



International
Institute for
Environment and
Development



Mining, Minerals and
Sustainable Development Project

PROJECT DATABASE: DOCUMENTATION OF INFORMATION ABOUT SMALL AND ARTISANAL MINING – BRAZILIAN REPORT

Jose Antonio Sena do Nascimento
CETEM – Centro de Tecnologia Mineral
Rio de Janeiro, Brazil



This report was commissioned by the IIED's MMSD Project. The report remains the sole responsibility of the author and does not necessarily reflect the views of the MMSD Project, the MMSD Assurance Group or the International Institute for Environment and Development.

**PROJECT DATABASE: DOCUMENTATION OF INFORMATION ABOUT
SMALL AND ARTISANAL MINING – BRAZILIAN REPORT**

SUMMARY

INTRODUCTION.....	3
METHODOLOGY.....	4
1- LEGAL ASPECTS	5
2- POLITICAL STATEMENT	6
3 - ENVIRONMENTAL IMPACTS	8
4 - FINANCING AND MARKETING.....	10
5 - TECHNICAL ASSISTANCE: PROJECTS AND PROGRAMS	12
6 - ORGANIZATIONAL ISSUES	15
7 - LABOR.....	17
8 - CHILDREN LABOR.....	19
9 - WOMAN’S LABOR	21
10 - TECHNOLOGICAL RESEARCH.....	24
11 - HEALTH.....	26
12 – BIBLIOGRAPHY	28

INTRODUCTION

The CETEM – Brazilian Mineral Technology Centre, supported by MMSD, is building a database with documented information, that consists of bibliographic references and other types of media (video, hyperlinks, etc) about small and artisanal mining and related subjects. This database contains information about these subjects during the last 10 years in Brazil. This research is also being prepared in other South American countries such as Chile, Bolivia and Peru. After completion this will be added the main database of CETEM.

More than 350 titles were incorporated into the Brazilian information database. These works concerned the related themes that were used to prepare the Brazilian General Report, which is already done.

The database has 3 languages versions, Portuguese, English and Spanish. This allows access and data entry for researchers from Spanish South America and MMSD in England.

A bibliographical search of the database can be done through various categories, such as the type of document, subject, title, and main author. The references can also be found through selected key-words in order to allows the search for a document from a word contained in this document.

The final report that is being prepared will give a general perspective concerning small and artisanal mining and related topics in Brazil and South America in the 90's and will be useful to build a general view, with could be used to guide prospective public policy and support technical assistance projects to small mining.

One of the main goals of this project consists of provides support to decision making by the CASM Expert Group. This expert group is formed by many international co-operation agencies' members and experts. The group intends to provide direction to public policy.

The research themes of the database are: Legal aspects, Political statement, environmental impacts, financing and marketing, technical assistance: projects and programs, organisational issues, labour, woman's and children labour, technological research and health.

METHODOLOGY

The Data System was developed with objective to store data referred to bibliography and documentation of the small mining and artisanal mining project in Brazil. O program was developed in Access.

The main offers the following options:

- ◆ Bibliographic References and Documentation – where it is made the documents inclusion.
- ◆ Types of documents – for each new classification
- ◆ Issues (articles) – which show the document origin
- ◆ Visual report – through this option it is possible see and print all data included in the system

In the data entrance all the fields are available, to be filled according with collected information for each type of document, book with authors, magazine, article among others. The fields type of document and issue are obligatory for any data inclusion, since are reference for consultation. Names of persons or Institutions that could supply information about the document and to its location, also could be included through direct ways to small screen visualized at the lower part of the main screen.

The reports may be filtrated by type of document, issue, table, subtitle and main author, the first follows the standard bibliographic rules of ABNT, defined for each document. Any other type of document may be included, only informing what the model of print it should follows. Considering the above mentioned structure, the search process of registered bibliography on the data system shall be done through several categories as type of document, issue, title subtitle and main author. The references also may be founded through specific selected words, allowing the search documents starts with one word included in it.

1- LEGAL ASPECTS

Until the beginning of the year's 80, few persons were in position to recognize the importance of small size enterprises. It was recognized, theoretically, the economical and social relevance of the small size production units, their contribution and decentralization of the entrepreneurial activities, but almost nothing objective and concrete were proposed to allow them to practice their role of development agents. By the contrary any trial of different treatment simplified or favored to small enterprises were made nonviable. Apart of this a group of small entrepreneurs unorganized and lacking of expression and political representation, let them unable to act on defense of their specific interests(Ferreira,1996).

Even on the 80's decade were approved by the national congress the "estatuto da microempresa", which immediately rises adversary reactions of the state and municipal government worried with the possible loose of assets as a consequence of fiscal dispensation.

With the enforcement of the constitution of 1988, the small enterprise were included on special legislation, as its article number 179 establish that the micro and small enterprises should have special conditions as fiscal dispensation and credit lines, to be able to develop. Apart the fact that this article was in force from 1988 until the last years of the 90's, it was not applied, because it should be regulated through complementary law (Vale,1997).

In therms of conception, there is a difficult to name what would be a small firm on the mining case, having no agreement concerning what would be considered a small company mainly in a country with continental dimensions like Brazil where such classification may change from one region to another.

Apart of the frequent use of the terminology small enterprise, by technicians or legislators there is an evident lack of understanding on this definition, even in general terms. Majority of people seems to prefer a quantitative way of definition.

2- POLITICAL STATEMENT

The small enterprises, in opposition to what is generally believed, occupies relevant position in the economy of the industrialized countries, mainly the United States of America, Japan and some European Countries.

They perform important functions, playing relevant role in the wealth production, labor generation, taxes collection, technological innovations and increment of the economic system efficiency, due to the high degree of competition they promote (ARANTES, 1995).

