SMI
SMALL MINING INTERNATIONAL

International Agency for Small-Scale Mining

Agence internationale pour les petites exploitations minières

BULLETIN

Published for the information of the international small mining community

ISSN 1188-9519

Number 7
April 1994

PRESIDENT'S REPORT

SMI has continued to grow and gain international recognition as the agency involved with small-scale mining. Together with the UN Department for Economic and Social Development and the Government of Zimbabwe, the UN Interregional Seminar on Guidelines for the Development of Small-medium Scale Mines was organized in February 1993 and inputs provided for the formulation of these guidelines. During this meeting, SMI took the lead in formulating a resolution for strengthening and supporting, small-scale mining, together with nine other NGO's. SMI was represented at a follow-up of the Harare meeting at the International Conference on Technology and Finance Support to Small Scale Mining Ventures, November 1993, in Randburg, South Africa. This was organized by MINTEK, the Department of Mineral and Energy Policy of the African National Congress and the University of Witwatersrand

The keynote speaker, Ms. Beatrice Labonne, Chief of the Sustainable Development and Environmental Management Branch of the UN was sponsored by SMI and delivered a contribution on Guidelines for the Development of Small, Medium-Scale Mining. SMI has also been invited to participate with a contribution on the environmental impacts of small scale mining in the upcoming International Conference on Development, Environment and Mining in Washington D.C. in June 1994. This meeting is co-sponsored by the World Bank, the United Nations Conference on Trade and Development, the United Nations Environmental Program and the International Council on Metals and the Environment. At this occasion I will announce SMI's intention to organize a forum in a developing country in 1995 on the Social Conflicts and Environmental Impacts of Small Scale Mining in the Tropics.

Our individual and corporate membership has more than doubled over the past year and there has been a steady increase of requests for information and assistance. As a result, the capacity of the secretariat has been strained beyond its limits, placing SMI in danger of not living up to its obligations to the members, donor agencies and expectations of the international small-scale mining community. The decision was taken at the last Annual General and Board Meeting in October 1993, to focus our activities on:

1) regularly publishing the SMI Bulletin.
2) completion of the International Small Scale Mining Information System and
3) organizing and participating in seminars, quite a full plate given our limited resources.

In order to meet these priorities we will need the assistance of the members, as SMI is basically a volunteer organization. It is obvious that the major solution to our problems is adequate funding, which despite serious efforts appears unattainable in times of shrinking budgets and refocusing of priorities by donor agencies for international cooperation. SMI is therefore investigating innovative ways to become self-sufficient in a phase of development when services requested by our clients are not yet fully available. We will continue, however, our efforts with your help to make SMI a strong and vibrant organization to fulfill its mission: fostering the orderly development of small scale mining.

CONTENTS

THE HARARE GUIDELINES ON SMALL/MEDIUM SCALE MINING

SYNOPSIS

The Interregional Seminar on Guidelines for Development of Small and Medium scale Mining was held in Harare, Zimbabwe, 14-19 February 1993. The meeting attracted more than 150 participants from over 35 countries, including high level government participants from far away countries such as Brazil, Chile, Bolivia, Morocco, Ghana, the Philippines, and Papua New Guinea where small/medium-scale mining is very active. The DESD sponsored seminar aimed at assessing recent progress achieved in that particular field since 1988 when DESD organized an 'Interregional Seminar on Small Scale Mining in Developing Countries' in Ankara. Small Mining International, SSM, was closely involved in the preparation and implementation of the seminar. The Government of Zimbabwe hosted the seminar and contributed several very relevant papers on the topics under discussion. Moreover, the seminar wanted to promote new initiatives and projects which had been successfully implemented by governments and aid agencies alike in specific developing countries where small/medium scale mining contributes substantially to the economy.

The main purpose of the seminar, however, was to draft a set of guidelines for developing countries in order to further the interaction between governments, donor agencies and nongovernmental organizations (NGOs) for encouraging development of small and medium-scale mining as a legal, sustainable activity with a view to optimizing its contribution to social and economic development.

The seminar was organized around three themes: (a) legal, fiscal and financial aspects, (b) technical, environmental and social aspects, and (c) marketing, investment and government support. After the formal daytime sessions, the participants were divided in three groups to draft the guidelines.

Obviously, the choice of Zimbabwe to host the meeting was not coincidental. Zimbabwe offers an ideal setting seeing that its government has adopted a forward looking strategy toward the mining sector. The vibrant mining sector makes up 5.5% of GDP (1991) and represents 43% of total export value. The country provides a showcase for small and medium scale operations. A field visit was organized by the Small Scale Miners Association of Zimbabwe (SSMAZ) to the Shamva Mining Centre. Visits to small (Bindura gold mine) and medium (Cluff Freda Rebecca gold mine) scale mines were alternative programmes.

