there himself; (c) social - often this type of activity is the only form of work in the area.

Another reason for the increase in small-scale operations is the need to supply a limited local demand for minerals and primary materials, which may be expensive to import in the minimum volumes sold by international exporters, which leads to substitution by national products, on a regular and continuous basis. This situation has created mining villages in many parts of the continent, especially for work with construction materials. This also happens with coal, in order to supply local inputs for coal-fired power plants, or with industrial minerals: special clays, limestones and marbles, feldspars and kaolins. The latter are mined on the outskirts of cities with growing industries that require those materials and wish to avoid as far as possible the impact of the transport variable on the final cost of their manufactured products.

Another variant of this situation has developed in relation to specific minerals such as salts, or as in the case of Chile in the past with saltpetre (see box 4); the output was intended for export, and in the enthusiasm to find new deposits other minerals were also discovered. Whatever the origin of the settlements for informal and small-scale mining, they have a considerable economic impact on the national scale. In Brazil, Colombia and Peru, the gold produced by these mining sectors account for large percentages of the national totals. In the north of Mexico a certain amount of silver is produced by mines that have many technical difficulties, and the same happens in Chile with small-scale producers of copper and gold (see box 5 and table 2).

Box 4

THE SALTPETRE INDUSTRY AND THE DEVELOPMENT OF SMALL-SCALE MINING IN THE GREAT NORTH OF CHILE

Foreign trade was the dynamic factor that brought growth in the Chilean economy in the nineteenth century; the exports in this period included both mining and agricultural products, which were of equal importance until at least 1879; the situation then changed to one with predominance of the mining sector, when the saltpetre provinces of Tarapacá and Antofagasta were incorporated. Mining exports (mainly copper, saltpetre, gold and silver), together with agricultural exports (wheat and flour and, to a lesser degree, leather and cattle), provided the country with the foreign currency needed to meet the internal demand for imports, as national industry was not well-developed at that time.

In about 1880, when development of the saltpetre industry began, foreign trade accounted for about 40% of fiscal income, a figure which reached close to 80% at the beginning of the twentieth century, and then declined with the crisis in the 1930s to a little over 40%.

Prior to 1930 there were two major cycles of expansion and crisis in Chile; the period from 1830 to 1878 was mainly affected by the legacy of colonial institutions (cultural, and economic and social organization), the restructuring and consolidation of the State, and the export boom (mainly of silver, copper and wheat), that brought Chile into the international economy. At the end of this period there was a crisis owing to the influence of new dominant groups and a decline in copper and silver exports. In the second cycle, 1880-1930, saltpetre production may be said to have ruled the Chilean economy from 1879 until 1920; during this period, income from saltpetre predominated in the national budget and also in financing the country's foreign commitments.

The inherent instability of the primary export activity accentuated the economic, financial and exchange instability of the whole country, which was subject to the vagaries of external markets in terms of both volume and prices of exports and imports. The second cycle of expansion came to an end in 1930, also because of a crisis in the world economy. The saltpetre industry was not to recover this time, as a synthetic form of saltpetre came into use; as of 1930 copper replaced it as the leading export.

The State, together with the external sector, had a very important role in the development of the country, helping to build a network for administration and public works to support the growth of the external sector. Until the middle of the nineteenth century there was emphasis on constructing public buildings (customs houses, police stations, etc.), ports, storage facilities and roads; in the second half the main focus was on developing the railways, so that by the beginning of the twentieth century Chile had a central railway line of more than two thousand miles in length, which connected Iquique in the far north with Puerto Montt in the south. The government could not be said to have taken the initiative in this area, as railway construction was mainly a private activity, especially in the mining areas of the north. Although the first public railway dates from 1851, between Copiapó and Caldera, by that time there were already various lines functioning in the nitrate fields which were to become part of Chilean territory after the War of the Pacific. In the last phase of the public works policy prior to 1930, from 1900 to 1930, the effort shifted more towards the internal sectors.

Box 4 (conclusion)

Although there is saltpetre or sodium nitrate in many countries, the saltpetre in the two provinces of the Great North was notable for the vast extent of the deposits, their high standard and the thickness of the saltpetre layer. These extraordinary natural conditions led to the huge saltpetre boom between parallels 19 and 26, or between the ports of Pisagua and Chañaral, including the provinces of Tarapacá, Antofagasta and the north of Atacama, over a distance of more than 750 kilometres.

The breadth of the deposits varied between one half and ten kilometres, with deposits at between 40 and 80 kilometres from the sea. In view of these physical characteristics, saltpetre mining was extensive and led to numerous population settlements being established in the saltpetre areas and at the ports on the coast, as well as an extensive communications network, not only to facilitate saltpetre export, but also to provide the saltpetre offices with inputs and capital goods and provide the mining population with consumer goods.

From 1870 to 1872, 18 offices were opened, while another 55 were established between 1872 and 1878. In the 1890s the number of offices fluctuated around 50, increasing in 1910 to 102, and reaching about 130 in the peak years, with a relatively homogenous distribution of production, which amounted to 3 million tons. This large number of offices was linked to a number of ports through the saltpetre railways, which were private property. Construction had begun in the 1870s and by 1881 there were over 339 kilometres of railway lines, by 1887 there were 861 and by 1905 there were 1787 kilometres.

The population of this area grew very rapidly, rising from 88,000 to 141,000 between 1885 and 1895, while between 1895 and 1907 it increased by 66%, reaching 234,000. As for the population employed in the saltpetre industry, in 1880 there were 2,848 employed persons, in 1900 about 20,000 were recorded and in the peak period prior to the crisis in 1930, employment in the saltpetre industry reached 44,000.

In view of the above factors, the saltpetre region was clearly a favourable environment and attracted people from all parts of the country, including of course the inhabitants of North Chico, where copper, silver and gold mining had traditionally taken place at large deposits such as in Arqueros, Chañarcillo, Punta Gorda and Tamaya. The development of the railways associated with the saltpetre boom, as was mentioned, provided employment to a large number of persons and small-scale mining activities were in turn associated with the railway system.

In fact, the railway stations constituted small centres of activity and purchasing power; the stationmaster was said to be an authority on his environment, collecting information and making surveys of surrounding areas. For this purpose, he employed the "*carrilanos*" (employees responsible for railway maintenance) outside their working hours for the surveying work, which was sometimes successful. As an example, in the saltpetre commune of Taltal, in the province of Antofagasta, such activity was observed at various stations between the port and the nitrate fields: Breas, Central, Canchas, Agua Verde and Catalina. Nevertheless, it was not until after 1930 that purchasing power was available for minerals from small-scale mining in Taltal.

Source: ECLAC, on the basis of information provided by Georgina Ortiz, an official of the Natural Resources and Infrastructure Division, United Nations, March 2000.

Small-scale mining and artisanal mining is mainly concerned with four basic mineral groups, namely; (a) precious metals, especially gold and precious stones; (b) metallic minerals, copper, zinc and tin; (c) industrial minerals; and (d) construction materials such as kaolins, feldspars, clays of all kinds, sand and gravel. Those countries which have recognized the difficulties experienced by those engaged in small-scale and informal mining have taken various approaches to resolving the conflicts caused by this activity. One of the mechanisms most used has been association.

Box 5

SMALL-SCALE MINING IN CHILE

A recent study sponsored and conducted by the Natural Resources and Infrastructure Division of ECLAC, United Nations, describes the following features of small-scale gold mining in Chile:

The gold produced in small-scale mining comes from gold-bearing sands or underground mines or clearings, and processes of concentration, cyanidation or smelting then take place. Table 4 shows the volumes produced. The values recorded do not indicate the quantity of gold that is processed in ore crushers with mercury, which is a widespread practice in many sectors of artisanal mining.

These figures obviously also omit the metallic gold sold on the black market, which, understandably, is not covered by official records. The National Mining Society of Chile (SONAMI) estimates that 90% of the gold produced in small-scale mining is sold on the black market. Small-scale gold mining takes place over an area from the north of Chile (First Region) to the Metropolitan Region, but in the recent past this activity has reached as far as the Eighth Region.

The Third Region has historically been the main small-scale mining producer of gold-bearing minerals for concentration. Adding its records to those of the Second and Fourth Regions, they produce between 100% and 80%, with 92.8% as an average over the last twenty years. This region is the main producer of the mineral from direct smelting, accounting for 45.9% over the last two decades.

As the Fourth Region produced 41.2% over the same period, it is clear that the two regions account for almost all of the output. However, some other regions also have a small level of output from direct smelting: including the First Region and the Fifth, which has increased its volume since 1995. Mineral production from direct smelting has always been in a state of fluctuation, with increases at certain points over the past two decades. The first was in 1981, when 315.8 kg of gold was produced, and the second in 1989 when production amounted to 244 kg of gold. These high points do not coincide with the highest prices for an ounce of gold, but the price was: US$ 459.6/oz and US$ 381.3/oz in those years. Cyanidation was only reported in the Third Region between 1983 and 1992, with rapid initial growth, but then decreasing as of 1986. It reached a high point of 124.5 kg in 1985. Despite the short period of production, 594.1 kg of gold was produced, which is quite significant for a single geographical area.

Gold panning is a small-scale mining activity that has taken place in all regions of the country, even in those without a mining culture. without any capital and without other markets The work is carried out not only by miners, but also by persons normally employed in other occupations who change their activity for economic reasons. There is no correlation, however, between variations in production and variations in the price of gold. In fact, the last year of recorded gold production from gold-bearing sands is 1994, when the price for an ounce of gold was US$ 384.2, 7% more than in the previous year, and so there does not seem to be a logical economic explanation. It is important to note that this activity is impossible to control, as it does not require any technology, or any complicated processes with a certain level of facilities. The pirquineros rent ore crushers, and then amalgamate the mineral using mercury, obtaining metallic gold rapidly and inexpensively, which is marketed very quickly with the help of traders, and without State involvement in any kind of transaction.

In general, small-scale gold mining has a high level of variability. Production varies on average by 16% from one year to another. Over the period studied, the highest level of growth occurred between 1982 and 1983, when there was an increase in production of 43.7%. This situation coincides with the increase of about 11% in the price of the metal. It is also related to the significant increase in the number of miners working in gold extraction, rather than an increase in the technological capacity of the mines and processing facilities: 1,604 miners were working in gold and silver extraction in 1982, and in the following year this number increased to 5,934.

Another important fact to consider is that over the past twenty years, on average 39.4% of the gold is produced as a by-product, mainly from copper and silver mines, with small-scale copper mines making the largest contribution. In small-scale gold mining, the largest contribution came from mineral concentration, with 39.9% on average, followed by smelting with 9.8% and then gold-bearing sands with 8.7%. An interesting case is mineral processing by cyanidation, which contributed between 2% and 6.5% of gold production in the years it took place.

Source: ECLAC, based on Pablo Saez, La pequena minería en Chile: Análisis, diagnóstico, relación con la economía del país y comparación con otros países latinoamericanos, Santiago de Chile, 9 February 2000, unpublished.

Table 4

PRODUCTION OF SMALL-SCALE MINING IN KILOGRAMS OF GOLD

Year	Concentration	Smelting	Cyanidation	Gold-bearing sands	By-product
1978	197	59		19	760
1979	333	70		20	863
1980	557	151		15	926
1981	502	316		0,4	643
1982	432	113		5	744
1983	946	110	51	21	730
1984	722	97	120	248	643
1985	752	105	125	483	666
1986	956	120	87	534	594
1987	828	110	60	504	375
1988	745	217	61	361	379
1989	363	244	27	65	456
1990	392	123	25	21	478
1991	471	169	24	40	568
1992	565	156	13	26	482
1993	504	148		13	434
1994	468	118			355
1995	350	94			307
1996	454	78			173
1997	378	83			202
1998	148	60			90.7

Source: Pablo Saez, *"La Pequeña Minería en Chile: Análisis, diagnóstico relación con la economía del país y comparación con otros países latinoamericanos"*, Santiago, February 2000, (not published).

D. Associations and cooperatives

The difficult circumstances in which small-scale mining takes place have always provided an incentive for those engaged in it to establish associations, and there are many examples of different forms of association. A distinction should be made between establishing trade syndicates, which defend global ideas against the State, and the cooperative movement, which seeks to achieve more specific objectives. In the latter field, there are some examples of quite successful cooperatives, which does not necessarily mean that their number is greater than the number of those that fail. Trade syndicates, which are usually associations of producers, set up cooperatives for saving and credit or for consumption as a service for their members.

It has to be admitted that the States have not attached much importance to the trade syndicates and have made little contribution to assisting and developing them. To a significant degree this is due to the reluctance of the public sector to encourage organizations or bodies when there is no guarantee of them becoming independent of their initial sponsorship, and may turn into actual critics who are paid by the State. It has been a different story in the cooperative sector, which has received various forms of support, ranging from specific legislation to financial resources, although such measures have not necessarily been successful.

The poor level of development of the cooperative as a mining institution is explained by the rigidity of the rules that cover their establishment in the different countries of the region. There are also structural problems which have limited the use of tools specially designed for the creation and promotion of cooperatives; the lack of adequate training for the partners and also of training for those responsible for supporting and assisting the cooperatives, are also reasons for this inadequate development. Despite all of these factors, one of the main barriers is still the difficulty of the

members in establishing associative groups with more or less shared objectives and with a long-term vision, as usually the associative effort is aimed only at achieving subsidy mechanisms that bring higher profit levels.

This is why there are generally conflicts when defining the objectives of a cooperative. The basic principle which motivated the men in Rochdale to organise the first cooperative group was the fact that their only capital for survival was their labour. This may seem obvious, but the result is confused ideas which seem harmless enough but eventually come to exhaust all efforts and enthusiasm; a cooperative of producers, a cooperative for marketing mining output and a producing cooperative are all very different entities.

If the aim is to establish a working group with the aim of mining a deposit, it is essential that the workers involved forget the idea of continuing individual operation of their own mines. If this is possible, they should concentrate on jointly or collectively working in a shared mine, where various *garimpeiros* or *pirquineros* come together with the following aims: to make their work legal, market their output, reduce costs by collective purchase of inputs and, ultimately, improve their quality of life. But on many occasions this is where the problem arises, they refuse to or cannot stop working as individual producers and do not want to produce in association with others. The result is that each member of the cooperative has different objectives, interests and views in relation to managing the business.

A mining cooperative where all the members operate a single mine is thus incompatible with a cooperative of producers in which each manages his own mine. In the latter case, there are always disputes about the administration of the cooperative. Groups are formed for or against the administrators, and in addition to the little time available for managing, there are constant changes in the organization's plans and programmes, which impedes the continuity and implementation of long-term programmes.

A critical consideration of current cooperative models suggests they have proved unable to meet the challenge of unemployment and of strengthening new production links. These cooperative models have not been able to get off to a good start in the area of mining, because the very essence of the activity, and the difficulties in marketing the minerals produced by the mining members have impeded the development of this initiative. In the case of mining, variations on mining-cooperative options could and should be encouraged, such as, for example, the possibility of taking account in this model of local needs such as repair and maintenance services for machines, equipment and tools, cleaning and maintenance of roads and aqueduct systems and garbage collection and recycling. One should not discard the possibility of developing cooperative works which generate employment in work of a social nature, particularly for the spouses of the unemployed, such as child care, care of the elderly and services in general (Munkner, 1998).

E. Financial difficulties

Difficulties in obtaining additional financial resources is typical aspect of small-scale extraction activity. This is for various reasons: the lack of real guarantees for credit, the lack of mining rights, uncertainty as to the potential of a deposit, *inter alia*. These facts are all known and have been discussed in the usual meetings convened to study these issues; there is little or no information, however, on the basic procedures for obtaining credit.

In view of a low level of knowledge of the mining business, financial operators are apprehensive of the credit applications made by small-scale miners and cooperatives. Most of the miners who have thought of applying for credit are unaware of the procedures, and thus a vicious circle tends to develop that the financial sector has no interest in breaking, as it has sufficient

clients in other economic sectors. This also means that the miner turns to non-bank credit, or soon exhausts his liquidity, with all the associated consequences. This is why small-scale miners and mining cooperatives have difficulty in obtaining resources.

This situation of a lack of connection in the mining sector with sources of financing occurs on such a scale that a survey carried out by the Mining and Energy Planning Unit of Colombia in the financial sector of that country showed that more than seventy per cent of credit requests were turned down because of incorrect applications[6].

[6] Ministry of Mining and Energy, Mining and Energy Planning Unit (1997), "Plan Nacional de Desarollo Minero de Colombia", Bogota, Colombia.