Among advantages reached by the small companies are the management capacity or flexibility when compared to the big firms. The great corporations invest considerable resources in scientific research and technological development, and the small company has the flexibility to turn the result of these researches in products directed to the market, in a fasten way. Examples of sophisticated products, well known nowadays, were originated by small size companies, like the Xerox machine and Apple personal computers (FERREIRA, 1996).

There is, by several reasons, a trend in the modern world to stimulate the small company's sector, creating a favorable environment to Science & Technology Development. The government try to eliminate restrictions and legislation distortions upgrading the small entrepreneur and the role of the small companies (SILVA, 2000).

In Brazil debates about this sector are relatively new; only on the last decades are being given importance to the small companies.

The recent studies about these small production units enhance the lack of systematic statistical information, to allow its better knowledge and, as a consequence, the definition of more realistic polices directed to the sector. Specifically, these studies are on agreement concerning the importance of these units in the absorption of significant part of labor, as well as complementarily and for subordination related to the big company on taxes collection and the development of some regions.

The central executive power through the law nº 9.317 of December, 5th, 1996, create the "simples" which has modified all the collecting of taxes and social contributions for the micro and small brazilian companies.

This legislation reaches about 60% of the country companies, or 2,4 million of small size companies. Starting in January 1997 the "simples" unique tax with ranging from 5% to 10% over the income before taxes obtained by the micro and small companies.

The inclusion should be volunteer (?), or, the companies that wish could choose by the conventional system currently in force nevertheless when enter in "Sistema Integrado de

Pagamento de Transportes e Contribuições das Microempresas e Empresas de Pequeno Porte (simples)”, the company when collect the “DARF – Documento de Arrecadação Federal” will be up to dated with all the taxes. The companies suitable in the system will collect through only one unique DARF, all the taxes and federal contribution :

- ◆ Income taxes of juridical person;
- ◆ PIS-PASEP;
- ◆ Social Contribution over Liquid Profit;
- ◆ COFINS;
- ◆ Social Security Contributions of the Employer.

3 - ENVIRONMENTAL IMPACTS

The analysis of bibliographic material available about small mining allows us to some considerations about their effects and impacts on the environment in the last ten years.

Mining has some specific characteristics that differentiate it to other economic activities. The distinction, for example between property of the soil and of the underground it is ignored by many miners. The obligations with relationship to the mining right are also laid to a second importance, as well as the adequacy of the mineral activity with the environmental preservation (SANCHEZ, 1994).

Studies related to environmental protection are also made rarely done being evident, the lack of an action integrated between the mining promoting and fiscal agencies. This lack of coordination has been caused problems to the miners, mainly to the small ones, that don't know to who to appeal. The technology now available for the control and recovery of the environmental impacts allows the development of the mining without environmental risks.

In relation to “garimpo”, a great quantity of papers analyzed had the objective to identify main social and environmental impacts of this activity these studies had been carried on several places in Brazil, but had serious impacts in their ecosystems like Amazônia and Mato Grosso Pantanal. (CLEARY, 1992), (FARID, 1992).

The cassiterite “garimpo” brings impact as concerning deforestation and river's contamination by soil due to the ore extraction washing. In Rondônia, there is great “garimpo” about 80 square kilometers of deforested area , with holes of until 15m of depth in “Serra da Setenta e Cinco” which is along Santa Cruz River, affluent of Candeias. The rivers and their landscape are been transformed in mud, with degradation of fish stocks.

The gold alluvial mining is the mining activity with greater impact over the environment in wet areas and human population. The “garimpo” uses about 600.000 people, mainly in the States of Rondonia (Madeira River), North of Mato Grosso (small afluentes of River Teles Pires and high Jurema), Pará (mainly along the rivers Tapajós, Tocantins and Araguaia) (CLEARY, 1992).

Such activity had inherited several empty settlements and small agricultural projects, bankrupted in the Amazon's States, like Rondonia.

Apart the lack of information's, can be say that “garimpos”, such as is being made in Amazon, by individual “garimpeiros” or by firms it is a great danger to the ecosystems of wet areas and to the local population and even out of them. Due to the process of biomagnification it is to expect that the consequences will be even more serious in the future. On the other hand, the “garimpeiros” are, at same time, agents and victims of the environment degradation process. It is urgent that the brazilian society and the government

found in a short time, ways to control this activity, as well as the negative effects already extensively proved.

With the increase of the “garimpeira” activity starting in the years 70’s even in the amazon forest than in the Mato Grosso Pantanal, it was increased the use of mercury in the process of gold amalgamation in procedures where it is used in conveyors, in the expectative to catch that fine particles of gold that passes on the ore, in a process highly inefficient and polluter, because mercury is dispersed to the environment through its fragments. It has being observed also problems related to amalgamation residues which made piles that causes negative influence in the local environment (LINS, 1992).

In Poconé, situated in Mato Grosso Pantanal, CETEM has established a program of environmental technology development in the region, that actually is on the second gold cycle, with participation of 4.500 “garimpeiros” changing the mineral exploitation as main economical activity, over passing the traditional cattle raising (FARID,1992).

In this region it is noted the existence of a lagoon, on the “transpantaneira” road, polluted with more than 300.000 m³ “garimpos” residues, that local news considered as “a pot of gold and mercury”. Named “Tanque dos Padres”, nowadays a bank of residues with extensions of 62.4000 m², the lagoon combine the degradation conditions with absent of current “garimpos”, turning viable the erection of a small laboratory to support researches that are being developed.

The idea of “ pilot project”, model to be used to other degraded areas of the country, seems to follow the mercury in the drainage’s, study its behavior of incorporation in sediments and biota, locate points of contamination and to propose solutions to avoid the continuity of the pollution action, as well as, methods of mercury extraction in the environment (FARID,1992).

The research activities, approach, the “garimpeiros”, its labor relationships, its role in the local society and consequences in the national reality. It has being noticed that the “garimpeiros” of Poconé, were extremely aware of what should be considered the environment. The main motivation of “ garimpeiros” it is, more than the desire of a healthy environment, the interest in continuing with the “garimpo” without worries, since in the past interruptions of activities occurred due to the closure by the state environmental agency CONDEMA.

All the papers analyzed show the need of going deeply on research to be able to know the magnitude of the use of mercury in the brazilian mineral processing.

4 - FINANCING AND MARKETING

The weak investment on mineral research, even basic than specific, was one of the serious problems of mining on the last decade, that interrupt the process of generation of new mines in the country.

The mineral activity, either the research phase than the extraction, depends of methods and equipment some time expansive and not available to the small entrepreneur. The investments related to this phase are well variable, depending on the complexity of the occurrence, the localization, conditions of entrance, and infrastructure available, among others.

With the objective to keep or develop the economical viability in the sector, the government try to minimize the private risks investing directly on the basic research and intermediate phases. As concerning the final steps of research and development the government has no Agencies that stimulate and finance the sector, supporting the entrepreneur and reducing the investment risks.

The entrepreneur when invest on mineral research should have to his disposition technical information that suggest clearly to invest or not (CHIODI FILHO, 2000).

In general, the characteristics of mining, as the use intensive of capital, the high financing risk and the long term of return of capital invested are contrary factors to the activity of small mining (FERREIRA, 1996).

Experience shows that the time between the definition of the occurrence and the start of the mining production is of eight years, meaning that a small mining firm, considering the case of good performance during this long time, never may haven unsuccessful.

The working capital, indispensable for the good running of a business, it is not considered as a serious item by the small company owner. Nevertheless, it is of fundamental importance to estimate carefully, calculating their initial components, mainly the stocks, expenses, store sales at long term and assets to pay, as well as all the increments needed during the time.

The difficulty to obtain the working capital motivates the miner to produce richness as quick as possible. Without working capital and trying to obtain profit and get back its investment capital as soon as possible, the small entrepreneur search to maximize the extraction, given preference to explore the more rich sections, leading to a predatory exploration and reducing the mine life cycle (BEZERRA, 1998).

Research done by Centro de Tecnologia Mineral (CETEM) in 1994, realize that 73% of small and medium miners do not pay attention about stocks and spare parts for its

equipment and machines, even having a store. The sales are made on cash, and are poorly known the operations of bank discount of titles (FERREIRA, 1996).

The extractive mineral industry have, in almost all the official financing agencies, the same treatment given to other industrial sectors of the country. So, the Banco do Brasil S.A., offers financing to increase enterprise's capital, purchasing of machinery and equipment, enlarging and modernization of industrial districts and investment directed to the small and medium company.

Nevertheless, the basic works for economical exploration of a mineral deposit, as already mentioned, are expensive and have peculiar characteristics, being the conventional financing not sufficient and unsuitable.

The significant risks may let the entrepreneur to get rid off getting financing based in goods of capital guarantees and other forms usually accepted.

Considering the lack of financing resources of the miner and the significant risks of the mining project, government creates some financing programs with risk clause, these programs are a model on which the financing agency participates, jointly with the financed company, of the risk for not succeed in the research. The guarantee for the money borrowed is exclusively based on the rights related to the business, being included a risk tax which is paid only by the companies well succeeded on their researchers, the financing, nevertheless, does not reach the majority of small companies, due to require real guarantees, and also an excessive bureaucratic procedure.

When they have access to financing, they are submitted to restrictions which are not observed in other economical activities, because, on mining, the capital inversion should be suitable with the probable life cycle of the deposit, on a way to assure the amortization and remuneration in this time; and this aspect rarely is taken into consideration by the small miner (DNPM, 1992).

The credit policy reaches to few small companies which indicate the bureaucracy, the high taxes rates and the short time of financing as the main responsible by the disaffection.

So, majority of investments are made with capital owned by the small miners and, on the case of mineral research, has the risk of be unsuccessful.

5 - TECHNICAL ASSISTANCE: PROJECTS AND PROGRAMS

In the case of dimension stones, technical assistance and cooperation mechanisms are needed on all aspects of activity. In the case of extraction, it is noticed that the needs are even greater, since the exploration of dimension stones in Brazil still lacking of adequate know-how to explore the rocks (RETECMIN, 1999).

As concerning the mineral treatment, the national machines and equipment, in general, are not in conditions of competition, in quality and productivity, related to the foreigners. In terms of products application, mainly to great external covering of vertical surfaces, still not using suitable techniques of fixing plates.

Aware to the importance assumed by the dimension stones and of covering, some brazilian states, mainly Espírito Santo, Bahia, Ceará, São Paulo, Pernambuco e Goiás are developing incentive actions and promotion to the sector. Among these efforts is the establishment and application of technical assistance programs to the small and medium miner.

An emblematic example of this technical assistance program has occurred in Pirenópolis Municipality, Goiás State, where the exploration of quartzite (lamellar) is an important economical activity, and is being done since the end of the last century (CETEM, 1997(1)).

The extraction operations of quartzite are done out doors, in methods by hands and/or mechanized, according with the type of material and organization of the activity in each sink.

The identification of the main problems observed in the extraction and treatment of dimension stones in Pirenópolis-GO, was done by a team of technicians from CETEM and MMA during technical visit to the region, in April of 1998, and also, through data obtained from project report issued by “Fundação Alexandre Brandt”, supported by MMA.

Some points should call attention with relation to exploitation of dimension stones (quartzite) on Pirenópolis-GO, used as a basis for a specific project proposal, aiming the optimization of mining activities developed in this municipality. Such points could be resumed by the lack of extraction plan technology made, leading to great loses of material on the operations of transforming blocks in slabs, location of residues near the hole, unsuitable deposition of extraction wastes and low extraction recovery.