II. Latin American legislation for small-scale mining and differential treatment by strata

As legislation is a very important issue in the mining industry, it was decided to deal with it in a separate chapter. It is impossible to disregard the physical existence of small-scale mining within the mining industry, and laws and policies have been developed to support this segment of production, and are still in force in many countries of the sub region, despite the current clear trend to maintaining complete neutrality in the mining policies of countries in the region, as shown by the figures.

The ECLAC Natural Resources and Infrastructure Division has created an up-to-date and systematic record of mining legislation in 14 countries of Latin America, and the main features of this study[7] are presented here. As indicated above, the focus is on stratification, with a few notes on the most recent legislation in that area. The aim is not to refer exclusively to small-scale mining, but also to indicate the two trends of thought that currently coexist in Latin America with regard to mining: on the one hand, neutral policies towards the industry and on the other hand the establishment of a stratification of mining in order to support the small-scale producers. The mining strategies of different countries are presented below.

[7] Berrios, Jorge (1997), "La legislación minera de los países de América Latina", ECLAC, United Nations. LC/R.1720, Santiago, Chile, May.

A. Mining strategies by country

1. Argentina

The **Ley de Actualización Minera** of 1995 repealed the large-scale mining regime of the Mining Code (Ley de Actualización Minera, art. 15) so that there are at present no provisions for differential treatment by strata in this code. Despite this, there have always been formal and informal mines on a much smaller scale than that of the recent projects that have been so successful in this country. Argentina, and also Chile and Peru, offer typical examples of recent trends.

2. Bolivia

Legally established mining cooperatives have the same rights and obligations as those specified in the Mining Code for all mining concessionaires. Mining cooperatives may be established, and may sign any kind of contract, including shared-risk contracts with the Mining Corporation of Bolivia or with other persons, whether individual or collective, national or foreign, without losing their status as public-interest corporations (art. 21).

The State is to establish mechanisms for promotion, technical assistance and financing policies for development of small-scale and cooperative mining. It is also to establish incentive systems for environmental protection in small-scale and cooperative mining operations (art. 22). Despite this mandate, there are strong calls from industrialists and trade associations for the State to take action on this provision.

The Executive Power had the legal mandate to define the tax context of what were referred to as small-scale mining producers, establishing by regulations the date of application, which was to be no later than 1 October 1997, for the tax declaration forms. The latter should be appropriate to the nature of the mining operations and the additional general deductions established in the current legal provisions, applicable to the tax on company profits for small-scale mining producers, to be determined according to the regulations (art. 9, temporary provisions).

An clear example of the existence of legislation for small-scale mining is the regulation that obliges the Executive Power to establish training programmes in accounting for small-scale and cooperative mining (art. 10, temporary provisions). It is important to note however that the differential treatment was only temporary; as of 30 September 1999, the companies, in particular the small-scale and cooperative mining companies that were under the royalties regime were obliged to come under the company profit regime.

3. Brazil

The case of Brazil is an excellent example of the large number of options available in the area of stratification of small-scale mining.

There is pressure exerted by a large number of workers generally referred to as small-scale miners, as well as the impact of “garimpo tc\12 “C.Brasil”, which is no other than artisanal operation, usually informal, with little technical and financial capacity and usually starting out as a means of survival; in view of this situation, Brazil adopted special legislation to stratify mining activity and make special arrangements for the informal sector.

Law 7.805 of 1989, which modified the Mining Code by creating a special licensing regime for artisanal operation (garimpagem), made provision in that regime for the direct exploitation of mineral deposits which, owing to their nature, size, location and economic use could be worked without previous exploratory activity (art. 1).

The license may be granted to a Brazilian individual or to a cooperative of such persons for a renewable period of 5 years and for an area that does not exceed 50 hectares (art. 5). The license is conditional on the prior granting of an environmental license by the competent authority (art.3). Despite these provisions, there are numerous complaints and unresolved problems relating to mining in Brazil.

4. Chile

This country, that has been the most successful in attracting foreign investment, does not have any special regulations in its Mining Code to stratify the mining industry, which does not mean that there are not well-defined strata of production for which there is specific legislation as well as support programmes. The Mining Code does not include regulations specifying differential treatment for different strata; however, Decree-Law No. 824 establishes the following categories:

- Small artisanal miners, which refers to those working personally and directly in a mine or a mineral processing plant, assisted by family members or a maximum of five dependent workers. This category also includes legal corporations with no more than six partners, and cooperatives of artisanal miners (art. 22).
- Large-scale miners are corporations and joint-stock companies as well as taxpayers who own or operate mining deposits under any form of title, whose annual sales exceed 36,000 tons of non-ferrous metallic mineral or 6,000 annual tax units, irrespective of the mineral concerned (art. 34 No. 2).
- Small-scale miners are those engaged in mining who cannot be classified in either of the two previous categories (art. 34 No. 1).

5. Colombia

Colombian mining legislation is one of the most detailed in terms of stratification. The main criterion used to define the status of small-, medium- or large-scale mining is the volume or tonnage of useful and sterile material extracted during a year, usually considered to be from 1 January to 31 December, and also the area covered by the mining title.

The level of installed capacity for materials extraction determines the level of investment, value of production, employment, the degree of mechanization of the mine as well as technical, economic and social aspects. Small-, medium- and large-scale mining are classified using ranges of production and according to whether the extraction method is surface or underground. The scale of production is defined by the projected annual capacity of materials extraction, as established in the corresponding Work and Investments Programme, referred to as PTI (art. 15):

a) Opencast mining

- Metals and precious stones
  - Small-scale mining: up to 250,000 m^3/year
  - Medium-scale mining: from 250,000 to 1,500,000 m^3/year
  - Large-scale mining: over 1,500,000 m^3/year.
- Coal
  - Small-scale mining: up to 180,000 m^3 or
  - 24,000 tons/year
  - Medium-scale mining: from 180,000 to
  - 6,000,000 m^3 or between 24,000 and 800,000
  - tons/year
  - Large-scale mining: over 6,000,000 m^3 or

- 800,000 tons/year.

- Other (excluding construction materials)
  - Small-scale mining: up to 100,000 tons/year
  - Medium-scale mining: from 100,000 to 1,000,000 tons/year
  - Large-scale mining: over 1,000,000 tons/year.

b) Underground mining

- Metals and precious stones
  - Small-scale mining: up to 8,000 tons/year
  - Medium-scale mining: from 8,000 to 200,000 tons/year
  - Large-scale mining: over 200,000 tons/year.
- Coal
  - Small-scale mining: up to 30,000 tons/year
  - Medium-scale mining: from 30,000 to 500,000 tons/year
  - Large-scale mining: over 500,000 tons/year
- Other
  - Small-scale mining: up to 30,000 tons/year
  - Medium-scale mining: from 30,000 to 500,000 tons/year
  - Large-scale mining: over 500,000 tons/year.

Every two years, the Government may adjust the volume limits of the extraction capacity stipulated for small- and medium-scale mining, according to socioeconomic conditions, the mineral markets and progress in extraction technology. This adjustment may not exceed 50% each year of the volume established for the period immediately preceding.

The volume in cubic metres refers to the total volume of solid material extracted, including both the mineral and waste material. Thus, in the case of opencast coal mining, the owner of the mining rights may opt in his work plan to use metric tons when referring to coal and cubic metres when referring to the removal of waste.

c) The extension or area of the mining rights

An exploration license may be granted for small-scale mining for an area of up to 100 hectares (art. 28), for medium-scale mining, up to 1,000 hectares (art. 29) and for large-scale mining, up to 5000 hectares (art. 30).

In the case of the beneficiaries of titles classified as small-scale mining, they are only obliged to present the final exploration report and the work and investment programme when their exploration license expires (art. 35). Also, Colombian legislation provides for the existence, operation and development of cooperatives and pre-cooperatives, and specifies a number of special privileges.

Cooperative and pre-cooperative corporations which are established with the aim of carrying out small-scale and medium-scale mining activities benefit from special privileges. Such entities may obtain mining titles, carry out mining activities in mineral or other deposits or mines, and process and market their output in order to meet the needs of their partners and the community (art.

148). Miners' cooperatives may acquire mining titles (art. 150). The pre-cooperatives which do not become cooperatives within a fixed time period are dissolved by statute and their mining titles are extinguished (art. 155).

Mining cooperatives and pre-cooperatives (art. 151) have priority in the official technical assistance and training programmes for the mining sector; also in special credit programmes using mining promotion funds, and they may benefit from exemptions and privileges of any kind that have been established or that are established for cooperative entities or for persons carrying out mining activities.

According to the legislation, specifies that the Ministry of Mining and Energy promotes and supports the establishment of cooperatives and pre-cooperatives whose aim is exploration, mine operation, or the provision of materials, equipment and tools for this industry (art. 152). The Ministry and its attached and associated entities are obliged to conduct technical assistance, training and mining promotion programmes aimed at cooperatives and pre-cooperatives (art. 153).

This regulation makes a clear distinction between small-scale mining and subsistence mining. The operation of washing surface sands from river beds and shores and other alluvial areas in order to separate and collect precious metals may be carried out freely with the following exceptions: in areas where all mining work is prohibited, areas where machinery and facilities are in operation that belong to the beneficiaries of a mining title, areas where it is prohibited for reasons of safety, health, or urban decor and development, and on private property without prior authorization from the owner (art. 135).

It would seem that this distinction exists only for precious metals and minerals, and not for others, which could explain to some extent the proliferation of unregulated artisanal and subsistence mining in Colombia. Those who are engaged in this activity have to register with the relevant mayor's office (art. 136). The mayors are responsible for monitoring these activities and resolving conflicts between those engaged in mining, the beneficiaries of the titles and the owners and occupants of the land (art. 137).

6. Costa Rica

The placer deposits situated in uncultivated lands or in riverbeds or gullies for which no previous mining rights have been granted may be worked freely if the work is carried out manually (art. 39). In the case of a conflict, the Department of Geology, Mines and Hydrocarbons may assign clearly defined placer deposit sites for each interested party, giving priority according to seniority (art. 40).

If the placer deposits are not going to be worked manually, a prospecting license or operating concession must be applied for, as specified by the Mining Code. The Department of Geology, Mines and Hydrocarbons must give priority to a concession application if the applicant guarantees a higher output or quality of work, subject to providing compensation for the displaced workers as required by law, and according to a technical study by the Department (arts. 42 and 44).

7. Cuba

Small-scale mining production is understood as all work that takes place on concentrations of mineral resources that are considered to be small deposits (art. 46).

The Council of Ministers or its Executive Committee delegates to the Ministry of Basic Industry the granting or withholding of mining franchises for small deposits of certain minerals and also their cancellation or extinction (art. 47). In addition to the general obligations of the franchise-holders, the owners of small-scale mines have the following obligations (art. 48):

- To begin prospecting work within a maximum period of two years from the date of the title;
- To maintain updated topographical plans of the area under franchise and the work carried out;
- To have the minimum geological knowledge required for working with the relevant mineral.

8. Ecuador

Artisanal or subsistence mining is carried out individually or by a family and uses rudimentary tools, manual equipment, or portable equipment duly approved by the National Department of Mines. Subsistence mining activities may be carried out on river beds and banks and other areas (art. 142). Registration is required, and a permit from the Regional Department of Mining in the area, the permit being non-transferable (art. 144).

Those who practise subsistence mining activities have the right to take ownership of the mineral found and sell it to anyone who has a marketing license (art. 143). Those engaged in subsistence or artisanal mining must use methods which do not contaminate the land, water, flora or fauna. The use of mercury and other reagents is only permitted when the process allows for recovery and recycling, and avoids contamination. Infraction of this regulation results in cancellation of the permit, without prejudice to penal and civil liability regarding compensation for the damage (art. 145).

9. Guatemala

There are no regulations providing for differential treatment by strata.

10. Honduras

Hondurans working in small-scale mining may obtain a prospecting permit and operating licenses for mining lots with an area less than the minimum established in the Mining Code (art.47).

Hondurans may extract gold freely from deposits in alluvium areas, channels, beaches, river beds, lake basins and sea beaches, on the condition that artisanal working methods are used (art.97).

Some areas may be declared open for gold mining, although underground work is prohibited. Marketing of the mineral is the subject of special regulations (art. 98). Artisanal miners in areas where gold mining is allowed are exempt from the payment of taxes (art. 108).

11. Mexico

There is no differential treatment by strata with the exception of the following provision:

Those who operate mineral-processing facilities are obliged to process minerals from small- and medium-scale miners and from the public sector on competitive conditions to the extent of a minimum of 15% of installed working capacity, when the latter is greater than 100 tons in twenty-four hours (art. 37).

12. Peru

The State protects small- and medium-scale mining and encourages large-scale mining (art.III, Preliminary Section).

Small-scale mining producers are those that have any kind of title, whether in the form of petitions and/or mining concessions, for areas of up to 1000 ha and whose production and/or processing capacity does not exceed 150 tons/day, with the exception of those working with construction materials, detrital heavy metals and alluvial gold miners, for whom the limit would be 200 m^3/day. The small-scale producer establishes his status by means of an annual sworn statement that he presents together with proof of payment of the *derecho de vigencia*, which is the annual fee paid to maintain the concession (art. 91).

Small-scale mining producers enjoy the benefits of tax stability if they present investment programmes of the equivalent in national currency of at least US$ 1,000,000 (art. 92).

13. Uruguay

There are no regulations that provide for differential treatment by strata in the Uruguay Mining Code.

14. Venezuela

The new law of 1999 established a stratification by establishing the following 5 modalities for prospecting, exploitation and development of mining resources in Venezuela:

- Directly by the National Executive;
- Concessions for prospecting and subsequent operation;
- Authorizations for small-scale mining;
- Mining associations; and
- Artisanal mining.

The three latter categories may be described as follows: small-scale mining carried out by natural or legal persons of Venezuelan nationality for gold and diamond mining, over a period of not more than 10 years, in areas previously specified by resolution of the Ministry of Energy and Mines, for surface areas of no more than 10 hectares, to be worked by no more than thirty individual workers (art. 64). The Ministry of Energy and Mines regulates by resolution the development of small-scale mining projects (art. 65).

In deciding whether the small-scale mining regime shall apply to a particular area, the Ministry of Energy and Mines takes into account the initial level of investment required, the quantities of mineral to be extracted and the capacity of the facilities for mineral extraction, smelting and processing, as well as the other conditions specified by the regulations of the law on mines (art. 66).

In small-scale mining, the right to operate is exercised by precarious title, as it is granted *intuitu personae*, and hence no real land rights are granted, and thus cannot be alienated, encumbered, leased, transferred, or given up, except for their contribution to the social fund established for the formation of mining associations (art. 67).

The status of precarious title means that at any time the national Executive may revoke the resolution of authorization, as when title is granted in this way, there is no contract. The environmental regulations must be observed, the tax regime established by the law on mines applies, and the authorization is granted for mineral deposits that do not require previous exploration on account of their geological, mining and economic attributes (arts. 67, 68 and 69).

Small-scale miners who wish to continue their activity have priority for obtaining authorization to work with the same status in those areas where they are already working, as long as they are not contravening any environmental or land-use planning regulations, and subject to

confirmation by the Ministry of Energy and Mines. This takes place in accordance with the procedure established by law (art. 70).

The procedure established by law specifies that the first step in the formalities is the presentation of a plan, which should comply with the provisions of article 50 on scales and which accompanies the request for the relevant authorization (art. 71). When certification has been obtained from the competent organization on land occupation, the Ministry of Energy and Mines, if it accepts the request, must order its publication in the Official Gazette of the Republic of Venezuela. The interested parties should follow the above-mentioned procedure for publications in the national and local newspapers, in order to allow for the right of objection, which may be exercised within a continuous period of 30 days from the last date of publication (art. 72).

The Ministry has 15 days to establish the relevance of the objection, if one is made, and the decision then goes beyond the administrative channel (art. 73). If there is no objection, or if the objection is found to be invalid, the interested party has to submit to the Ministry of Energy and Mines a mining plan and project in accordance with the Ministry's regulations within a continuous period of 90 days from the end of the period allowed for objections (art. 74).

The Ministry of Energy and Mines orders the correction of any shortcomings found in the plan or project, which must be remedied within a period of no more than 30 days from the date of notification by the interested party (art. 75). After this time the Ministry has a period of 30 days to approve by resolution the requested authorization, which is then published in the Official Gazette of the Republic of Venezuela.