Apart of these points, there are the problem of laid down sterile material without any planning, during all the time, questions related with the ways how the productive activities are done, mainly in the stone mines, and finally, the treatment (slab's cutting), which at beginning is done manually in the hole of the mine, where the final polishing is done by way of diamond disks in factories located in the rural area of Pirenópolis.

Considering this situation, CETEM made a proposal to “SEBRAE/GO” for execution of a project to give technical assistance to the miners in the field of explosive and desegregation of rocks, suitable to the case specific of this region, aiming the reduction of losses on the operations of rock’s disintegration (a lamellar quartzite) and on the transformation of blocks in slabs, which are transported to the factories, where are cut on suitable dimension for the market.

The technical assistance is made of theoretical expositions in adequate place and theoretical lectures to be transmitted to the miners, at the work places, at the rock mines.

The results are related to the improvement in the use and handling of explosives, including the safety of the worker, reduction costs of extraction and transformation of blocks, reduction of losses in the extraction, reduction of conflicts with ruling and fiscal agencies, improvement on labor, reduction of environmental impact through technical advisement about displacement of rocks and fixing time schedule for blasting at the stone mines, reducing possible accidents between workers, and also with others.

In the specific case of Rio de Janeiro, there are RETECMIN as technical assistance program, which is a cooperative net of research and use of mineral goods directed to buildings construction, helping, for example, on technical problems of extraction on treatment related to small on medium miner and also to the products used in the construction (RETECMIN, 1999).

The technical assistance to the entrepreneur is done on aspects of advisement related to technical requirements of operation and equipment for stone rock mines extraction, soil and sand, in advisement to meet the environmental and legislation agencies requirements (FEEMA, DRM, IBAMA, DNPM, in the advisement about financing support to projects through SEBRAE, in the identification of problems and suggestions of technological solutions in survey and geological studies, in aspects related to worker’s health and safety, in choose of machinery and equipment, in characterization and essays of raw materials and products and, in the direct attendance with technical answers to the associated producers .

The selected area for the assistance pilot program was “Santo Antônio de Pádua”, at Rio de Janeiro state, which is dedicated to a great number of dimension stone rock mines in the field of mining, whose main application are on recovering of floors and walls (CETEM, 1997 (2)).

Among the mining companies existent in this municipality, it is believed that more than 60% are not able for the handling, transportation, storing and use of explosives, but they make usually there activities .

Apart the fact that there is no systematic research, it is estimated that the total loose in extraction and treatment would be around 80%, and 50% are due to losses in extraction (blocks disintegrate) and the balance in treatment (blocks and raw slabs in the stone mines

and final products in the cutting factory operations). These high raw materials losses, represented by pieces of stone remained in the mines and by stone scraps which are rejected in the factories, are a great number and reason of concern, because in few time could represent the risk of losing the major richness of “Santo Antônio de Pádua”, without offer a financing return accordingly with the desired development for the municipality.

The knowledge of such problems, and the consult from the region’s companies, led SEBRAE/RJ to hire the technical assistance of services of Centro de Tecnologia Mineral – CETEM (RETECMIN, 1999).

Considering the identified questions, the experts team of CETEM approach the following points, under technical assistance way, with the local miners:

- stone mining basic concepts, including hygiene and work safety;
- theoretical and practical lectures about the adequate ways of handling, transportation, storing and use of explosives;
- demonstrations at mine’s site of how to optimize the several steps of extraction, avoiding excessive use of explosives, allowing better block’s extraction and reducing of stones;
- Advising related to alternatives for waste recovery including transference of other place’s experience;
- Clarifications about the importance of adequate cooling of diamond disk, as well as the improper excessive pressure of the material to be cutter, over the disc;

Apart of the technical assistance referred, the CETEM’s team has analyzed alternatives on the studied region, related to extraction and treatment.

6 - ORGANIZATIONAL ISSUES

The work's organization on the small company show deficiencies very offer production as made through archaic and artesanal methods with familiar structure and without any scientific concern about administration. It is observed that the owner and family members are directly involved in the production, and when the business assume major proportions they turn to managing or direction's functions. In reality, it is around the owner's work that the economical activity of small companies trend to gravitate. The type of organization more usual is made of owners and employees, and are also significant the number of companies made exclusively by owners and family members. There is no motivational personnel policy, only the remuneration, based at the minimum salary, and in some cases on the standard salary of the class or of the region (FERREIRA, 1996).

In several small mining companies the labor are available to work when the agriculture is not running well, due to nature factors, such as the drought in the northeast. The workers are placed to work without any selection, bad trained and with minimum notions of safety.

Majority of the companies have their decisions centralized, and tasks structured in a simple and individual form, in a way to allow the replacement of workers and the use of unskilled personnel. With the unqualified and unknown of safety rules, there are risks of work accidents due to handling of explosives, resulting in enormous losses to the small mines (CUNHA, 1991).

The lack of appointment in follow the rules it is one of the main facts that causes the great number of work accidents and unhealthy an the mining.

The fact forecasted by legislation of that, in some cases according to employee's agreement, modifications are introduced to the work contract (for example, during the work shift) could reach to conflicting situations. In some regions, the mining companies are the only employers activities and the equipment could became requirements to hire the worker, changing drastically the spirit of law.

Other fact very usual, observed in several researched documents at as the situation where the entrepreneurs hire their relatives, mainly sons, without register in the "carteira de trabalho" and social taxes payment according to legislation.

The lack of management capacity has being responsible by not consolidating in the market several small business, on general run without any production technique.

The legalization at the country, far way from the external economy of the great centers, let the small entrepreneurs, among other difficulties, to face problems of access to up to date management techniques. This situation obliges to a loose of competition in the market, reflecting on activities expansion. Generally, the manager is the mine owner who, with help of his relatives, takes care of the administration, without any concern about

improvement and knowledge of new administration's techniques. So, in 56% of the companies researched the owner was the manager of the entrepreneur, having, also, other activities, usually linked to small commerce and agriculture (SICSÚ, 1991).

7 - LABOR

The offer of jobs in this sector stay practically static during the 90's decade; apart of be observed an increase of 6.69 at the end of years 80, it has shown a decrease of 10,7% from 1990 to 1993, when the country population grow tax was always on expansion (FERREIRA, 1996).

It was observed that, in the mines and factories, there is low rate of medium and superior level technical personal, this situation being explained by several factors.

- very few research and survey work, where the rule of these professionals would be indispensable;
- majority of companies do not have treatment units, without concerning of add value to the product, and
- the nature of small companies, that are incapable of hire qualified labor.

In all be federation units activities of extraction of mineral substances are being developed; nevertheless, at is in the southeast and northeast that the small companies are more frequent (CHAVES, 1995).

São Paulo State, considering IBGE' s statistics referred to construction materials, is the leader in job absorption, representing 29% of the country, followed by Minas Gerais, with 25%.

There are just the smaller exploitations sheet operator with productivity very law of the medium, with levels highly differentiated from the big ones. According to IBGE's data, the value of production by employee on the companies where there are more than 250 persons results in productivity almost three times of the companies that have less than five persons.

The "Departamento Nacional de Produção Mineral (DNPM)" in "Plano Plurianual para Desenvolvimento do Setor Mineral", fix the targets for the job's generation in the mineral sector: "Keeping the productivity and the functional structure of labor and the rate capital product verified in 1992, on the hypothesis of reaching the production targets for 2010, the brazilian mining shall generate nothing lass than 200.000 new direct jobs until that year. Adding the expansion effect of mining on the number of jobs generated by the prospecting activity and mineral research, the level of employment on the formal mining shall be around 300.000 effective jobs on the 2010, or, are increase over 200% on relation to 1992.

Beyond the direct effects over the level of employment of the sector the mining's expansion will have also, as indirect effect, the creation of several other jobs on the mineral

manufacturing industry and on the sectors of services, feedstock, machines and mining equipment.

Considering that, according to IBGE's data, on the year of 1985, for each job on mining was related 8,7 jobs on the manufacturing industry of non metallic mineral and on metallurgy, the effect of mining grow, as designed, would generate, at least, 1,9 millions of new directed and undirected jobs."(MME v DNPM, 1993). In the case of small producers of artisanal rocks, the major positive impact that this activity have on the labor market is the creation of new jobs positions, due to it's intensive laborer character.

In the northwest region of Rio de Janeiro state, where CETEM is developing a project of technical assistance to small and medium artisanal rocks producers, it is reported the creation of more than 5.000 jobs linked to this activity.

The dairy income per worker was in 1999 of roughly US\$ 15,00/day, approximately double of the medium salary of the local agricultural workers. These jobs are important on the economical scenario , mainly on treating of low developed regions (RETECMIN, 1999).

8 - CHILDREN LABOR

Apart of forbidden by law, several cases of work with children on the range of 7 to 14 years old are reported on different places of the national territory during the 90's decade (Folha de S. Paulo, 1997).

At "Garimpo's" areas of Rondônia e Mato Grosso as recently as in 1997 were found children working in poor conditions, with entire work sheffs that, in many cases turn difficult or even totally not allow then to go to the school.

During that year, an systematic fiscalization made in Rondonia's "garimpo" found hundreds of children working on activities "requeiro" (who collect one's wastes that machines are not able to collect) and also on "pranchetas"(garimpos underground galleries). The working children were getting between R\$ 100,00 and R\$ 200,00 monthly, which represents a significant contribution to the family income and makes difficult their disengagement from the illegal job, due to familiar situation of mining, that is responsible to direct children to this find of work (OIT, 1998).

In relation to safety, on of tasks more dangerous is made in slopes which are outlet by shoves to makes ease visualization of ore. To know if the founded vein is a good one, children to a kind of cavern and come inside searching for are; some times the cavern falls down. An accident on the year 1993, a cavern of 40 meters came down killing 19 persons, between then two children, one of 6 and other of 10 years old.

Children are also used to enter in holes of until 20 meter of depth searching for cassiterita veins, activity of double risk, once one could die by asphyxiation of gas scaped from the underground after caverns fall down.

In regions where occurred extraction of artisanal rocks in Southeast or Northeast of Brazil is also usual found children with less than 14 years old working on stone mines, many times handling explosives or developing physical activities not adequate to their structure and, usually, keeping out of school due to remuneration that is less than 1 minimum salary (SICSU, 1991).

One of the ways to revert this situation is running in the garimpo's areas of Rondonia state. In june of 1997 it was signed an Comittment Term between "Delegacia regional do Trabalho", the Rondonia State Government, and companies that explore the "garimpos" and associated productors. In their Commitment Term was established a multipurpose agreement for projects execution direct to improve life conditions, education and health of children and Joring workers (OIT, 1998).

It is obligation of "Delegacia do Trabalho" to fiscalize and penalize any company that use children labor. The government of Rondonia State was responsible by develop the children

Citizen program, that includes complementary activities to basic education, school improvement, food and leisure to attend children of 7 to 14 years old.

This type of attitude is a proof that the State, in partnership with private companies acting in the mineral sector big, medium or small may effectively turn over the unfavorable situation of the children that enter earlier on the labor market.

9 - WOMAN'S LABOR

In relation to “garimpo”, all the researched bibliographic references has shown the poor social and economical conditions of the original regions as the main reason for the women's migration to the areas of garimpo's activity. In the Northeast of Brazil, the frequent cyclic crisis caused by drought and extreme land concentration, at the beginning of 90's decade, were responsible by a great contingent of poor peasant population would continue to have to emigrate to Oriental Amazon “garimpo's” areas as an alternative to be free, at least for a while, of the miserable condition in which they live.