Venezuelan legislation introduces the concept of stratification in relation to the category of mining associations. In practice, such associations had previously been formed at coal deposits mined by artisanal miners and small-scale miners in Colombia, in areas referred to as integration zones. In the latter country, however, the work could take place legally without any kind of title being granted, whereas in Venezuela only the owners or holders of authorizations may engage in small-scale mining (art. 78).

In Venezuela there is a regulation that the State shall encourage the establishment of mining associations (art. 77). The latter are defined as groups of small-scale miners who work in different areas of a single deposit or in various deposits that are located in such a way that all or part of the services they require for carrying out the mining activity may be shared (art. 77).

In order to form an association, the holders of mining authorizations have to submit the relevant request to the Ministry, accompanied by details of the mining project, with an explanation of the advantages to be derived from the mining association, and stating the technical and economic conditions, together with their social implications. The request should include a copy of the draft agreement, as well as the instrument of incorporation that regulates the form of company adopted, plans of the area to be developed, and the transfer to the association of the mining rights of its members (art. 78).

Once the request is received, the Ministry has a period of 60 days to make a decision on the case. If the decision is positive, the approving resolution is published in the Official Gazette of the Republic of Venezuela, and the interested parties have to comply with the provisions for the constitution of the form of company adopted. If the decision is negative, the explanation must be provided and the Ministry has to notify the applicants (art. 79). The beneficiaries of a mining association have to request a concession in accordance with the provisions of the text of Title III, chapter IV of the law on mines (art. 80).

Artisanal mining is defined as personal and direct work in alluvial mining of gold and diamonds, using manual, simple, portable equipment, with rudimentary extraction and processing

techniques, that may only be engaged in by natural persons of Venezuelan nationality (art. 82). The State supports such activity by means of technical assistance for its further development. The National Executive shall specify, by decree, the areas in which this activity may be carried out (art. 83). Artisanal mining is to be carried out in compliance with the environmental regulations (art. 84), and taxes shall be paid as specified in the law on mines (art. 85).

B. Lessons from a country with small-scale mining. The case of Brazil

The increase gold prices at the end of the 1970s led to an upsurge in informal mining that was very similar to the gold rush in the nineteenth century. Higher mineral prices increased production, even when costs were high, and as a result, many people took part in an informal and poorly organized race for the mining of gold-bearing minerals. Subsequently, however, the fall in prices proved to be an even greater incentive to growth in informal mining, which usually masks its true production costs at the expense of the workers and the environment, in the effort to stay in the market. In 1973, in the Tapajós district (in the Amazon region to the south of the State of Pará), only 5.9 tonnes of gold was produced by the *garimpeiros*, whereas five years later this same area reached a production level of 18 tonnes (Neto, 1991). It should be noted that in 1975 the price of the troy ounce of gold was US$ 161 whereas in 1979 it reached US$ 307.5 and in 1980 US$ 612 per ounce, according to UNCTAD.

As this upsurge was taking place, the quantity of gold on the black market increased disproportionately. Table 5 shows the differences in the figures from different sources of information on gold production since the beginning of the 1970s. The figures only began to match when the Brazilian currency became stable on international markets. In table 5, the "difference" column (percentage difference between columns A and B) indicates the percentage of discrepancy between the official figures and those of industry experts, suppliers and marketers. In 1979 the percentage difference was low once the metal price began to rise again, which illustrates how the market can stimulate or depress prices; but it is not always the only factor, as the producers did not have sufficient incentive to declare their production accurately until the flotation of the Brazilian currency.

In other words, the *garimpo* phenomenon in Brazil and in other countries was created either by a rise in prices or by the slowdown in the metals and minerals market, which meant that producers had to lower their final costs and minimize social, technical and environmental expenditure in order to continue. As it is the two extreme scenarios that increase the phenomenon, a set of measures is needed that guarantees reasonable prices, State regulation and alternative and worthwhile job opportunities, in order to avoid the proliferation of harmful mining in the informal sector.

In this connection Maria Hanai notes that, in addition to the factors referred to above, there are also other very specific factors of a socioeconomic nature, such as rural-settlement policies, and the failure of agricultural reform that are key elements; there are also other factors such as the oil crisis that had such an impact on Brazil. Highway construction to help integrate different areas into the national economy resulted in migratory movements of workers to the Amazon region to take part in informal mining.

Table 5

GOLD PRODUCTION BY "GARIMPEIROS"

(1973 –1990)

Year	Percentage	(A) Official (t)	(B) Estimated (t)	(A/B Difference (%)
1973	1,2	5,9	4,7	79,7
1974	1,1	9,0	7,9	87,8
1975	1,5	9,6	8,1	84,3
1976	2,5	9,9	7,7	77,8
1977	1,6	12,1	10,5	86,8
1978	5,4	18,0	12,6	70,0
1979	1,1	31,7	30,6	96,5
1980	9,7	35,9	26,2	73,0
1981	12,9	37,6	24,7	65,7
1982	20,9	41,0	20,7	49,0
1983	47,5	63,6	16,1	25,3
1984	30,6	55,0	24,2	44,4
1985	22,2	65,0	42,8	65,8
1986	14,8	75,0	60,2	80,3
1987	22,7	78,0	55,3	71,0
1988	34,3	90,0	55,7	61,9
1989	29,5	80,0	50,5	63,1
1990	-	55,0	55,0	-
1991	-	1,9	1,9	-

Source: ECLAC, based on Araújo Neto (1991), DEM-DNPM (n.d) in *Formal and Garimpo Gold Mining in Brazil*; and Hanai, Maria (1999), *Mining and the Environment* IDRC, March.

A very important aspect of the development of informal mining in Brazil and in many parts of the continent is the introduction of new technologies, which in turn has social and environmental effects on informal operations. It is not often recognized that the *garimpos* in Brazil are getting stronger and multiplying because of access to new technologies such as pumps, crushers and mills. A similar process is occurring with other forms of production in Latin America such as the *barranquilleros* in Bolivia, the *gurrera* in Colombia, the *pirquén* in Chile and the *gambusinos* in Mexico.

Although the degree of mechanization is limited, it has led to the appearance of a new category of miners: entrepreneurs who have the capital to buy and maintain machinery. This situation often produces site bosses with a certain amount of wealth and with economic, political and social influence in the mining areas. In Colombia this has happened at some rivers in the central-western part of the country and at many places along the pacific coast, places where both mini-dredgers and retro-excavators are widely and intensively used by self-styled "small-scale miners" and "informal subsistence miners".

The accumulated power of these entrepreneurs has on some occasions allowed them to exert a strong influence on governments, managing to define or impose amendments on government policies, as in the case of the gold *garimpeiros* in Brazil; coal miners and emerald-producers in Colombia; and a few years ago at the Las Cristinas deposit in Venezuela, where the miners assumed some of the functions of the State. One example of these processes is the inclusion in the Brazilian constitution of special provisions for the *garimpeiros*; in the case of Colombia, presentations were made when regulations were being developed to implement constitutional provisions, with regard to setting percentage payments, assigning the resources from coal royalties, and lower taxes on emeralds; and in Venezuela there has been a long and expensive legal dispute, in addition to the difficult situation that the government had to face in order to normalize and impose mining law in that country.

The appearance of new levels of mechanization without any control have led to serious degrees of deforestation, salinization and land sterilization, despite the modest level of technology used (Silva et al. 1989; cited by Hanai, 1999). There is also the health impact and the serious damage caused to indigenous communities resident in the mining areas.

The cases of Colombia and Brazil are good examples of the economic significance of this form of mining. Over the period from 1973 to 1991 informal gold production in Brazil was always higher than formal production, with percentages that did not go below 55.2%. One might have expected that the extensive changes occurring in the economy of that country at the beginning of the 1990s would have had an impact on that relationship, but there was no definitive change. In Colombia, formal production has gradually declined from an average of 28 tons in the 1980s to a range of 18-21 tons in the following decade, although it is known that in just one of the districts, the various artisanal and informal miners' associations produce from 10 to 12 tons per year.

The environmental analysis conducted by Hanai, which establishes a distinction between formal mining and *garimpeiros*, sheds light on the scale of the activities involved, the stable location of formal companies versus the mobility of the *garimpeiros*, and the different levels of mechanization. It also demonstrates that in Latin America State policies need to take into account the fact that there are three different groups of entrepreneurs or producers: *regulated, unregulated and unregulable*.

In general, experience shows that, apart from the appearance of the so-called "junior" companies, the main mining businesses in Latin America are engaged in large-scale projects, carried out by international private investors, in contrast to the low level and limited nature of national investment. In some countries such as Chile, state participation is perceived as belonging to the past, and the privatization processes are made easier in countries with long-established public mining sectors such as in Bolivia, Mexico and Peru.

In parallel with the environmental research, many private and public corporations have been making commitments with regard to compensatory measures such as setting up flora and fauna reserves in suitable areas, as in the case of the *Companhia Vale do Rio Doce* (CVRD) in Brazil, which invested in community facilities as a form of public relations.

In the *garimpo* area, or uncontrollable informal mining, according to the view proposed here, the projects are very small-scale, and in some cases financed by national investors who participate in different ways: direct mining, when they themselves carry out the extraction work and also sell the mineral on site; or lending money to the mine operator, who can pay it back when the mineral is sold. Sometimes the initial output of an informal miner is bought by a third party with greater economic capacity, who expands the initial facilities, and displaces the original miner. This is how artisanal and informal mines expand and become legitimate.

In general those who finance, manage or carry out informal artisanal mining work, whether controlled or controllable, do not show any concern for possible damage to the environment. Many of these miners operate in areas where they do not own the land, and are thus not interested in conserving and protecting it.

One distinguishing feature of the formal, or controlled, operations, meaning those that conduct mining as a business activity with a defined structure as far as legal, accounting, technical, administrative and environmental matters are concerned, is that they are designed to continue in the same place for a long period of time, as they involve a high level of capital investment. A large number of such formal mining operations are carried out by family businesses which gives them special significance: they are from the producing region or have arrived there some time previously; they have thus established significant links in the region and take a close interest in local needs and initiatives. On the other hand they do not always have high output levels, or large

numbers of workers, which would put them in the category of medium-scale mining according to the national classifications.

Many formal operations are carried out in areas close to urban communities and have been involved in their development and growth in various ways, which makes them more susceptible to social control; similarly, the fact that they are almost always linked to large transnational corporations, brings a higher degree of social control while also generating a certain degree of formal control. In contrast, the informal mining referred to as uncontrollable, *gurrería, garimpo*, or *pirquén*, is in need of much stricter control. In the Sur de Bolívar in Colombia, there are more than 2,000 gold mining settlements; in Brazil there are around 2,000 facilities; and the numbers for Bolivia and Peru are unknown. This type of settlement is extremely mobile because of the size of the deposit, the short period of time required for the work, the low level of investment required to set up the direct infrastructure at the mining site, and because the mining infrastructure consists of machines and equipment that are easy to move and transport.

At the same time, many of the controlled (formal) facilities use technologies that obtain higher profit levels by increasing productivity, reducing labour costs and conducting technical research; they also have procedures that are managed, designed and constructed in such a way as to minimize the environmental damage caused by the use of dangerous substances, and to minimize the release of hazardous solid residues throughout the treatment process. The smaller mining companies accept and implement both the recommendations of the mining environmental authorities and those of consultants who are either paid by the companies, or by the special technical assistance programmes provided by the government.

The uncontrolled and uncontrollable formal and informal mining operations (the latter category includes many artisanal mines and others of larger size and financial capacity), in contrast, carry out their activities with working methods that cause serious and widespread contamination. Unlike their colleagues in controlled formal mining, these miners do not need to make large investments, and the technology they use is inexpensive, as it consists of mechanized or semi-mechanized techniques for rapid mineral extraction, without paying attention to efficiency or to environmental management. As a result, often somewhat less than 50% of the extracted gold is recovered.

It is important to note that when equipment such as retro-excavators are used, it is no longer appropriate to speak of persons lacking economic resources. Also, the very structure of the informal mining settlement makes it difficult to introduce more efficient and environmentally sound technologies. In particular, the use of a wide variety of systems within the same deposit, with a variety of different machines such as: dredgers, mills, monitors etc. illustrates the difficulties of control.

III. The mining cycle

One of the worldwide trends in classification of the mining industry has been to divide it into three main categories: small-, medium- and large-scale mining. Many different criteria have been used to clarify or explain this classification. This can be seen from the review of regulations concerning to mining stratification in Latin America.

For some time, however, the concept of "mining cycle" has been used to offer a global vision of all the activities that take place when a deposit is mined. But this has to be defined and understood as a sequence of processes that take place in time and space. The cycle can be used as a basis for assigning categories to the different stages of business development to be considered in the design of a strategy for managing and understanding the whole process, according to the concern and the role of each social group involved.

Time is the determining factor for assigning the categories; that is, the period of time required for implementation of the entire mining cycle, which defines the entrepreneurial or subsistence level of each mining operation. The mining cycle covers all of the activities carried out at a bed or deposit, beginning with project planning and ending when the operation is closed down. In this context, there are five sequential stages: the first consists of planning the business, and the second is exploration, followed by development, production and closure (see box 6).

Box 6
THE FIVE PHASES OF THE MINING CYCLE

Planning the business: in the past many mining projects and operations were begun in an informal manner, although with time they were able to establish themselves more formally. In this context the planning phase should be understood as the period of time that the private actor allows for the activities needed in order to take the decision to undertake a project.

Exploration: this phase is considered decisive when a mining project is undertaken, and is expected to consist of three basic aspects, namely: basic exploration which includes the traditional geological work, beginning with field reconnaissance, and ending with exploratory drilling and tunnels; definition of the potential project which includes economic studies and initial designs for support engineering and thirdly, determining the technical and economic feasibility.

Development: this concept, despite being the same expression used in the classic mining triad of **Development, Preparation and Operation**, goes far beyond that concept and consists of two well-defined stages: the first is the final designs and studies together with the purchase of inputs, machines and equipment; and the second is the construction of the mine and assembly of the auxiliary facilities required for the project.

Production: in this document, the phase of development which usually involves engineering, is considered first of all include everything related to mining extraction work and the associated auxiliary tasks: internal transport, ventilation, safety and drainage, together with all the elements making up each step of this phase; the work of transformation, processing and marketing is also considered a constituent part of this stage, inseparably connected to the first part and determining its scale.

Closure: researchers working on environmental issues relating to mining activity have found bibliographical references on theoretical developments in this area over the last sixty or seventy years. But it is only in the last two decades that significant contributions have been made, including the concept of mine closure, which has gradually been refined by the NGOs and by the environmental policy of the larger mining companies. Allowing for the fact that this phase of closure must start at the very beginning, that is, at the planning stage, various interrelated tasks can be identified: preparation, which consists of measuring the impact of mineral extraction, transformation and processing, with the first measures being taken to ensure rapid, efficient, and effective closure at the end of the process at a reasonable cost. Then there is the phase of disposal of solid and fluid wastes, and provision must be made for the resources needed for implementation of the work planned for the decisive stage of impact mitigation and control.

Source: ECLAC, on the basis of the National Mining Development Plan of Colombia (PNDM), UPME, Bogota.

The five phases described above as the links in the chain of the mining cycle do not take into account the amount of capital, the scale of production, the number of workers, or even the type of mineral or extraction method used. This is because, regardless of the status or scale of the person or organization engaged in mining, all of these phases have to be carried out for mineral extraction to be conducted on an economic basis.

Success will depend on the degree of completion of each of these stages, which also brings acceptance in labour, environmental, community and legal terms. This means that due time must be allowed for full completion of each of these stages, and, using the traditional terminology, all miners, from the small-scale miner to the multinational conglomerate, must to a greater or lesser extent follow this mining cycle. One might then ask: what is the difference between this and other perspectives based on the criterion of the scale of operation? The answer is: the time allowed and the degree of compliance with each phase.

The next point to consider is the level of entrepreneurial skills of the operator of each mining task or activity. A realistic and descriptive view of how this industry functions can be based on the degree of attention, in terms of time, which is given to each of the phases described above. This implies leaving aside the terminology currently used in all the codes, laws, decrees, technical

assistance programmes, congress forums and organizations: the well-known classification of small-, medium- and large-scale mining. On the contrary, governments, the community, and all interested parties should be aware of the procedures, treatment and results to be expected in accordance with the aims of mining policy.

Accordingly, with consideration of the level of development, or commitment, if preferred, a new proposal for stratification in terms of entrepreneurial development is presented, namely: (a) controlled miners, (b) uncontrolled miners, and (c) uncontrollable miners.

A. Mining groups, their characteristics and the role of the State in relation to them

As there is a whole range of possibilities for entrepreneurial development, a series of characteristics is needed to identify the three main groups.