Nevertheless the poor statistics, the available data allow us to say that were existing, on the middle of the 90's decade, around 218.000 “garimpeiros” on the amazon region, being 17% of this labor force made of women (SEICOM, 1994 in RODRIGUES, 1994).

The entrance of woman directly in the productive process, on, in the locals where it is processed the extraction and gold treatment, also is determined by similar factors found in the recruitment and it is done trough mediators, that could be their partners, and relatives, that are members of the team in which they will work.

In relation to the type of activity to be performed by women on “garimpo”, the researches made has shown three basic activities, which are the cooks, the night club girls and the machine owner.

In general, the analyzed references show two different situation of the female work. In the cook's activities environment the virtual confidence characteristic of a familiar economy, is the majority of cases, based on affinity and relative relationship, whereas in the sex workers activity, major forms of immobilization are supported by violence and physical constrain (RODRIGUES, 1994).

The women worker, locally named cook, performs on fundamental function in the resistance and good yield of the productive visits that extract gold in the areas locally named as “baixões”. The women are responsible by all the tasks related to the control of production, as well as specific competence in the organization and consumption of basic feedstock. They perform as equilibrium factor are the cash calculation of the food expenses of the named team. There are a general idea that be a cooker means to practice a good profession. Apart the fact that they consider difficult to stay in the “baixões”, be far way of the family and wake up very early, there women say that as cooker in “garimpos” they can have better salaries than on other activities, even in the country or in the cities.

The female cookers keep, in majority of cases, permanent relationship with the original family group, with those who are in cities mean the “garimpo” and also with those who are situated in far way regions, sending, periodically, money necessary to their maintenance.

About perspectives for the future, the female cooker as their peasant origin have the guarantee of land position for the family group as the unique possibility to be free of this oppressive life situation. They dream with the recovery of their identity temporally last and the services done in “garimpos” are lived as a transitory character, on pretext to recover their peasant conditions.

The named girls of night clubs also get in “garimpo” through invitation never alone and, in the same way as the other women, always scorted by somebody from inside the “garimpo”.

The nets of illegal mining of sex workers are spread by suburbs of the Amazonian cities where the workers originated from the countries are concentrated. The agents, very often are not external of their social group and live at the same suburb. The difference between scort of the cooker and the girl of night club it is that, the first is directly linked to the extraction work and the last are dedicated to activities which are not linked to the productive process (commerce, pubs, hotels, etc.).

In terms of labor conditions, the conditions at night clubs in the garimpos made them very near of an institution, because there have rigid control in a trial of permanent immobilization many times with gunned supervision, in a routine of rules laid down by night club owners.

The studied documents show also that the rules which organize the life at prostitute houses of garimpos are keep by the agency of Public Safety of State’s representatives, which act, many times, submitted to private interests, applying penalties which were established by night club’s owners, until because are maintained in the garimpos news by monetary contributions supported by night owners and other traders.

This group of rules contributes for a situation of absolute terror, of control and initialization of these sex workers, placing them in a condition similar to slave work. There were appointed cases of torture, private prison and occurrence of venereal diseases between these women.

Apart the temporary condition of immobilization of those women, there are situation which could be utilized as tentative of exit. Basically it is possible to show three strategies of exit: the liberation, the rescue and the evade. In the two first kind of liberation, somebody acts as intermediate to the exit, on the woman creates situations, which are responsible to be liberated from this almost slavery. The condition of physical or mental disease of the girl of night clubs also could result in their liberation, in the same way that the emotional involvement with some garimpo’s worker may made him to pay her “debt” with the night club owner and producing her rescue.

The flight appears as the last tentative of woman to be liberated and se has plain conscience of the penalty to be submitted, in case to be caught. Apart of this, in many situation of evident violence, there women take a risk in a flight which could be fatal.

The speech and the practices in the garimpo's areas, from men and women, have activities developed as temporaries, the reason why the staying on there garimpos do not take part of future plans.

In other activities related to small and medium mining as the stone rocks and sand extraction, the situation is well diverse, since the female participation is done at management level in a stage where woman is owner of the production factors and, apart of prejudices which many exist, she has considerable autonomy of action in an environment mainly male (AREIA E BRITA, 1998(2)).

In the case of women owners and/or administrators of stone mines and points of sand extraction at is very illustrative. Their participation in a market yet mainly occupied by man required much of her actuation, maybe more than if she was a men, having to prove that she is able to occupy the function to what she was main in charged. The capacity of management and professionalism are qualities which many administrators, entrepreneurs and executives already have proved to make part of routine of women, which by choose or circumstance, became to exercise positions of direction.

Many stone rocks women administrators attend to universities linked to the branch of administration and business to be able of better perform their functions and have an academic/curricular background tuning them more recognized and respected (AREIA E BRITA (1)).

The entrepreneur vision of these women show that many questions raised by them are similar to the men that act in the same branch, with general concern in relation to tributary legislation and environmental problems which may cause looses to their companies and business.

10 - TECHNOLOGICAL RESEARCH

In technological aspects, it is observed that the small projects of mining industry are being made, in general, without company matching with the raw material's characteristics available on the country. It is not considered that each deposit requires on specific technology, just because are composition and characteristics are variable. It is observed that, in small companies, there is a lack of adequate technology to the better recovery of their ores, mainly on extraction, always made outdoors, and using poor or almost any technology.

The use of mechanization is well spread, nevertheless only 40% of companies uses more heavy equipment, as mechanic shoves, retro escalators, and bascule trucks. Here, it is emphasised on important restriction, which is the fact that electric energy or unavailable nearest the mines. This raise the extraction and treatment costs, which requires the use of explosion motors. The secondary roads also contributes to the expensive costs, due to their very poor conditions of traffic, which turn difficult the production down stream, fact well known by the great majority of companies (MOREIRA, 1994).