In this context, it is clear that each of the five phases previously described involves procedures of various kinds that must be carried out with the support, authorization or assistance of the State. The State will have to apply certain criteria to define its role at each of the levels indicated; so that the public sector has a response and a way of dealing with each segment of the industry, which is far from homogeneous and offers a very broad panorama of challenges and opportunities.

The involvement of the State will depend on the identification of the relevant areas, in accordance with the level of entrepreneurial development in each segment of the industry and according to its own areas of competence and obligations. The latter include ensuring that mining activity takes place in accordance with national regulations, and providing facilities and licenses for marketing mining production and for its financing. All of this is based on legal and institutional frameworks that are stable and durable, and take account of environmental and social issues. There are areas of State intervention where every effort should be made to ensure that all phases of the mining cycle are carried out; by means of direct official intervention, providing appropriate conditions for the planning and coordination of the extraction work, which constitutes promotional support, guaranteeing the physical protection and legal security of the investments, and regulation and control of private activities through the mining authority.

1. Controled Miners

The most important issue with regard to this segment of the industry is that they carry out the entire mining cycle to the end. They carry out all of the processes, interact with the State through the central and local governments, and also with the surrounding communities, complying with the regulations, and paying attention to natural resources and environmental issues.

During the **planning** phase, a process of decision-making takes place, in order to define the project profile, which requires high-quality public information on the business potential of mining activity in the country concerned, investment regulations and requirements, and information on mining, environmental, tax and labour issues. This means that the entrepreneur, in the planning phase of a mining project, has to seek the relevant information and that the State has to provide it as appropriate. This phase defines, from the very beginning, the nature of the activity and the person carrying it out. At this first stage, the controlled miners are motivated by economic interest.

The **exploration** phase begins with the basic field tasks of prospecting and exploration, for which the State should provide basic mining geological information, on the appropriate scale and with adequate physical and chemical support. The second process in the exploration phase is

identification of the potential project, as described in box 6 above. The State has to provide general profiles or guidelines for investment projects, establishing all of the basic requirements, which need to be stable and permanent in order to act attract private investment. The last process in this exploratory phase is a pre-feasibility and feasibility assessment. At this stage the State is expected to distribute and disseminate information on the relevant conditions, so that the assessment will be objective and the decisions taken will be appropriate, not only in economic, but also in social and environmental terms.

The **development** phase for the controlled group consists of engineering and design work, which is essential for implementation. The relevant official procedures should be made simpler and more flexible. Other stages that the entrepreneurs need to go through are: purchase, construction and assembly; the government should provide support at the national level in those areas, by ensuring a natural process of creation and maintenance of national industrial clusters or groups.

As for the **production** phase, the process of extraction has to be the responsibility of private interests, but a public system is also needed, with previously chosen mechanisms, to monitor the investor's plans with regard to mining, social, and of course environmental issues.

The process of transformation should be carried out, similarly to the preceding process, with a clear regulatory framework for the production conditions specified in the industrial health and safety regulations which provide environmental and labour protection for the workers, and for other affected persons, such as those living in the vicinity of the works.

With regard to the third process to be included in the production phase, which is marketing, the State should establish, maintain and promote the necessary conditions for national and international competitiveness of the mineral concerned, with strict supervision of commercial activities.

The final phase of work for a the controlled miner is *closure*, for which the preparatory process should start, as previously mentioned, at the very beginning of the mining cycle, when the public sector should evaluate the plan for closure. The next stage would be supervising activities during the process of asset disposal, verifying and ensuring that the process of impact mitigation was fully completed, in order to safeguard the collective national interest, thereby enhancing the sustainability of the entire industry. It may be noted that the work of monitoring, control and supervision may be carried out by private agents, but in the service of the State, as in the case of Peru, where the State has not relinquished its power of enforcement, although it may be carried out through third parties.

This description of the processes carried out by the entrepreneur and the relevant counterpart backed by the mining authority, helps to understand and provide a picture of which miners in other segments of the private (and sometimes the public) sector comply with these processes, and can therefore be classified in the various categories proposed.

2. Uncontrolled miners

The reference use fo the term “uncontrolled” may seem unfortunate, but it is used to refer to a group of persons or entrepreneurs who are intentionally resisting State action. They are reticent in their links with the community and are generally a source of conflict between community, authorities and workers. The bulk of environmental and community complaints refer to this category, which makes it very difficult to distinguish them from the group of uncontrolable miners. They almost always refer to themselves as "small-scale" miners and are continually clamouring for assistance from the State, although they resist its regulatory action.

The mining cycle followed by this group is of shorter duration and more precarious in its entrepreneurial development that that of the controlled group. Characteristics and proposals for the role of the State in each phase of the cycle followed by the uncontrolled miners is described below.

In the planning phase, they collect geological information on mineral deposits from empirical explorers such as *gambusinos* or *pirquineros*; they then identify opportunities for high profits and a rapid return on investment, a process which may alternate or take place in parallel with commercial intermediation activities for mining, where mineral intermediaries finance illegal operations in order to reduce costs and control prices in their zone of influence.

In order to deal with this situation, the role of the State is to develop sustainable employment alternatives, to provide options to those who have been obliged to accept the conditions imposed by the miners described in this segment of production. There should also be intensive efforts to define and specify these activities, as they tend to be confused with those of the artisanal group. Such efforts must be supported by the necessary budgetary resources, or else there is the danger of losing the room for manoeuvre that is essential for successful action, thus exacerbating the problem.

The second phase, of exploration, is rarely carried out by this group of miners. As mentioned above, they use the information provided by local explorers or from explorations carried out by private and state companies which have suspended their projects. Their activities thus begin in an artisanal and illegal manner. The role of the State may be defined as controlling and monitoring the deposits, taking preventive actions and applying sanctions for those who work deposits without a mining title. Unlike the controlled group, this group carries out, in a fairly inadequate way, just one of the three processes needed for conducting an exploratory phase at an appropriate technical level.

It is similar in the development phase, where the process of engineering and design is replaced by direct purchase of equipment, which often is second-hand, in poor condition, and does not comply with the basic technical specifications for its use. The process of purchase, assembly and construction does not meet the minimum operating specifications, which results in a lack of hygiene, a high rate of accidents and serious environmental problems. This situation has occurred, for example, in Nambija, Ecuador. In such cases the State has to take a strict enforcement role controller in order to prevent such conditions from spreading and perpetuating themselves.

The production phase, in contrast to the controlled enterprises, is simplified to two processes: uncontrolled production, and sales. Instead of an extraction process consisting of development, preparation and exploitation, there is direct mining, by "creaming" the deposit, without taking environmental considerations into account, or mining hygiene and safety. Of course this group very rarely takes responsibility for the processing and proper marketing of the mineral product.

The uncontrolled group does not usually comply with the declaration and payment of taxes, or payment of compensation, royalties, fees, invoices etc. The quality of output is uneven and supplies to the purchaser are erratic. Under these circumstances, the State should aim to limit the impact that this type of operation has on formal production, by encouraging a change of operating practices and forcing undesirable operations to close down.

The final phase of *closure* is the most visible owing to its significant impact on the environment and on the community. Unregulated miners simply abandon the mine or works; they always claim that their low income prevents them from taking on any environmental management responsibilities; they usually disappear from one site in order to reappear elsewhere and repeat this incomplete cycle. The State should therefore be concerned not only with punitive actions, but also with assessment and mitigation of the damage caused, as well as promoting and encouraging alternative employment in the areas affected by this environmentally damaging activity.

For this group, the number of processes and their quality is less then in the preceding one. Another factor is the absence and disappearance of the entrepreneur or the person responsible for the mining operation, who does not continue the business and sometimes, unfortunately, moves on with the same mentality to another economic activity.

The extraction work does not always take place on a small scale; often the volume, size and value of such operations is very high, despite the label of "small-scale" which is usually applied to this form of extraction activity. It should also be noted that this group often includes miners of the uncontrollable group, also carrying out intermediation work and gathering information which allows them to reproduce this form of operation.

3. Uncontrollable miners

This group has its own characteristics. The work is almost always carried out on a small scale, it is very varied in terms of social composition, levels of education, and gender structure, and there are children working in order to supplement their family's income. The motivations are very different from those of the groups described previously.

In the planning phase, there are three predominant processes for the uncontrollable group. Firstly, there is an urgent need to find a means of subsistence. Secondly, there is an incapacity to capitalize on the potential short-term gains of their operations. This is a complex sociological phenomenon, which is related to other issues requiring social action by the State and has never been taken into account at the time of designing and implementing state welfare programmes. The third process, for uncontrollable miners, is related to the previous ones and is the constant searching for and attempting to confirm rumours of new mining deposits. The desire for immediate gain attracts large numbers of people with no experience whatsoever in mineral prospecting and mining, a situation that is particularly frequent in the case of precious metals and stones. The State needs to develop sustainable alternative employment in mining areas; it should also define the minimum parameters for artisanal mining and implement technical and social development programmes.

While recognizing that the work of the empirical and local miners in the past has led to the location of large mineral deposits, at present the operations of *unregulable* miners are taking place in conjunction with processes of displacement and superficial surveying. These two processes should be regulated and monitored closely by the geological and inspection services of the State in order to prevent damage, false expectations, invasions, etc.

Those involved in subsistence, artisanal or wildcat mining do not carry out any process corresponding to the *development* phase, while *production* is limited to processes of panning for metals and precious stones (*barequeo*) and to the sale or exchange of their output through intermediaries. They are not able to accumulate resources in order to upgrade their operations. This is clearly a different situation from that of small-scale miners who, despite their limited economic resources, understand that they have to allocate part of their income to reinvesting in the mine and in the different processes of the mining cycle.

Under these circumstances, again the public role of the State is to focus on limiting the impact on production, mitigation of environmental impacts and of course encouraging a change to other economic activities by facilitating an honourable and equitable transfer for those who wish to do so. This proposal, together with the promotion of alternative employment related to mining helps the State with regard to the phase of *closure*, as frequently the mine is abandoned without any planning owing to economic problems that generate a series of conflicts.

B. The actors in the mining cycle and their guiding criteria

It may not be possible to make a complete list of all the actors involved in the mining cycle and define their roles, but table 6 below offers a general list of the main protagonists in the mining industry at all the phases of the productive cycle:

Table 6
ACTORS INVOLVED IN THE MINING CYCLE

General list of actors in the mining cycle	
Formal mining entrepreneurs	Final purchasers (users)
Informal mining entrepreneurs	National private investors
Government agents and agencies	Foreign private investors
Regional authorities	International technical cooperation
Communities and their representatives	Fauna and flora
Non-governmental organizations	Neighbouring countries
Financial intermediaries	Workers in formal industry
Universities	Workers in informal industry
Marketers and transporters	

Source: ECLAC, on the basis of various official publications

1. Formal mining entrepreneurs

Formal mining entrepreneurs are mainly motivated by financial gain in their activities. In general they comply with the legal requirements for their activities with regard to labour, economic, tax, environmental, technical and legal matters; they expect regulatory State intervention to be at the lowest possible level. In many areas of mining production, not only do they act as private economic agents, they sometimes also carry out State functions with a conflict of interests.

Generally speaking, in Latin America, national private investors have a lower investment and management capacity than those from developed countries. Sometimes they compete for specific titles, but generally they see the foreign investor as an opportunity to sell mining rights or to capitalize on their activity by selling their own part of the business. Others work in areas that are not of interest to foreigners, such as industrial minerals, construction minerals, or in some cases they become involved by purchasing other businesses such as cement plants which have mining titles or property in their name.

Formal mining entrepreneurs sometimes start out by creating specialized companies that they later convert into mining companies in order to participate directly in the mining of metallic minerals and precious metals.

Foreign investment usually comes from transnational corporations which finance the investments of their mining subsidiaries through loans which affect the financial profits of the projects. Sometimes foreign investors promote and finance the activities of small exploration companies (referred to in mining circles as "junior" companies) which can carry out the activities at a lower cost owing to their small corporate size. Then they sell the deposits found under a mining right that they have requested or acquired from a third party who is usually a national of the country concerned.

In general, both miners and mining investors are interested in high-quality mining. They recognize that informal mining and groups of miners that have hitherto been referred to as small-scale miners, artisanal miners or by any other synonym of this kind, offer opportunities for potentially harmonious mining development.

Today's mining entrepreneur explores, designs and implements industrial development projects; he makes contact with the communities in order to increase the possibility of reaching harmonious agreements, avoids the former practices involving deceit or modification of the mining rights; many seek to collaborate with governments on the understanding that a good relationship with the authorities will help them to have a more fluid relationship with the communities and their surroundings. Lastly, the formal mining entrepreneur generates employment, pays taxes and stimulates the national industry.

The entrepreneur and his way of conducting the mining cycle forms the backbone of the traditional Latin American mining industry, which has developed from the level of the most productive workers, and now has a very varied structure. Indeed, there are mine workers who have reached a perfect level of symbiosis between the worker with a pick and shovel and the manager and trader, while some third- or fourth-generation mining families have even produced investors with a high level of education.

National entrepreneurial activity in Latin America is extremely varied, ranging from the new entrepreneur starting out with a very low level of schooling, who concentrates on mining and marketing activities, to small- and medium-scale investors, who delegate to "field" personnel the administration and technical development, paying more attention to marketing and transport. These characteristics reflect the different potentials and complex combinations of producer, transformer, transporter, marketer and administrator, going through the processes of industrial integration, as is the case of some producers of copper concentrates, ceramic products, rock aggregates, coke, and other products.

2. Informal mining entrepreneurs

Informal mining entrepreneurs are usually just trying to make a living, but some are seeking rapid wealth, preferably without State control, although they make insistent requests for free assistance from the State. They are also referred to here as informal entrepreneurs because, although they do not comply with certain obligations, they are capable of carrying out some entrepreneurial responsibilities with regard to labour, technical, social, environmental, legal and tax matters.

There is one constant factor: the low level of business training, which prevents them from adopting more efficient procedures for their activities. Cultural resistance to technological change, a disdain for technology and the conviction that administrative changes are unnecessary are the most difficult barriers to overcome, in view of a cultural-sociological system that is tied to an obsolete mode of production. This situation results in difficulties and conflicts relating to the lack of legalization, invasions, labour disputes, unsafe mining techniques, unmitigated environmental impacts, low profit levels, incapacity to take advantage of skilled entrepreneurial assistance, a deterioration in the deposits and a lack of commercial competitiveness compared to other consumption industries such as plastic, industrial mineral recycling or the use of other fuels.

The efforts made by the State to offer technical assistance to miners have been numerous, varied in origin and always full of good intentions. Despite this, the success achieved has not been commensurate with the efforts made, so that the State resources could have been better used in other activities, or might have had better results if used in another way. The low level of business

management has prevented the development of a recognized Latin American national product, and the creation of a marketing base with trained and qualified personnel.

The average informal mining entrepreneur is the product of individual effort, without any formal training. Generally de facto companies are established, and family interests are generally combined with those of the business. They are highly vulnerable to civil action owing to the lack of formality, and the tendency to act almost always as a natural person without a defined juridical or legal constitution.

3. Government agents and agencies

Government agents and agencies are actors whose activities are not always coordinated, sometimes because of conflicting interests resulting from different criteria, sometimes even within a single entity. They are responsible for specific functions of the State: contractual supervision, enforcement, technical assistance, environmental control; that is, they carry out official policy, which is usually contained in the relevant codes and institutional system. Despite this, they often neglect to carry out their responsibilities for reasons as basic as a lack of funds.

The action taken by the State through its governmental organs is almost always short-term in nature, sometimes with the support of international technical cooperation, and usually deals with the symptoms rather than the real causes of the problems that need to be resolved. In order to give the civil authorities a new perspective of the mining sector, the State should establish areas for action and initiate the necessary procedures.

The State should ensure adequate inter-agency coordination, with indicative planning processes to guide the entrepreneur in his daily activities. For this, relevant information should be provided to promote the mining business, especially as for the majority of countries in the region, mining is an area of significant public interest, as demonstrated in the creation of special laws and codes.

The State, however, in addition to promoting the mining business, should also make sure that it is protected, by guaranteeing legal stability and lasting "rules of the game", as well as ensuring the physical security of both the facilities and the persons involved. This should be quite independent of compliance with one of the basic elements of State action, which is regulation and control of the industry.

4. Regional authorities

The regional authorities should complement public action at the national level, as often they are the regional counterpart to the central government. They represent the management of quotas of power, and are the first to deal with and respond to the conflicts generated by mining, often without sufficient resources to do so.

Generally, they do not have any influence on the decisions of the central authority. This is due to the fact of State ownership of the minerals, and that administrative law ensures that the central authority is legally responsible for their management. This situation is a little different in federal states such as Argentina, Brazil and Mexico; in Venezuela the federal status of mineral management is not very clear.

This legal mandate is familiar to those in positions of authority in the capital, but not always to those dealing with the problem from the provincial or regional level. The latter usually take sides with the miners or the community, as the case may be, in clear opposition to the national mining authority, claiming that the province is being denied its share in decision-making. There is now a clear tendency to decentralization in Latin America, which means a greater involvement of the

local authorities in mining issues and they should be given more scope for public management in mining.

5. Communities and their representatives

The communities and their representatives are the first to be affected by the positive or negative impacts of a mining project. The communities, for their part, designate representatives to negotiate and reach agreements with the mining companies, with State agencies acting as arbiter. In general, these actors are familiar with the local situation, often strongly oppose a project without knowing anything about it, condemning it, for example, on the grounds of environmental damage. In some cases the community representatives or groups take specific advantage of an exclusive cultural factor. They often try to ensure that part of the wealth remains in the area of the mining operation, and wish to protect the environment, cultural values and rights of ethnic minorities, which are not always taken into account when the viability of the project is considered.

6. Non-governmental organizations

Non-governmental organizations are generally entities concerned with environmental protection and all that is connected with it: minorities, public health, and the political and social rights of communities. Often they are bridges which facilitate understanding between miners and communities; other times they take a leading role in actions to oppose mining development and provide input for the technical and economic reports that is not available to the affected community. At other times they ensure proper public management, report abuses of the miners' rights and privileges, and seek forums of local power in coordination with political organizations, which gives rise to doubts as to their impartiality.

There is no absolute certainty as to the independence and the goals of some of these organizations, but they are certainly an excellent instrument in the service of the community for interaction with the mining industry.

7. Financial intermediaries

Financial intermediaries, such as bank corporations and investment societies, seek to finance profitable operations, whether with new clients or with traditional clients in new projects or amended versions of existing projects. They encourage and carry out work relating to investment banking, insurance and reinsurance; they assess the investment climate, and at times influence the attitude of national governments. They seek to obtain the greatest possible return on their investments, and with a few exceptions are never directly involved in the industry.

8. Universities

Researchers in the faculties of earth sciences, engineering, and social sciences, carry out research in two relevant and well-defined areas: geological, mining and metallurgical research; and social, environmental and combined research. They also provide the basic technical staff required by the industry, in some cases resolving specific problems in the industry and conducting independent studies. They are not always aware, however, of the great divide between the reality of practical implementation and the theoretical formulation of development proposals and projects.

9. The marketers and transporters

The marketers and transporters carry out complementary activities. Very often international marketers own some form of specialized transport such as carriers, trains, or fleets of trucks, or offer quality-certification services. In most cases the companies that market the minerals are

independent, but have capital links with producers or purchasers. These marketers establish strategic alliances with the transporters, shipowners and laboratories in order to achieve their goal of obtaining a high-quality product on time and under market conditions that they try to influence to some extent, but cannot control. In that connection they take action to control prices, often affecting the terms of trade.

Sometimes transport is the determining factor for the viability of a project in relation to the profit margins which determine the economic feasibility of the business. This factor applies both for internal trade and for international trade, which in maritime modes is covered by regulations such as the Inconterms for maritime transport. For land transport, there are different definitions, and there is competition to find the lowest ton/kilometre cost.

A more detailed description is given below of this vital aspect of the mining industry.

a) Actors involved in the marketing of informal and small-scale mining output

Different kinds of marketers coexist in both the regulated and unregulated sectors of small-scale and informal mining: cooperative organizations, marketing companies, independent marketers, and others that are linked to the final consumers or to intermediaries.

The cooperative organizations are always mine operators who have decided to form a cooperative in order to obtain supply quotas from large-scale consumers or large-scale purchasers and commercial advantages in the purchase of inputs, machines and tools. The cooperatives thus formed generally have very weak organizational structures, despite the official efforts made to support the management of their governing bodies and their administrators.

Their main activity is thus centred on marketing, with examples of this activity throughout the continent, including the Mollehuaca Mining Community in Peru and the coal-producers' cooperative in Zipaquira, Colombia. In general the most efforts are made around gold in the different countries: Brazil, Chile, Ecuador and Venezuela; copper in Mexico and rock materials, see box 7.

At times of low liquidity, owing to a tight market, or financial difficulties of the large consumers, the members soon abandon the cooperative and its administrators; they rush into an individual search for markets, and offer their output at a lower price, thus causing severe damage to the organization which suffers the after-effects of this for long periods.

Some cooperative entities associate their capital for marketing, forming regional companies which seek alliances with capital in other geographical areas that is available for inter-regional trade and export opportunities. This process has generated the need for quality-certification laboratories, improvement in sales techniques, and the construction of storage centres, which sometimes cause environmental conflicts because of their location and management.

b) Individual marketing actors

There are commercial intermediation agents who work very intensively on an individual basis. Some of them lend money to small producers, or directly encourage the invasion of mining property by buying the future output of third parties in areas where the rights have already been assigned, and others purchase the output at a lower price but in cash. Almost all of them store the mineral in a poorly-organized manner in inadequate facilities and encourage price wars in which the producer always loses, as he never receives the best price or quality bonuses for his output. They also encourage non-payment of the royalties required by law, impose penalties relating to quality or weight and produce serious distortions in the quality of supply, generating uncertainty in

the purchaser and/or consumer. Sometimes they become regular suppliers for large consumers, or suppliers to other more stable intermediaries.

Box 7

PROCESSING AND MARKETING OF GOLD IN A PERUVIAN COOPERATIVE

Ninety percent of the mineral is processed in crushers and quimbalates (stone mills) which are part of the production circuit in artisanal mining. Quimbaletes are amalgamation facilities that have been used since pre-Hispanic times. The level of metal recovery is not more than 50%. After 10 or 15 days' work, the miner obtains a few grammes of ore in amalgam. The proprietor of the stone mill receives as payment for this service part of the mineralized tailings, which may contain up to 25 g Au/TM.

The amalgam is then burned, weighed and sold. In Mollehuaca the price paid for the intensively burned gold varies, but for "yellow gold" the amount paid is similar to the international price. The buyers derive their earnings from fraudulent weighing. The owners of the stone mills send the accumulated tailings to metallurgical plants; two such plants were constructed in the area specifically to process this material. Before 1993, there was only one metallurgical plant in the area of Mollehuaca, and it practised all kinds of abuses of the artisanal miners. Taking advantage of their lack of knowledge, and falsely claiming ownership of mining concessions in the whole gully, it obliged the artisanal miners to sell their production at less than one tenth of its real value. The miners relate, for example, that in 1994 the international gold price was US$ 385/oz. The value of one ton of ore with a fineness of 0.5 oz, deducting the processing cost, should be at least US$ 137.5. The metallurgical plant never paid more than US$ 34 per tonne of ore (in local currency), irrespective of the gold content of the mineral. The mineral samples that some miners sent to laboratories in Lima showed values of between 1.5 and 2 ounces/TM.

The Mollehuaca miners realized that they were being cheated when purchasers arrived in the area from another plant situated 40 km away and offered much higher prices. Conflicts arose between the plant that had had a monopoly, the plant trying to enter the area, and the artisanal miners, who were slandered and prosecuted. These events prompted the beginning of formal organization, and the Comunidad Minera Mollehuaca S.A. was established in 1994.

Source: Martinez, Zoila, International Seminar "*El desarrollo sustentable y el medio ambiente en la minería artesenal del oro*" Copiapó, Chile, 31 March to 2 April 1999.

c) Exporters

Producers of gold, coal, copper, nickel, tin, silver, zinc, lead, iron, emeralds and diamonds, *inter alia,* clearly intend to export their output, which is a very different situation from that of the developed countries. The countries in the region are basically global providers of raw materials with very little added value, often purchasing manufactured products made with their own raw materials, such as with domestic minerals that mostly come from national producers with a low level of entrepreneurial development.

The countries sometimes give priority to some minerals rather than others, so that the supply of elements important for national development is relegated to a secondary position in relation to exports. This was one of the topics discussed at the Third Conference of Mining Ministries of the Americas, which recommended increasing the mining offer with a selection of minerals and metals that had previously not been considered.

There are marketing companies in the region which manage the storage, transport and shipping of gold, precious stones, copper and ornamental stones, with links to some international marketers. There are also reports of very small companies of this kind, that conduct binational trade in less profitable products with industrial minerals such as coal. In general they collect the mineral according to certain quality requirements, pay in the short-term, buy from whoever offers them the mineral and use highway transport, except in the case of gold and emeralds. The exporters are very vulnerable to problems of public order, the breakdown of industrial associations, organizational

issues, difficulties in complying with port regulations or importing regulations in the receiving country, as well as technical problems relating to production, safety and quality control.

d) Transporters

As in the case of producers, these actors in the industry also come in many varieties, so that the transport industry has many similarities with mining activities at a low level of entrepreneurial development. They vary from the owner of a small-capacity vehicle to producers who combine their activity with transport using different methods and tonnages.

The transporters include long list of actors ranging from mining producers who own simple trucks, double-axle trucks and carrier trucks, to transport companies and cooperatives with mining-intermediation partners and transport cooperatives whose partners are also members of the producer cooperatives. One constant factor, whatever the method of production, transport and marketing, is that the producer almost never plays a significant role in fixing tariffs or in price structures, uses outdated production and transport technology, and is unaware of current mining and commercial standards.

11. The final purchasers (users)

There is a wide variety of final purchasers or users, including two main groups defined by the type of mineral and its supply; that is, according to the importance of the mineral and the number of producers. The purchasers of metallic minerals are nearly always linked to specific projects by means of financial associations. They become to some extent owners of the mining projects, by means of equity ownership in parent companies. The final purchasers of industrial minerals, who are almost always local, seek the best sales conditions in the market with regard to price, quality and form of payment. Examples are coal-fired power plants and cement plants. This is one way of viewing the consumption of mineral production, but a more detailed description is given below:

a) Actors in consumption

Official consumers: this group includes, *inter alia*, the national and local offices of public works, contractors of public agencies that carry out civil engineering works, regional electricity companies, aqueduct companies and others in those countries and regions where these services are not privatized.

Sometimes, these entities become very large regional consumers, assigning supply quotas, sometimes under political pressure. They do not always store the mineral in adequate conditions, which can lead to inventory losses and environmental problems. In general they do not have a long-term purchasing policy, and so the fluctuations of high and low levels of demand for purchases make it impossible to make mining projections for the medium or long term. Their quality requirements are familiar to the miners, and they know very well who their providers are. They depend to a large extent on the decisions made with regard to infrastructure by the national or regional governments.

These consumers usually pay late and there has been a gradual shift towards a bidding system. Claiming that supplies are uncertain, they often call for the rapid dispatch of purchase orders, and do not always consult the lists of providers with established mining titles. The end result is that State entities are often encouraging illegality and informality, thus undermining the efforts of the mining authority to standardize the institutional and legal framework of the industry.

This situation occurs very frequently in municipalities that make purchases, through their works offices, of various kinds of minerals for their own activities: road maintenance, boilers in

public buildings, or else they contract the construction of public works with third parties without requiring the minerals used in these works to be produced in areas with mining titles.

Industrial consumers: this group includes producers of cement, glass, paper, chemicals, and ceramics, the tile industry, paints, the agricultural industry, oil services companies, pharmaceutical producers and small foundries, *inter alia*; that is, all the manufacturing producers that consume relatively low volumes of minerals such as kaolin, baryta, bentonite clays, copper or iron concentrates, limestone, quartz and others. They have never been interested in developing their own mining business in view of the low level of consumption. These consumers pay less than the official prices, but their payments are more immediate and reliable, and they generally make use of intermediaries as some companies provide consultancy services, loans and legal assistance. They have very variable and specific quality requirements.

Some industrial consumers produce a part of their inputs such as in the cement industry, using hydrocarbons as well as coal, and a few have leased mines for some minerals; those with lower consumption levels are supplied at the pit head. There are consumers in Brazil who have suppliers located at a distance of more than 500 kilometres, for minerals such as gypsum and some plating and ornamental stones.

The smaller-scale consumers, depending on their technical requirements, are less demanding with regard to quality and concentration. They usually maintain a stable relationship with the same provider, do not make distinctions with regard to the origin of the material and tend to buy indiscriminately from legal and illegal miners.

12. National private investors

A large number of American mining developments have been managed by the miners themselves, who have thus become investors, generally using their own resources. Sometimes they try to attract the interest of capital financiers, industrialists or traders who, through limited companies or other forms, bring new investment to the development of mining operations. This is often a source of conflicts, as both the miner and the investor hope for a rapid return on the investment, but the latter lacks adequate information on the project and is unaware of the specifics of the mining industry and the periods of time involved.

The financial sector, and large national conglomerates use their credit agencies to invest through the companies of their respective economic conglomerate or business holding, in large-scale operations, including investments in cement and construction groups, and also in iron and gold.

13. Foreign private investors

The role of an investor is obviously very different to that of a financial intermediary, especially at the international level. While the latter may provide resources for project implementation in the form of a loan or credit, the former decides to risk his capital himself or in association with third parties for the operation of a mine, with the hope that the mining business will make sufficient profit.

International investors risk high levels of capital, but this is not always the case. In fact the so-called junior companies, which collect risk capital, are a clear example of how foreign private capital is involved in mining projects in different countries, without requiring massive levels of financial investment.

They seek joint ventures with national investors or miners. This form of association may in the future be one of the forms for developing small-scale mining in countries such as Chile; or in

small-scale but very profitable gold projects in various countries of the region. The forms of investment using joint ventures have also appeared in the area of emeralds in Colombia, with links to Canadian capital.

Whatever the mineral, the origin of the company and the amount of the investment, foreign private investors are always looking for prospects that have proven to be profitable, are legally secure, and involve low-cost operations; generally such investors maintain a very discreet profile in relation to the communities. The role of the foreign investor in megaprojects is very different.

14. International technical cooperation

Recently, in September 1999, the Department for International Development (DFID) of the Government of the United Kingdom recognized the importance of providing technical cooperation for mining, owing to the high priority of this area, and the fact that multilateral donors are generally involved in sectoral reform programmes geared to generating new systems and legal frameworks. The donors, at this time, aim to motivate the receiving countries to carry out assistance programmes aimed at small-scale miners, as both international technical cooperation agencies and governments perceive this type of miner as poor and dangerous, both for themselves and for the environment. The programmes thus motivate the receiving country but generally fail to meet their objectives (Walls, 1999).

International technical cooperation is mostly provided by industrialized countries and carried out in the form of specific projects. Environmental protection and the eradication of poverty are the basic aims, while there is also provision for identifying business opportunities, training of national experts in specific areas, and occasionally long-term projects to create national development capacities and opportunities.

Accordingly, what is needed is extensive research, based on a broad experience and consensus on the type of services to be offered to the small-scale miners, the form in which these services should be provided, in what circumstances, and how they should be structured and financed.

Assistance from international donors is often focused on a particular area. At present the environment has high priority among the cooperation organizations, and therefore this subject is at the top of the donors' agenda, a situation which does not always coincide with the needs of the miners. On other occasions, many of the projects which seem to be related to international cooperation are case studies rather than direct technical development activities.

15. Flora and fauna resources

Flora and fauna are obviously victims of mining activity, and they are defended by NGOs, communities, and government agencies. Only in the last few years have international companies been making statements and taking action in relation to the protection of flora, fauna and water, aiming for a social consensus that is different from the former practice of no community participation and disregarding ecosystems except for the purposes of exploitation. In general the areas closest to mining activities are affected by dumping of tailings, felling of trees and the removal of vegetation; this affects the ecological chain, sometimes with irreversible damage that has an impact on the communities dependent on these ecosystems. One example is the dumping of mercury or sediment in river basins, affecting fish that will be used for human consumption.

16. Neighbouring countries

Some countries in the region are seriously affected by border projects or unregulated activities in border areas, for example the dumping of mercury in river basins in Bolivia which

drain into Brazil, the migration of Brazilian *garimpeiros* to the department of Guanía in the basin of the river Orinoco, the expectations of gold in the Cordillera del Cóndor on the Ecuadorian-Peruvian border or the conflict over water between Bolivia and Chile. Often the countries affected do not have any form of control over the transborder mining projects that cause significant damage. On the other hand, there is another form of deterioration caused by the countries themselves, when, in an attempt to attract foreign investment, they produce a series of legal amendments and incentives, thereby reducing the mechanisms for control and regulation in order to offer more attractive conditions to investors that may otherwise invest in neighbouring countries. An open fight to attract investment is thus generated.