The treatment of the ore extracted is done, in general, at the mine, in treatment factories, being that 25% of the mining companies sell the on completely run of mine to bigger companies. It is not significant (about 10%) the number of companies which treat in their factories ore extracted by others, occurring this fact occasionally.

Some Brazilian technology centers has made efforts to develop techniques more adequate to the exploration of the country mineral resources, trying to avoid importation of technological packages which are not adequate to the national ores. Apart the efforts done to the development and use of more adequate technologies to the Brazilian minerals, the country still importing great part of mineral process that utilize (STELLIN JUNIOR and CARANASSIOS, 1991).

In the small mining, the poor importance dedicated to geological research, to the knowledge of the deposit, to the mine project, to the cost control and to interaction with environment contribute to give to mining the image of activity technologically poor and pollutant (CIMINELLI, 1995).

In the case of artisanal rocks the problems of adequate technology application above mentioned are responsible for the non development of this branch, in Brazil, accordingly with is potentiality, source the country have an enormous geological potential for marbles and, overall, granites, of several aesthetic homogeneous and moved standards (VIDAL, 1995).

This competitive advantage only shall be materialized, through the improvement of labor basis and capacitating en all segments of activity linked to this branch, with emphasis for the adequate know-how to extraction (VIDAL, 1999).

The extraction of pieces of stones have minor cost of production (US\$ 50 to US\$ 80/m³) but its practice allows better quality control and bigger rates of material's recovery, supplying the market, fixing commerce and causing less environmental degradation.

It is observed that major part of the brazilian production of granites is derived of pieces of stones extraction and that extraction of blocks is done without the desired technical skill (STELLIN JUNIOR AND CARANASSIOS, 1991).

The clearest results of the problem are the low commercial standards submission to process and difficulty of open new markets for Brazilian exportation, either of materials run of mine than finished and intermediate products (STELLIN JUNIOR AND CARANASSIOS, 1991).

11 - HEALTH

In Brazil, the importance of association between environment and people's health raise significantly in the last decade. In the case of Amazonian Basin it was without any doubt the use of excess of mercury on the gold production processes contributes to this increasing conscience of problems related with the branch of environmental health (SANTOS, 1995).

The several etiological agents of accidents and diseases on garimpo's areas are linked to the work process, labor relationships and life conditions. Beyond the exposition to high concentrations of mercury, the production process of gold in garimpos presents other serious risks and consequences, among those it are included: malar, leishmaniose, sexual transmitted diseases, hanseniose, gastroenteritis, verminoses, thermic unconfort, violence, alcoholism, drug's dependency, serious traumatic effects due to handling of mechanical cutters, excessive physical efforts, exposition to nature elements, tetanus, lombalgy, damages by excessive vibration, possibility of economy of earth desegregation and skin comes linked to work out doors. The relationship of work generates violence, which have origin in the conflicts between garimpo's owners with garimpeiros, Indians, foreigners, land owners and others.

The life conditions show no sufficient income for the expenses, housing in poor conditions, lack of basic sanity, nutrition not adequate and complete lack of medical assistance (COUTO and CAMARA, 1991).

It is important to emphasise that do not exist only one type of mercury on the production process of gold and, really two: the metallic and the metyllated. For each one of these chemical species are necessary, many times, different methodologies and technologies for environmental and biological monitoring of levels of exposition and their effects (HACON, 1996).

The activity garimpeira it is made in open space, inside forests or in the margins of rivers. So, beyond of adverse effects caused by mercury, the worker also is submitted to direct contact with nature; to the physical factors (sun, rains, winds, noose, abnormal body position, etc.); to the biological factors (flyers and parasites); to the chemical factors (clay, detergent, gasoline and lubricants) and to the social factors, which are related with low levels of life condition and adverse work relationship

Beyond this, the reasoning have influence in the garimpo's process of production and as consequence also internet in the situation of period. In the winter, the rains intensity decreases the work pace, and in summer, the pace is intensified, increasing either the direct exposition of workers to metallic mercury than to indirect exportation of people in general to methyl mercury (SANTOS, 1998).

In relation to demographic information in areas of gold garimpo, even for urban areas, many times are few and not reliable, due to the enormous migratory moving of garimpeiros. So, there are necessary more complete field researches to obtain detailed information which could be used in the planning of sanitary vigilance of the systems (COUTO and CAMARA, 1991).

In the case of small mining of stone blocks in the regions Southeast and Northeast the use of safety equipment, even the more simple, it is not usual nevertheless, there are an increasing concern between workers and environmental and health governmental agencies about health problems and safety associated with the cutting of stones and activities of factories (SANTOS, 1995). The main problems of health linked to artisanal rock's extraction are the silicone resultant of the large exposition period and powder inhalation and hearing damages related to excessive exposition to noise in the factories. Other more serious and immediate effects of vision's loss or of members during dinamite explosion in the front of extraction and injuries and in some cases death as accidents consequences with stored explosives. In this case also there are no reliable statistics about the extent of the problem (ANTONIO and ESTON, 1997).

In the region of garimpo of diamonds in Jequitinhonha Valley, Minas Gerais, the consequences of this activity over the health are present due to bad quality of water supply which serves the population, that, many times lives at hundreds of kilometers for away from the mining site but that also suffers directly with land erosion and river pollution (HACON, 1996).

The health secretary of Almenara city, in the low Jequitinhonha Valley sorrows the river destruction. According with him, day after day increases the occurrence of skin diseases in the region populations, mainly the riverside inhabitants.

12 – BIBLIOGRAPHY

ANTONIO, E.ESTON, Sérgio Médici de. Considerações sobre ruídos contínuos. Dedalus, São Paulo, , , 37-40, , 1997.