17. Workers in the formal industry

Workers in the formal industry are always able to achieve a steady improvement in their level of income and obtain salary benefits that enable them to raise their standards of living. A bargaining system has been established for this purpose in their trade syndicate organizations, which has helped them to obtain net incomes that are in general much higher than the national average remuneration, or at least in the area where the project is located.

Sometimes the trade syndicate organizations take on attitudes and tasks that go beyond the economic level and make political statements in order to oppose the owners of the business or the government; when they do this, they become significant social factors, especially in establishing development policies for the sector. In general terms they enjoy a better quality of life and better-regulated and more acceptable working conditions than other workers, although sometimes their stability is affected by competition from minerals produced by uncontrolled and uncontrollable miners, especially in the case of minerals for industrial use and construction.

18. Workers in the informal industry

Workers in the informal industry are usually only seeking to survive in conditions of extreme poverty, and they are not concerned with social or labour protection, and even less with environmental conservation; they are merely trying to obtain incomes that will cover food and some kind of shelter for their family and for themselves. If they do survive under these conditions, they will begin to identify other needs: health protection and education, housing, retirement, and compensation for their extreme physical efforts.

IV. Mining for peace and equity

It is unfortunate that at a time when humanity is moving forward in the technological and economic spheres, violence has spread as never before and is affecting such large areas of the world. This situation has regrettably become a horrifying aspect of reality in Latin America and the Caribbean, which for various reasons is now considered to be one of the most violent regions in the world. Many factors come together to make up the dramatic and violent situations which to different degrees affect the continent's development. There is no single cause that can explain the intensity of these manifestations against the population, but various factors can be identified that are operating at different social levels: individual, local and community, that allow the proliferation of violent action that takes place in the region and especially in mining activity (Bubinic and others, 1999), see table 7.

Despite this context of multiple factors that are responsible for the violence, one or several of these factors seem to be mainly responsible for the structure and the results left by the violence. The relevant factors should therefore be taken into account when designing and implementing a policy aiming for both control and reduction; that is, an integrated policy which takes account of specific objectives and/or areas of action (Bubinic and others, 1999).

Whatever the path chosen, all "violentologists" who are concerned at the increase in violence in Latin America and the Caribbean recognize that when devising a public policy to resolve this problem, great care must be taken to assess the cost-benefit relationship of each option.

Table 7

FACTORS AFFECTING VIOLENCE IN LATIN AMERICA AND THE CARIBBEAN

• Social and community	• Violence in the media
• Social inequity	• Cultural standards
• Availability of drugs and weapons	• Levels of poverty in communities
• History of social violence (wars, internal armed conflicts)	• Crime levels (crime rates) in communities
• Inadequacy of institutions of social control (legal system, police, community groups, churches and others)	• Environmental features of neighbourhood: availability of housing, street lighting, etc.

Source: M. Bubinic, and others. Violence in Latin America and the Caribbean: a framework for action, IDB, March 1999.

All the indications are that in the above-mentioned context of multiple factors that generate violence, action is urgently needed at various levels to combat the almost geometric increase in this phenomenon. This applies especially in the area of social violence, which is considered by all experts and in all publications as the most serious and significant threat to the exercise of fundamental freedoms, and the consolidation of peace and democracy.

This statement is not only made by human rights organizations. The situation is such that the industrialized countries, when providing aid to the third world, have begun to attach significant conditions relating to the results of policies for human rights protection.

It is important to bear in mind that democratic institutions are now facing new demands and challenges generated by collective insecurity that not only affect economic development, but also create growing doubts as to their capacity to act in the face of various forms of crime, the most obvious result being the enormous political impact of social violence in the regional and national context of a culture of democratic weakness (Fruhling, 1995 in Buvinic and others, 1999).

There is a typology of the costs of violence that establishes four main categories in the area of mining, which affect in one way or another all the actors involved in small-scale mining, as follows: (a) direct costs: the value of goods and services used in dealing with or preventing violence: safety, health services, criminal justice system, the cost of conflict management by the mining and environmental authorities, and housing and social services; (b) non-monetary costs: high levels of morbidity in the industry and in mining towns, an increase in mortality owing to deficient hygiene and mining safety conditions, homicides and suicides, alcohol and drug abuse, and depressive disorders; (c) escalating economic effects: decreasing participation in the labour market, reduction in labour productivity, decline in labour income, loss of purchasing power in local markets, increase in labour and school absenteeism, impacts on intergenerational productivity owing to school failures and low academic achievements, decline in investment and saving, and flight of capital; (d) escalating social effects: impact on interpersonal relationships and the quality of life through intergenerational transmission of violence, reduction in the quality of life and erosion of social capital, reduced participation in democratic processes[8].

Some data mentioned by Buvinic demonstrate the impact of violence on the national economies of Latin America or on its cities; thus, for example, Colombia in 1996 spent 5% of its GDP, and another 1.4% in private expenditure, on security measures (CEDES-UNIANDES, 1997,

[8] Bubinic, M., and others (1999) *Violence in Latin America and the Caribbean: a framework for action*, IDB, March.

in Buvinic and others, 1999). In El Salvador the costs of government and legal institutions relating to personal injuries and preventive measures represent about 6% of GDP (Cruz and Romano, 1997, in Buvinic and others, 1999), Venezuela spent an amount of approximately 2.6% of GDP on security-related public expenditure (IESA, 1997 in Buvinic and others, 1999), in Mexico City alone public and private security measures resulted in expenditure to the amount of US$ 181 million during 1995, and according to the Mexican Health Foundation, in 1997 expenditure on the administration of justice and prisons amounted to an additional US$ 18 million.

Public spending by the Peruvian government on police, courts and prisons for the city of Lima amounted to 1% of the Lima regional product in 1997; the private sector in the same city, spent 0.41% of this regional product on security measures (Instituto Apoyo, 1997 in Buvinic and others, 1999). Table 8 indicates the economic significance of this phenomenon in the continent. Although only six countries are considered, five of them, other than El Salvador, have sizeable mining activities.

Table 8

ECONOMIC COST OF SOCIAL VIOLENCE IN SIX COUNTRIES IN LATIN AMERICA

(expressed as a percentage of GDP in 1997)

	Brazil	Colombia	El Salvador	Mexico	Peru	Venezuela
Health losses	1.9	5.0	4.3	1.3	1.5	0.3
Material losses	3.6	8.4	5.1	4.9	2.0	9.0
Intangibles	3.4	6.9	11.5	3.3	1.0	2.2
Transfer	1.6	4.4	4.0	2.8	0.6	0.3
Total	**10.5**	**24.7**	**24.9**	**12.3**	**5.1**	**11.8**

Source: Juan Luis Londoño, Epidemiología economica de la Violencia urbana. 1998, mimeo.

The factors that generate violence are clearly also relevant to the origins of informal mining in its unregulated and unregulable forms. According to Walls (in Buvinic and others, 1999), while many of the aspects of this sector are very different from each other, throughout the world there is a common denominator at the root of many of the problems of small-scale mining, which is the abject poverty so often associated with it.

Although informal mining can be a breeding ground for various forms of violence, it has the potential for becoming one of the most direct and effective tools for generating processes of peace with equity and social justice. The present text aims to emphasize this idea, with the understanding that although it is not the only way out of this problem in the region, it could certainly be an important tool for Latin American governments in their struggle to consolidate the democratic processes in their countries.

In the case of mining, there must be a balance between the various factors involved. Latin American governments have to generate better social conditions for informal miners, guaranteeing them access to respectable and productive employment, and therefore a process of technical and business support and well-defined civic training is needed, as proposed below.

At the same time, the governments in the region should take strict action in relation to the uncontrolled group of miners, which is the fraction of the informal sector that does have economic resources, but is resistant to complying with the minimum conditions that would ensure that their activities were sustainable. In this connection, strong, stable, and highly professional institutions are needed, that have technical resources and great flexibility of administrative action, through forms of contracting that allow rapid and extensive monitoring, and decision making and

implementation with transparency in resource management and a clear institutional framework for both action and procedure. The accident and mortality indices should be reduced, which would relieve the burden on public funds. All such measures are geared to the definitive, programmed and confirmed elimination of those forms of mining extraction that do not comply with the conditions established in national regulations.

Consideration should also be given to policies and other tools that would make it more difficult, less profitable and more risky to engage in unregulated informal mining, by means of fines, confiscating the mineral output and penalties for those purchasing from such mines.

At the same time, any preventive action loses its effect and the efforts of governments will also be wasted if the preventive action is not based on a profound, continuous and serious effort of technical training at all the levels involved: the workers, the owners regardless of scale, and the authorities: that is, all those in one way or another connected with the mining business.

This process should guarantee, inter alia, a low drop out level and a labour market that is open to those who have gone through a new process of training; this process thus requires observation, study and permanent evaluation of the market conditions, and also the adoption of protection mechanisms for local prices, when appropriate.

It should also be noted that although there are three homogeneous and clearly distinct business groups in the mining industry, each group includes variations, alternatives and determining factors that result in different needs.

Figure 1, based on the ILO study mentioned above, shows that one of the main problems affecting miners all over the world is financial. Moreover, in today's complex financial world, the needs and requirements of mining entrepreneurs are very different; and there are few who do not have difficulties in this area. The needs of Chilean entrepreneurs with medium- or small-scale operations, who are not connected to the large-scale mining industry, are completely different to those of their Peruvian, Mexican or Colombian peers.

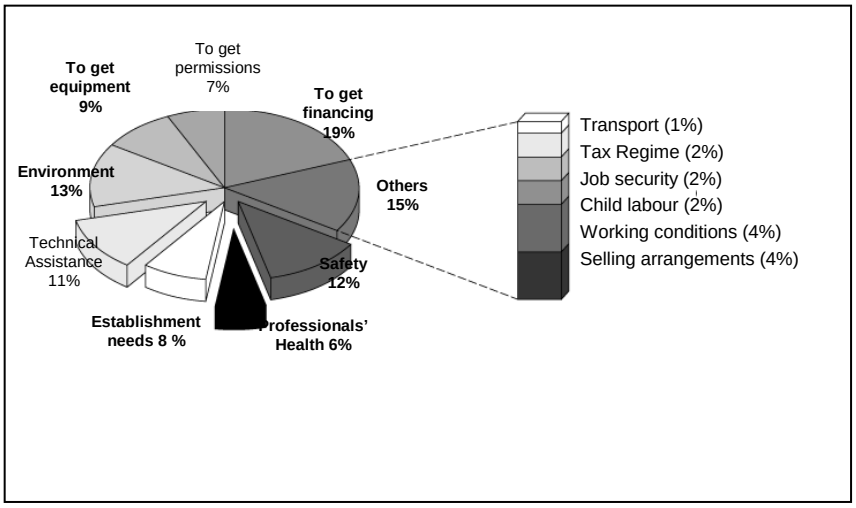
In fact, although it is a financing issue, there is a vast difference between a solution based on the creation of a copper price stabilization fund, as in the case of mining in the north of Chile, and the provision of soft credit for working capital as needed by the Peruvians, or the establishment of effective guarantee funds, which is the solution offered to Mexican and Colombian businessmen. In addition to these diverse difficulties and needs, there are also universal problems: how to obtain sufficient risk capital to start projects that involve exploration work, or the guarantees needed to obtain loans.

The options available include associations or joint ventures, with foreign capital and technology, which allow cost management and operation in deposits where only small-scale activities can be accommodated and larger projects are impossible. This issue should be carefully reviewed in all countries of the region by the mining promotion agencies, in order to encourage such associations of national capital and deposits with foreign investment and technology.

The issues relating to price stabilization funds, for these levels of mining, should be given serious consideration, and discussed openly and directly with the investors. The fluctuations of the international markets, although they may be transitory and short-term, often leave smaller producers in a vulnerable situation. The latter are generally financed by national capital and do not have the same economic base as the companies that carry out large-scale projects and which are subsidiaries of large transnational corporations. There is also an additional consideration, with regard to the environment. It is clear that in future a project will not be considered financially viable unless environmental issues and sustainability are taken into account at all stages of implementation. Despite the growing importance of environmental sustainability, many miners

resist adopting attitudes that take account of the environment, as they are unaware of the direct benefits of such practices in the longer term. It should be noted that there has not yet been any open discussion with regard to who is to pay for the environmental losses caused by the mines that have been meeting the global demand for metals.

Figure 1
MAIN PROBLEMS OF THE SMALL-SCALE MINING



Source: Norman Jennings, *Los problemas sociales y laborales en las explotaciones mineras pequeñas,* Oficina Internacional del Trabajo (OIT). TMSSM/1999 report, Geneva, 1999, May 17-21.

Miners, mining entrepreneurs, the associations that represent them, the labour organizations and the mining authorities, will all have to understand that the environment is not going to take the first step towards understanding the complexity of the mining world. On the contrary, it is the mining industry that will have to take the initiative, at all stages of development, to take account of environmental issues relating to mining extraction in order to report to those who see this activity (often justifiably) as damaging to humanity and the environment. If this environmental challenge were taken up in a fair and rational way, the quality of mining practices could be improved, and new levels of sustainability reached by means of environmental regulation and monitoring; this should be the attitude of miners and a responsible public mining sector. Environmental issues can no longer be excluded from any activity, their influence is growing every day, and ignoring that fact in the mining industry would be a serious error of business. There is no doubt that there is a long road to travel from theory to practice, but all the stakeholders involved will have to follow it, without exception.

It is worth noting that one of the most frequently sought –after and requested activities in this area is technical assistance from the State. Very often the governments accede to such requests, and rapidly proceed to design technical assistance programmes, which tend to be repetitive, ineffective, and end up as an enormous waste of time and money for all those involved. It is now time to make a new plan, with a view to training citizens who will become responsible entrepreneurs in the mining sector. This could be an opportunity to remedy the historical error of "promotion" in the sense of a cyclical and regular repetition of mining technical assistance programmes, without consideration for the abilities or management capacities of those benefiting from the support programmes. The following proposal is presented in response to this urgent need.

V. Technical assistance

A. Background

Significant efforts have been made to achieve levels of excellence in the mining sector, both with regard to institutions and with regard to the area referred to generically as small-scale mining. In Mexico the Secretary of Trade and Finance, as mandated by the General Department of Mining Promotion, is carrying out activities in the various states of the Federation with the aim of alleviating the situation in this area of production; in Venezuela the General Department of Mines is doing the same, and in Colombia over the last few years, specific programmes have been designed for traditional coal mining. Ecuador has received assistance from European governments and the World Bank; in Chile there is a specialized company to provide technical, financial and trade assistance to small- and medium-scale producers; and in Brazil efforts have been made to resolve the problems of garimpo mining.

In other countries, the efforts have been on a smaller scale, and have amounted to the occasional sending of a technical expert, especially in zones with environmental problems.

All of the known programmes are in line with the general policy that it is in the State's interest to give a strong boost to the national mining industry, and that specialized bodies should be responsible for this initiative, but the efforts have been on a small scale and not continuous.

As a result, this method of production has come to be considered as unviable, and it has been implied that only large-scale mining should be encouraged by Latin American governments. In some cases this has led to the conclusion that "small-scale" mining should no longer be supported and should be discouraged as a form of production. It is argued that the State should not continue to provide technical assistance as this subsidy has not been properly used by its beneficiaries, especially in view of the conditions and terms on which it has been provided.

Given current economic trends, the critics of these programmes are becoming more severe, claiming that in the context of globalization, there cannot be special treatment for one industrial sector, and forgetting that the appearance of informal mining districts would destroy the opportunity for generating projects that are viable not only in economic, but also in social, terms; while encouraging controlled development would generate a potential for equitable distribution and growth of income. Almost all the programmes have encountered institutional difficulties.

In the Americas small-scale mining has offered a means of survival in precarious economic conditions. The domestic mineral market is limited, consumption is minimal and thus the volumes marketed are not sufficient for large operations that generate significant economies of scale. As a result, there are high production costs, and efforts are made to reduce them with empirical production methods. Poverty is always associated with a lack of training and education and an attachment to atavistic and routine forms of production, without substantial changes or improvements.

There are countries with a tradition of mining, whose governments and national corporations are unaware of the importance of mining activity, or of the fact that it is a long-term activity, with a high risk level for investment, and sometimes for personal safety, so that operating a mine definitely does not imply getting rich quickly.

There are mining company managers who believe that the ability to read, write, add up and subtract is sufficient qualification for their position. They have difficulty in understanding that a lack of training and education prevents them from growing in entrepreneurial terms in a stable, long-term manner. In that connection, in decision 1994/308 of the United Nations Economic and Social Council, the Committee on Natural Resources of that body at its third session, recommended providing assistance for artisanal mining, as well as assistance in areas such as alternative employment options, education, health and support for women, considering that artisanal mining is a basic means of survival, that can contribute to enhancing activities for integral and multi-sectoral socioeconomic development:

"*...small-scale mining should therefore be viewed and approached from the broader view of socio-economic development and poverty eradication. For a large number of the people of the world involved in artisanal mining, mining activities serve as a safety net by providing income during difficult economic times. Since most of these activities occur in rural areas, artisanal mining is an effective weapon against rural poverty and rural-to-urban migration, and should be supported as such. When a Government moves to create a more enabling environment for artisanal miners, it is also increasing the access of its people to an income safety net and their ability to deliver themselves from poverty. Assistance to the sector can also serve as an important conduit for providing much needed social assistance to the people and areas concerned.*"

The above paragraph offers a summary of mining conditions in Latin America and should be taken into account when adopting an integral planning policy for the extractive industry; accordingly, a general programme of technical assistance is needed, designed to mobilize and guide the informal mining sector towards forms of production which, with entrepreneurial development, can be made more competitive, more profitable and less disturbing to the environment and the community, that is, more sustainable.

A fact which is not referred to above but which has a decisive influence on investment intentions is the fragility of public mining institutions. In many countries there is an evident instability and frequent rotation of managers in the sector. Changes in ministers, deputy ministers or under-secretaries responsible for mines and in the managers of State companies do not help the normal process of work; nor do they help the negotiations and planning processes which must take place between private investors and the State.

A profound transformation of the institutional framework for mining is needed, with the aim to create or strengthen a national mining authority, as an entity for managing national mining resources in all the relevant aspects, with the capacity for management, operation and review at the regional level, and with centralized control enshrined in a mining policy defined by the state.

In Chile, a country which has clearly made progress in opening new mines, the mining authority has a position of representation at government level that is unique in the continent, which for Chilean interests, purposes and achievements has been satisfactory. Frequent changes in the incumbents of management positions generate a lot of confusion and mistrust, which affects private investment, and especially foreign investors. In this connection, Chile and Argentina have been exceptions, and have benefited accordingly, as those two countries have received a significant percentage of the total mining investment in Latin America owing to the stability of their policies on private investment and their authorities.

It is essential to achieve as high a professional level as possible among the managers of the institutions that represent the mining authority. Every effort should be made, in view of the political situation in the power structures of the American states, to provide stability, continuity, confidence, good salaries and a decision-making capacity for those who represent the State in dealing with individuals in the management and administration of mining resources.

There are also those who believe that the focus of technical assistance should be changed, and accordingly the target population. There are even those who claim that technical assistance has been partial and incomplete, and has favoured just a few minerals and miners and that in general there has not been a clear procedure as part of a national development policy.

This document seeks to take account of considerations from both sides, while trying to offer an overview and a pragmatic approach to the issue, as has been recommended by bodies such as the World Bank. The latter organization claims that when looking at the conditions and restrictions under which medium- and small-scale mining is taking place, the following factors should be considered: "...the availability of trained managerial and technical personnel, and access to credit and capital..." as well as "...what policies could usefully be adopted to promote the development of existing mining companies and encourage the formation of new ones."[9]

The strategy recommended by the World Bank emphasizes the need to develop local capital markets as a source of funding (equity funding), keeping the financial sector (banks) informed of opportunities for loans to mining works which are operating legally. It is also planned to increase foreign participation in the sector by introducing new technology and training local professionals and businessmen to take on their appropriate role in medium- and small-scale mining. There is thus a need to enhance the capacity of local educational institutions for training related to mining, while fostering and stimulating the entrepreneurial spirit of local mining communities.

Under these circumstances it is clearly urgent to adopt a plan of action that will allow the Latin American governments to assist mining development with decisive action to overcome the

[9] World Bank, (1996) "A Mining Strategy for Latin America and the Caribbean", Executive Summary, Technical Paper No. 345, Industry and Mining Division, Industry and Energy Department.

entrepreneurial shortcomings, low productivity and social problems through a full plan of technical assistance that covers areas that were neglected in the past or dealt with only indirectly.

It seems that Latin America has been taking its time to apply the recommendations of Bolívar, in order to be able to generate a national mining industry in the countries and provide it with the necessary elements for social development through real, sensible and feasible business promotion programmes.

B. Objective

Efforts are needed to enhance the efficient use of mineral resources, rather than extending the scale of mining activity, so that the countries can achieve a high level of social benefit from the mining industry, with mines that use appropriate technology, generate employment, and guarantee adequate supplies with regard to quality, quantity and timeliness for the domestic mineral market. The work should also be carried out to high standards of industrial safety and occupational health, and with integral and rational use of the deposits, which brings added value to the mining output. In this way, the miner should receive an income that will enable him to improve his quality of life, and the risk factors that generate violence are prevented.

The model of developing an assistance programme to include all those involved in some way with informal mining has outlived its usefulness. The countries should adopt national standards for measuring results based on legal, financial, mining-geological and social criteria, such as for example the legalization of mining titles and quantification of reserves. A programme of this kind should have defined stages and goals, and aim to achieve a degree of development in the districts covered that is comparable to the most developed province in each country. The programmes should be available to the mineral producers that each country considers strategic for its development.

At present it is almost impossible to obtain any kind of reliable figure for the number of persons working in mines in the conditions described above and how many mining sites there are in the various production districts and zones, in order to have information as to their geographical distribution, their viability in social, economic, environmental and technical terms, and how to deal with them. A company wishing to carry out its mining in a capable, efficient, dynamic and socially and environmentally responsible manner needs to invest a high level of work and resources in order to improve the technical conditions and to offer other employment options to those who cannot or should not continue in mining.

It is also very important to recall the categories of different business attitudes that define the State function applicable to the homogeneous entrepreneurial groups described in chapter III. This clearly differentiates viable small-scale mining from subsistence mining, where State action should concentrate on very specific social parameters, whereas the former should have a double component: social and technical.

Against this background, a technical assistance scheme is proposed which would enable those traditional miners who have the potential and the desire to do so to develop and move forward from the current position; it would also enable the Latin American industries to have an adequate supply of tools when beginning the process of change. The first objective would be to produce true mining entrepreneurs, and stable syndicates, in a programme so extensive that, on its completion, the national entrepreneur would have the necessary tools and mechanisms for self-management. This would avoid a situation where the State provides assistance ad infinitum in the form of support, subsidies and favours for a weak industry.

C. Training

Substantial efforts are needed for business support and promotion to all segments of the industry in the technical, legal, commercial and administrative fields. Specialized bodies should be responsible for specific fields in the areas mentioned to ensure that the efforts of the State bear fruit. The mining entrepreneur should be trained to obtain the maximum benefit from the tools and instruments provided in the form of official aid in order to be responsible for his own management. Three areas for action are proposed: civic education, administrative education and technical education.

The education does not focus mainly on engineering aspects, although they should not be neglected. As indicated by the references to civic and administrative education, it is not so much a problem of geology or engineering, but rather a management problem of administration and marketing in view of the current situation of deficient entrepreneurial skills in the mining industry (the uncontrolled and uncontrollable segments).

A fuller description of the proposed areas is given below.

1. Civic education

In contrast with the previous decades, the 1990s have reflected the intention of the Latin American peoples to consolidate their democratic processes, resulting in profound institutional changes that open the doors to a greater level of citizens' participation in public affairs, participation which is gradually establishing itself in various areas; consequently, the citizen is a fundamental actor who should be prepared to take on this role. Venezuela has adopted a new constitution, Ecuador has changed its constitution, and so has Colombia. The Central American republics have made profound changes in their institutional framework and have resolved their internal problems in the light of the new political circumstances, while in the Southern Cone civil authority is growing stronger day by day.

The miner is not and cannot be an exception to this situation in societies where these changes have taken or are taking place. Those involved in mineral extraction have to be aware of the mechanisms for establishing contact with the State authorities, communicating with them and taking appropriate action.

a) Training in civic education

With the support of non-governmental organizations, the State provides training in the basic theory and practice of civic education for persons involved in mining activities. Information is provided on the constitutional framework, and also on the rights and obligations of citizens, the current legal framework, the origin and the purpose of taxes, charges and levies, and how they are used, supervision, State organization, the mining authority and its institutional framework, its companies and institutes. Individuals cannot take action with regard to the State and its government representatives without knowing where to apply, and the extent of their rights and responsibilities. It must be realized that a positive attitude to the State and the government apparatus cannot be developed by intuition alone, especially if one takes into account the existing negative precedents and the lack of confidence that decades of deficient, incomplete or non-existent public management have generated in some countries of the region.

b) Community training

The citizen is the basic unit of the State, and the latter provides the citizen with individual services through community forms such as hospitals, roads, schools etc. The citizen can also join various kinds of groups: local committees, civic boards, community action boards, users'

associations, neighbourhood committees, etc. These community forms have not always been operative or functional, and often enough they are closed in on themselves, as expressions of the status quo that inhibit community development. In mining areas, community participation is minimal, dispersed, and mostly short-term, with particular actions motivated by various specific circumstances: local needs, lack of institutional knowledge, lack of government action or decisions; which on a number of occasions has led to serious conflicts.

The State's training activity should demonstrate the advantages of community associations in the mining districts, and in particular the miner's ability to participate in matters that concern him.

c) Municipal training

Public administration in the mining districts should be appropriate to the development needs of each of the mining municipalities. In general, the local authorities also lack the necessary training, both in the ordinary procedures relating to their functions such as requesting, utilizing and describing the advantages and opportunities that mining production offers when dealing with various official bodies such as ministries, departments, managers of public companies, and those responsible for support programmes.

There are many examples of coordination and consultation as a mechanism for involving the community, as in the case of the citizens in Ilo, Peru; for this to be possible, the municipal authorities must be prepared to participate in the processes of negotiation or consultation. Community participation in the decision-making process is a very important part of the policy of large international mining companies when they wish to carry out projects in areas where the population is likely to be affected. The entrepreneurs know that before making the investment they have to sit at the negotiating table with the community. This policy is successful to the extent that there is open negotiation and participation at the level of both commitments and contributions with all parties. In this context, the new attitude of some Canadian mining investors is exemplary.

In this way, governors, municipal mayors, consultants and auxiliaries at the local management level need to have a basic level of training in administration, budgets, and mining and environmental legislation. This training process should aim to ensure rational and objective management in the process of negotiating with the mining company on the economic benefits for the local communities. The latter may take the form of royalties and start-up fees, and preparing the way for avoiding painful impacts once the mining cycle comes to an end with the closure of the mine.

In the past two years there has been a growing perception of the importance of community relations as a key to the long-term viability of both mining exploration and mining projects. Issues of social equity, justice, risk and benefit, appear increasingly linked to mining exploration projects, often but not always in association with environmental concerns. Exploration activities become a source of conflict, resulting in a loss of opportunities both for the community and for the mine-prospecting companies. Relations with the community have been particularly problematic in Latin America, where the recent political changes, previous history, the size of the indigenous population and the large number of exploration projects have created a particularly difficult environment for the work of the explorers.

According to Thompson (1999), the entrepreneurial culture and the traditional practices of mining prospecting have left the sector poorly equiped to manage community relations and other aspects of social risk. This attitude grossly underestimates the cultural and social impact of a moder exploration project and does not recognize the reality of the situation in Latin America, where communities are in a position to distort, delay or even prevent a project that is considered unacceptable, and often do so.

This text has been selected in order to make the point that if large mining corporations consider themselves poorly equipped for the debate, what about small communities where there are large-scale projects, sometimes displacing informal miners? It should be recalled that situations such as those described by Thomson occurred in Las Cristinas in Venezuela and that in Colombia gold projects have been paralysed for years by resistance from a community that was poorly-prepared and ill-informed for an objective discussion of the issue.

2. Business training

In order to develop a strong industry, the entrepreneurs need to have a sound training and education, with a knowledge of various aspects of the business; such as business organization, commercial accounting, education and training in labour issues, and of course in the technical aspects, and for this purpose the following programmes should be developed:

a) Organizational and business training

The operator of a small-scale mine needs to be trained and educated in various subjects, and to be aware of the rights and obligations associated with setting up a company. This will include requirements such as: writing a constitution, registration with the chamber of commerce, the relevant taxes, social security institutions, and of course how to make and calculate a profit. There should be practical encouragement for this process, in the form of assistance and support for whoever decides to establish a company.

b) Accounting and commercial education and training

Those involved in establishing a company need to be aware of the benefits of keeping reliable accounts of their operations. Of course the mining entrepreneur is not going to have the skills of a public accountant, but he should be able to understand the information that his accounts can provide on the progress of his business. He should be trained in the basic elements in order to understand a balance sheet, and a minimum level of terminology: assets, liabilities, depreciation, inventories, etc., terms that should be understood not only in their textual meaning, but also with their implications, significance, consequences, and above all their practical uses.

As the informal miner moves closer to the formal sector, he should be trained in commercial practices, so that he has accurate information, rather than relying on intuition or guesswork, on trade procedures and practices: the cost of overdrafts, the nature and types of securities, civil sanctions for non-fulfilment of contracts, various forms of financial intermediation, invoicing, charges, mechanisms for settlement of trade disputes, general concepts of marketing, costs, correspondence, and others; then he will know whether his business is viable.

c) Education and training in labour management

As experience is the most important characteristic of informal mining, the good workers of yesterday tend to become the bad employers of today, owing to a lack of training. They generally confuse paternalism with good worker-management relations, and are unaware of workers' rights. This situation generates high numbers of claims and counterclaims in the labour courts and unjust and illegal practices such as the employment of minors and irregular forms of recruitment.

The average miner does not know how to recruit his workers, nor how to terminate working relationships; the workers are unaware of the existence or extent of their rights. The usual result is prolonged and unnecessary conflicts between the two sides, which cause huge losses to both employers and workers, and ultimately to the State.

The entrepreneurs and the workers have to be instructed in the meaning and usefulness of a work contract; the benefits of social security, the rights and responsibilities of both parties, how to

pay for it and benefit from it, in order to establish appropriate working hours, work discipline, use of machinery and equipment, and forms of settlement and payment of salaries, social contributions and non-tax contributions.

The training should not be limited to technical training, but should provide the employer with tools to normalize the contractual situation of all of his workers, and make him aware from the very beginning of his civil responsibilities, and the penalties imposed for non-compliance with regulations.

3. Technical training

Basic, comprehensible and lasting information should be provided on aspects such as: topography, in order to monitor weekly, monthly and annual production; geology in order to have an awareness and understanding of the type of mining resource available in terms of quality and quantity, and a degree of certainty as to the reserves.

The training should provide information on the potential quality of the mining output; and also basic information on mining techniques, in order to understand and use the information provided by technicians and engineers. Information should also be provided on methods of exploration, and also on subjects such as ventilation, drainage, maintenance, and industrial safety below ground and at the surface.

Without these elements, the miner will never be able to make use of the technical assistance available, and will not be able to comply with the obligations conferred by the mining title. If he attempts to comply with them while using inefficient production methods and making mediocre reports to the State, his efforts will in the long-term constitute an expense rather than an investment.

4. Encouraging self-management

Training, education, and skills updating and instruction have the final objective of achieving self-management for the miner. The effort and resources for the implementation of specific tasks in these areas cannot be provided indefinitely, but they can be stable. This phase of education should be completed in the medium-term, so that when it is concluded, the country has a set of sound entrepreneurs of varying economic capacity, which are not dependent on external agents such as official agencies, subsidies or special protection for carrying out their work. There should also be a strong trade syndicate, as an integral part of the national economy, and able to generate relations of industrial and trade interdependence (a cluster) with other sectors of national economic activity and with countries in the region. Lastly, mining should have strong leadership that has developed within the industry, and has been selected in a democratic manner with the participation of all the stakeholders.

The State's training activities to convert informal miners into formal entrepreneurs have the aim of making mining a more professional activity; that is, mining should be conceived as a business activity with serious rules, where the entrepreneurs operate efficiently, making use of basic market knowledge, generating quality employment, strengthening the domestic consumption of minerals and placing the surplus abroad, while guaranteeing the quantity, quality and timeliness of the product to the final user, and demonstrating concern for the client's needs, *inter alia*. All of these aspects of professional mining should be developed without the need for State support beyond what is available to other industrial sectors.