ARANTES, Douglas. A posição competitiva do Brasil na exploração e mineração de ouro. Dedalus, Brasília, 7, , , , 1995.

AREIA E BRITA. Mulheres de Areia, nº 5, 22-24, , 1998(2).

AREIA E BRITA. Mulheres de Pedra, nº 4, 18-20, , 1998(1).

BEZERRA, F.D.. Aspectos técnico-econômicos da indústria de beneficiamento de granito no nordeste. I Seminário de Rochas Ornamentais do Nordeste, Olinda-PE, , , 134-149, , 1998.

CENTRO DE TECNOLOGIA MINERAL. Projeto de Assistência técnica na exploração de rochas ornamentais(Quartzitos) em Pirenópolis-GO, Rio de Janeiro, 1997(1).

CENTRO DE TECNOLOGIA MINERAL. Projeto de Assistência técnica a pedreiras(Pedra Miracema) na Região de Porciúncula.. , Rio de Janeiro, , , , 1997(2).

CHAVES, Arthur Pinto. The profile of the brazilian mining profissional.. Rio de Janeiro: USP, 1995. 24.

CHIODI FILHO, Cid. Realidade e perspectivas do setor de rochas no Espírito Santo. Revista Rochas de Qualidade, São Paulo, , , 128-145, , 2000.

CIMINELLI, V.S.T.CIMINELLI, R.R.. Curso de desenvolvimento e gestão dos minerais industriais (não metálicos). Fundação Cristiano Otonni, Belo Horizonte, , , , , 1995.

CLEARY, D.. A garimpagem de ouro na Amazônia. Uma abordagem antropológica. EDUFF, Rio de Janeiro, , , , , 1992.

COUTO, Rosa Carmina de Sena e CÂMARA, V. Buscando ouro, perdendo saúdeUm estudo sobre as condições de saúde no garimpo de Cumaru-Pará. Rio de Janeiro: ENSP, 1991. 134. Dissertações Acadêmicas.

CUNHA, Ana Maria B.M. da. Ensaio sobre a pequena e média empresa de mineração. CETEM, Rio de Janeiro, 12, , , , 1991.

DNPM. Avaliação da carga tributária incidente s/ setor mineralMME, Secret. Minas e Metalurgia, DNPM. Brasília: Estudos de política Mineral, 1992.

FARID, Luiz Henrique (Coord.). Diagnóstico preliminar impactos amb. gerados garimpos ouro em Alta Floresta-MTUm estudo de caso. Rio de Janeiro: Dedalus, 1992. 190. CETEM - Série Tecnologia Ambiental.

FERREIRA, Gilson Ezequiel. Pequena Empresa: A base para o desenvolvimento da Mineração Nacional. Rio de Janeiro: , 1996. 79.

Folha de São Paulo. Dinheiro do governo financia mineradora que usa crianças. Folha de São Paulo, São Paulo,01.05,1997.OIT.8.

HACON, Sandra de Souza. Avaliação do risco potencial para a saúde humana exposição ao mercúrio área urbana de Alta FlorestaNT, Bacia Amazônica-Brasil. Niterói: Univers. Federal Fluminense, 1996. 182. Dissertações Acadêmicas.

LINS, Fernando Antonio Freitas. Aspectos diversos da garimpagem de ouro. Rio de Janeiro: CETEM, 1992. 97. Série Tecnologia Mineral.

MME / DNPM. Levantamento nacional dos garimpeiros Relatório analítico. DNPM, Brasília, 1993.

MOREIRA, M.D.. Aplicações dos minerais e rochas industriais. SBG, Núcleo Bahia, Sergipe, , , , , 1994.

Organização Internacional do Trabalho - Relatório e Plano de Ação do IPEC no Brasil, 1998.

RETECMIN. Apoio ao setor produtivo de pedras ornamentais de Santo Antônio de Pádua. INT/DMCM/LAMAT, Rio de Janeiro, , , , jul, 1999.

RODRIGUES, Rita Maria. Mulheres do ouro: O trabalho feminino nos garimpos do tapajós. Belém: SEICOM, 1994. 131.

SANCHEZ, Luis Enrique. A diversidade dos conceitos de impacto ambiental segundo diferentes grupos profissionais. EPUSP, São Paulo, , , , , 1994.

SANTOS, Elizabeth de ^o. Diagnóstico condições saúde comunidade garimpeira na reg. Rio Tapajós. , Itaituba-PA, , , 212-25, 04, 1995.

SANTOS, Terezinha de Jesus Soares dos. Avaliação do risco da população do Mun. Tartarugalzinho, p/ consumo peixes espécie Tucunaré. Rio de Janeiro: Escola Nacional de Saúde Pública, 1998. 86. Dissertações Acadêmicas.

SICSÚ, A. B.LIMA, J.P.R.. A pequena mineração no nordeste - Suas características e o papel do estado. Série Estudos e Documentos, Rio de Janeiro, 12, , 9-26, , 1991.

SILVA, Adriano,GRADILONE, Cláudio. O nó dos juros. Exame, São Paulo, v.34, n.4, p.98-101, fev, 2000.

STELLIN JUNIOR, CARANASSIOS, A. Extração de rochas ornamentais. Dedalus, São Paulo, 9, 89, 30-34, 06, 1991.

VALE, E.. Aspectos legais e institucionais do setor de rochas ornamentais. Instituto Euvaldo Lodi, Fortaleza-CE, I, , , , 1997.

VIDAL, F.W.H.. Estudo dos elementos abrasivos de fios diamantados p/lavra granitos do Ceará. São Paulo: EPUSP, 1999. 173. Tese de Doutorado.

VIDAL, F.W.H.STELLIN JUNIOR, Antonio. A indústria extrativa de rochas ornamentais no Ceará. Boletim Técnico da Escola Politécnica, São Paulo, , , , , 1995.