The aim of the training and business promotion has to be self-management, and should be achieved within a timeframe defined according to the number of participants, geographical distribution, resources, acceptance of the plan by the mining community and the degree of

commitment to it; the plan should be measured and evaluated in percentages of quality and quantity of goals achieved, so that progress can be measured and corrections and adjustments made to the model.

5. Development of trade syndicates

The dispersion and fragmentation of Latin American miners is obvious. Local mining producers accepted and recognized that fact in recent meetings and seminars held in places as far apart as Lima, Peru, and Mazatlán, Mexico. There are also other factors that affect the possibility of achieving strong and unified trade syndicates such as the size of the mining district, its location, the type of mineral, political ideas, and the economic conditions of the region.

Latin American societies are made aware of the mining industry's activities through the actions of the sectoral leadership that participates in discussions on specific issues, but this leadership is not continuous, has poor communication with the members, is not easily replaced, and generally does not involve the whole industry, which is very heterogeneous in nature.

Strong, stable trade syndicates are needed, with a national presence on a permanent rather than temporary basis. These syndicates should stimulate discussion and agreement on issues such as mergers, integration or federalization of the different trade syndicate organizations and any other organizations that are needed to establish a process of trade syndicate integration which includes the most remote district, providing channels of participation that do not exclude any sector of the industry.

In addition, firm support should be given to the efforts of known Argentine, Chilean, Peruvian and Venezuelan trade syndicate leaders, who have tried to achieve integration through the Inter-American Mining Society. It is hoped that this association will help to find an effective solution to common problems such as metal prices, transborder contamination of water basins, lowering production costs, gold smuggling, and other issues, such as the exchange of techniques and technologies.

The experiences of each country with trade syndicates should therefore be evaluated, and the result could be channelled through regional and national groups in a processes of continuous negotiation with the mining authority and its relevant agencies. Also, relations should be developed with the producing countries through the national corporations that are the most representative, designated by their peers in each country in order to strengthen the Inter-American Mining Society.

In this way, the active participation of those who are involved in the mining business at all levels will be guaranteed, generating a permanent feedback of information, policies and programmes which nourish the trade syndicate and allow it to take an active part in the discussion and decision-making at all levels.

6. Legalization of mine workings

"Artisanal mining should be legalized and formalized to promote its growth. A legal framework that recognizes the existence and characteristics of small-scale and artisanal mining is a prerequisite for its formalization and for limiting its negative impacts. In particular, artisanal mining needs to be mainstreamed, and in many cases, alternative employment opportunities need to be created for these miners so as to ease the pressure on the natural resources and the environment."

The previous paragraph summarizes very well the fact that in general countries with uncontrolled and uncontrolled artisanal production are well aware of the potential of this type of production and consequently should take decisions regarding its development. Especially taking

into account that this is "...not only...a mining issue that requires mining expertise but also ... a poverty and socioeconomic issue that requires attention on a multisectoral level" (United Nations, 1996). It is proposed that technical assistance be provided for mining and also for the development of alternative economic activities, as well as education, health, and women's empowerment in mining districts, the latter aspect as a regulator of intrafamily and social violence.

In contrast to what is generally believed, the situation of the miners that have mining rights is not better than of those that do not have them. Although the legalization of mine workings has often been hailed as the ideal solution for achieving development in this segment of the industry, this has seriously distorted the attempts to manage the issue of informal, uncontrolled and uncontrollable mining. Legalization is the necessary path for industrial mining development, but it is not the principal objective, as in many areas, by tradition, mining rights belong to the entire community. Examples of this situation are sediments and construction materials obtained from river beds, as well as communal lands in reservations, indigenous zones, ethnic minorities, "palenques" (enclosures), and other forms of common property in Afro-American communities.

With legalization there is access to specialized technical assistance and to credit, the administration of deposits is improved, environmental monitoring is easier and production can be standardized in terms of quality and quantity. This process results in higher prices, and improved marketing, ensuring by means of long-term contracts a reliable supply for the consumers, who have certified lists of legal suppliers.

In this field, simpler contract procedures could make the whole process more rapid and less costly, focusing attention more on administration of the title (contract) than on the formal act of issuing it.

The mining code reforms that have been proposed by various countries should also make allowance for various ways of achieving legalization of informal small-scale and uncontrolled mining works that have development potential. The regulations, procedures and requirements should be disseminated and explained to all those who engage in mining without legal authorization. Guidelines should be prepared, published and distributed that illustrate in clear and direct language both the reasons for legalization and how it can be achieved.

These guidelines for legalization should include a description and summary of the existing regulations, models of the forms or documents that have to be presented, and an explanation of the information required. They should contain examples that explain the stages for achieving legalization, specifying the name of the offices where the application should be made, the requirements, the documents to be enclosed and the forms of presentation, as well as a glossary explaining the terms used in the text.

The legalization campaign will provide guidance for the actions of the mining authority and possibly for the transitional arrangements that are issued for the new code. The campaign should begin with a dissemination effort through the mass media such as the press, radio and television. Through a process of mining legal and cultural outreach, the mining community in general should be clearly informed of the advantages of legalization and the ways of achieving this. Promoters should be available in each region to explain and to advise the miners as they complete and presenting their applications.

The campaign of mining legal and cultural outreach should encourage legalization while also explaining the consequences of illicit mineral exploitation, the sanctions applicable to those who persist in that practice, and also the attitude and conduct of the official bodies who deal with those situations and the sanctions applied to those responsible if they do not carry out their work of control.

With a view to preventing unfair competition, deterioration of the environment, and tax evasion, the process of business promotion should include a programme of rewards in the form of metal bonds for those who report on illegal miners, and also penalties for landowners who assist, allow or sponsor illegal mineral exploration on their property. Such penalties should include decommissioning the mineral and sending it to local public enterprises, hospitals and public schools, and community tileworks and brickworks.

7. Economic diversification

The basic budget assigned to the Business Promotion Programme for civic and business training should be sufficient to cover all of the persons involved in mining extraction.

Although not all such persons can have a contract or a mining title, it is important to offer them viable economic alternatives for productive employment that may or may not be related to mining, so that illicit mining is not the only employment possibility. They need to be trained to use their entrepreneurial skills in new production activities. Such guidance will help to promote, establish and consolidate these activities and their linkages with the country's formal economy.

For this purpose it is proposed that the following forms of mining be promoted: microenterprises, family enterprises, and forms of association conducive to establishing specialized companies for mining technical services, in the areas of reforestation, supply and installation of supports made from immunized wood, drainage, ventilation, mining operations for the development, preparation and operation of mines by subcontracts, industrial engineering, maintenance and construction of installations at the surface, transport and supply of personnel, provisions and consumables, transport for training, transformation, profit: crushing, milling, concentration, smelting, coking; manufacture of work clothing and light tools; and also handicrafts, agriculture, road maintenance, communications and radiotelephony. If there was more support for the activities that form these invisible mining clusters, those who are unable to work directly in mining extraction would not have to be entirely disconnected from the industry and would not have to leave geographical area concerned but could be part of it in a productive and peaceful way.

8. Measuring parameters

Whatever kind of plan is adopted for State promotion activities, it should provide for measurements at six-monthly intervals at least, in order to allow adjustments to the annual goals. These measurements would use evaluation criteria such as: the number of miners trained, the number of mines legalized over a certain period, increases in production, number of jobs, amount of tax collected, companies established, affiliations to the national social security system, number of those attending courses and seminars, the number of safety incidents, reforested hectares, the number of active members of cooperatives, trade syndicates and their members, contracting requests received, illicit mines closed, budget implementation, number of mines provided with technical assistance.

9. Executors

The entity responsible for the programme in each country should be the mining authority, through the minister or secretary with responsibility for the administration of mineral resources. This would a positive political response to the question that should be asked in each country. If the extraction, processing, transport and marketing of minerals is a valid economic option, it should be the responsibility of a specialized department.

This department will in turn receive support in specific areas in the form of master contracts with non-governmental organizations, which in turn may have subcontracts with other NGOs or companies and specialized enterprises.

The concept of master contract implies that the general contractor is responsible for overall implementation of the Business Promotion Programme which includes components for training, technical assistance, mining legal and cultural outreach, economic diversification through the establishment of microenterprises and family enterprises; specific studies of production costs and volumes, the market, promotion and formation of neighbourhood and municipal committees; work to eradicate child labour, consultancy services to towns and municipalities. In the event that no NGOs were interested in specific tasks, or no satisfactory proposals were received, the executing entity would organize a training activity in order to establish small consulting companies for these purposes.

10. Summary of the proposal

In view of the economic and social circumstances generated by mineral extraction, with forms of production that are lacking in entrepreneurial skills, the governments need to re-think their view of small-scale mining, a label which is certainly insufficient, and too narrow to cover an issue that has so many geo-environmental, mining, economic and social components. The role of the State should be clearly defined in relation to groups of producers that meet the minimum requirements for implementing mining projects, independently of their scale or volume of production.

The lack of attention both to individuals and to communities working in mining areas in poor business conditions has led to expensive social conflicts, damage to the environment without any real possibility of remedial action, or processes of social crisis that are very difficult to manage because of the poverty produced by declining prices. Organized, conscious, articulated and continuous efforts are needed from the State for special support and development programmes for the national mining industry, which in contrast to previous mining promotion programmes, should not be in the form of assistance, should be for a specific period of time, and should be evaluated and monitored in line with clear objectives. Alternative economic solutions should also be proposed for those who do not manage to establish themselves as mining producers, and a network of labour, financial and educational support should be generated that in the medium-term will ensure economic self-sufficiency.

Those who have chosen to make their living from mining and decide to enhance their level of entrepreneurial skills in order to increase their chances of success in the that business should have access to a specific technical assistance programme consisting of six modules or basic programmes, in line with the above philosophy. A summary follows below of the expected beneficiaries, content and duration of such a programme.

a) Concept

The idea is to carry out a programme for overall strengthening and promotion of entrepreneurial development in mining and its support industries. The programme would include, on the one hand, a systematic range of public activities to benefit the sectors of mining production that are the furthest behind in entrepreneurial terms and on the other hand, a system for trade syndicate participation with the public sector in order to deal with issues such as the administrative decentralization of the mining authority and of support programmes. This would require continuous analysis of market conditions and the introduction of mechanisms such as export promotion funds, price stabilization funds, and special credit lines for export financing.

In order to obtain risk capital for exploration work and for preparing investment portfolios to promote projects in association with foreign capital, it is essential to have trade syndicates that are prepared, organized, and ready to interact with the State in order to attain their objectives.

The miners with a lower level of entrepreneurial development are generally the most numerous, and the following programmes are proposed for them, based on the technical assistance scheme, with an indication of the final recipients. This could serve as a reference framework for Latin American mining authorities.

b) Programmes and their recipients

Civic education: civic education can be divided into:

- Training in civic education: takes place continuously throughout the lifetime of the programme, intended for all levels of the industry, and all mining districts
- Training in community education: intermittent in nature, aimed at specified sectors of the mining community. Special conditions to be met.
- Training in municipal education: cyclical in nature, intended for managers in the municipalities.

Entrepreneurial training: entrepreneurial training is divided into:

- Education in organizational and business training: periodic, geared to the holders of mining rights, from the homogeneous entrepreneurial groups identified and selected by the operator of the programme, with emphasis on the uncontrolled group of miners.
- Education and training in commercial accounting: periodic and geared at the persons referred to in previous paragraph.
- Education and training in labour management: periodic and primarily designed for those holders of mining rights in the uncontrolled homogeneous group and open to, although not specifically aimed at, the homogeneous uncontrollable group.

Technical training: technical training is divided into:

- Basic entrepreneurial technical training: continuous throughout the lifetime of the programme, geared to mining entrepreneurs from the uncontrolled group, to mining workers in the uncontrollable group, and to smaller-scale producers among the controlled formal miners.
- Basic environmental education: continuous throughout the lifetime of the programme, aimed at all those involved in the mining industry, including *inter alia* producers, marketers, users and transporters.
- Training in technical processes: cyclical in nature, directed in particular at entrepreneurs of the uncontrolled group, and devoted to education and the solution of specific technological problems in: the mining cycle, preparation and processing of minerals, techniques for mineral use, marketing and others. Includes final users that are not miners, such as jewellers, stoneworkers, smelters, stone and marble cutters, those responsible for combustion, and heads of purchasing.
- Training in mining and environmental geology for the regional authorities: continuous, and designed to produce skills and a greater understanding of the industry among the political and environmental authorities at the regional, and sometimes national, level.

- Basic technical education for mining workers: on a continuous basis, theoretical and practical, designed for all workers in all entrepreneurial groups.

c) Encouraging self management

This should be on a continuous basis, as a programme designed to steer the formation and organization of companies to provide specialized technical services. Will begin to operate one year after the training programme begins, and should continue for at least eighteen months after completion of the training. Should be offered to those who express their willingness to participate and who, during the training process, have demonstrated the necessary abilities for forming companies. This part is divided into:

- *Encouraging the formation and organization of mining entrepreneurial units:* aimed at those owning mining rights who make a commitment in writing to organize their work according to an organizational structure that complies with all aspects of the relevant legislation.
- *Encouraging the formation of specialized companies providing mining technical services:* aimed at workers and entrepreneurs of the uncontrolled and uncontrollable homogeneous groups, who, because they do not have a mining title, or owing to the environmental, technical or economic viability of their activities have had to leave the mine where they were working because it had closed down, or was no longer viable.

d) Trade syndicate development

Designed for existing trade syndicates and to those that are established during the training process, this part of the programme seeks to strengthen the mining syndicates, their independence from the State and their operational management capacity. This part is divided into:

- Establishing a national preoperative trade syndicate group.
- Establishment of regional syndicate branches.

e) Labour substitution and economic diversification

This programme should form the concluding stage of the whole process, and should be well-funded and staffed with high-level business experts. It should not allow the formation of parallel activities in the traditional mode of the group referred to by definition as uncontrollable. The participants in the programme should be offered a different employment option, guaranteeing them a respectable and productive way of life. This part is divided into:

- **Identifying opportunities:** this activity will be the responsibility of a working group made up of specialists selected by the head of the programme, the mining promotion enterprise, and all those bodies concerned with the overall implementation of a programme of this kind; for example, the executive offices of heads of state, public health and labour ministries, planning offices, or their equivalents, the technical training and education institutes, representatives of mining cooperatives and syndicates. The aim is to define a programme for substitution and identification of opportunities for integration in various economic activities, for persons participating in the programme.
- **Identifying needs:** the main priority of the working group established according to paragraph 5.1. will be to identify the number of persons, their geographical distribution, their abilities, the cost of the programmes, and the technical, training, logistic and financial requirements.

- **Establishment of a data bank of projects and operations:** with the design of the programme as specified in paragraph 5.1. and the definition of resources and needs as specified in paragraph 5.2., the working group would establish a body to promote, finance and direct labour substitution projects, or would transfer this responsibility to the mining promotion enterprise, which would take on the task of management, and operate either through a master contract or regional contractors and consultants, and providing the latter with measurable goals and objectives.

VI. Conclusion

In view of the economic and social circumstances which are generated when mineral extraction takes place in the context of a low level of entrepreneurial skills, it is essential to reconsider the attitude and views of governments with regard to the sector which is somewhat vaguely referred to as small-scale mining. This classification is in any case insufficient and too narrow for dealing with an issue with so many mining, geo-environmental, geopolitical, economic and social components; consequently the role of the State should be redefined in relation to the different entrepreneurial groups, independently of their scale or volume of production.

The lack of attention to both the individuals and the communities which carry out activities in mining areas under very poor entrepreneurial conditions has generated large-scale and expensive social conflicts, as well as environmental damage that is beyond any real possibility of remedial action. In addition, processes of social crisis have continued to spread, and are very difficult to contain, mainly because of the generalized poverty caused by declining prices.

There is a need for organized, intentional, articulated and continuous attention from the State in programmes for promotion and training for the national mining industry. Special new programmes need to be designed, which, unlike previous mining promotion programmes, will not have the characteristics of welfare programmes. Also, these programmes should be for a specific time, with evaluation, monitoring, and a clearly and fully defined objective, and should offer alternative economic solutions for those who have not managed to establish themselves as mining producers, thus generating a network

of labour, financial and educational support that in the medium-term will ensure economic self-sufficiency.

Those who choose mining production as a means of making a living and decide to enhance their level of entrepreneurial skills in order to increase their chances of success in this industry, should have access to a specific technical assistance programme consisting of six basic modules or elements, as identified in a previous section of this document.

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