In organizing this seminar, DESD sought to ensure that the guidelines took into consideration results recently achieved by other agencies involved in rural development. Prominence was given to the experiences of sister UN agencies, the International Labour Organization (ILO), the United Nations Conference on Trade and Development (UNCTAD), the Economic Commission for Africa (ECA), and the United Nations Development Programme (UNDP) including the United Nations Development Fund for Women (UNIFEM) and United Nations Revolving Fund for Natural Resources Exploration (UNRFNRE). For the first time, NGOs active in grass root projects dealing with low technology extractive industries were invited. The NGOs produced a set of guidelines as a complement to the Seminar guidelines. The NGOs response was heartening and their participation further contributed to the success of the meeting.

The participants agreed that small and medium-scale mining made an important contribution to national and regional rural economies. In order to realise its full potential, this sector which is amenable to some upscaling, should be supported and adequately regulated. In developing countries blessed with a more mature mining tradition, small/medium scale mining is better integrated into the economy and alongside the large scale mining operations is a foreign exchange earner and a job provider. The participants indicated that contrary to large scale mining, small/medium - scale mining is not an enclave but a fully integrated industry.

The drought which has scorched Southern Africa during 1991-92 has pushed the sector into the limelight and in many river basins, subsistence mining[1] has become an alternative to subsistence farming. Consequently, mining has become the mainstay of many rural economies and has helped to preserve lifestyles while preventing migration to already strained urban centres. The many problems triggered by illegal panning and wildcat mining was also addressed by the participants. Many governments felt ill equipped to deal with the destructive force generated by swarms of panners and were powerless to implement or enforce regulating and streamlining policies. However, the participants believed that there was ground for improvement particularly in the legal field, i.e. stimulating a 'businessman' mentality, and in the marketing, i.e. taking the market to the miners.

Moreover, the role and contribution of women was addressed for the first time; several speakers addressed the audience on the opportunities and constraints on the participation of women in small-scale mining. A number of Zimbabwean women miners attended the meeting. Based on their personal experience, they actively participated in the drafting of the guidelines. A gender analysis based on systematic research into existing information in selected countries will be undertaken by UNIFEM with UNDESD.

Because the issue of definition had hogged down past seminars[2], the definition issue was avoided altogether. Participants understood the concept of small scale mining even if a generic definition did not meet everybody's expectation. A set of characteristics apply to the sector and is acknowledged by all the participants although small scale mining is called different things by different people. Each country has established its own terminology which can rarely be applied to another country. Indeed, definitions are country specific. Finally, a trend emerged, many participants now distinguish between a claim holder (whatever the size of the operation) from a panner who may operate sporadically without a claim. Loan should be made available to small/medium scale miners using the mining title as a collateral.

Some participants pointed out that whoever were into mining, he/she did so to make profit. But profit can only be reaped if a given property has a perceived mineral potential. This concept is crucial to larger scale operators, it should also be taken into consideration by the small scale miners. Mineral reserves make the difference between subsistence mining and entrepreneurship. Many participants regarded as paramount the geological appraisal of the propriety as a requisite to any government support to individual or the cooperative miners.

At the seminar a consensus was reached on the following issues:

- need for a definition was a non issue;
- the potential benefits of small scale mining outweighed its negative characteristics, and governments should harness it without hampering its rigour;
- small-scale mining was a motor to entrepreneurship and was amenable to some upscaling including "formalizing" the -environment pro-

1 term coined by UNRFNRE

2 In Ankara, three days were wasted in a vain search for a definition acceptable to all.

tection was not regarded as a luxury item peddled by first world participants but rather as a valuable resource which should not be wasted. Because if wasted, the welfare and livelihood of many rural population would be negatively affected;

- in addition, equipment needed by small/medium scale mining could easily be manufactured in developing countries;

To keep the momentum since the Rio Summit on Environment, mining related environment issues figured prominently at the seminar.

The seminar saw the emergence of new ideas, such as the need to reclaim land damaged by mining for farming use. Since many subsistence miners are women, the formulation of projects involving women to reclaim land for agricultural purpose was discussed. Small/medium scale miners find it increasingly difficult to cope with environmental protection requirements. It was felt that small/medium scale mining could benefit from technologies developed by larger scale mining to reduce their operating costs. Many speakers believed that cyanide leaching could progressively replace mercury amalgamation as a means of recovering gold. Cyanide is not regarded as dangerous as mercury. The cost of environmental protection is not an add-on, and the state should not subsidize the operations which cannot implement clean mining but rather use market incentive and community level solutions to ensure that these mining companies comply with clean environment practices.

The set of guidelines which was drafted and adopted by the participants embody this new thinking.

THE HARARE GUIDELINES ON SMALL/MEDIUM SCALE MINING

Small and medium-scale mining makes an important contribution to national and regional rural development in developing countries. To realise its full potential it needs to be profitable, sustainable and safe. Unfortunately, small-scale mining is often not taken into account in government policies and programmes.

In order to ensure its success positive action will have to be taken by all those concerned, including governments, mining companies and national and international development assistance agencies. An important prerequisite is the need for the active and coordinated participation of all those concerned at all stages in the development and implementation of policies and programmes to encourage this development. The most important broad areas for action are legal, financial, commercial, technical, environmental and social.
The objective of the following guidelines is to provide a framework for encouraging development of small and medium-scale mining as a legal, sustainable activity in order to optimise its contribution to social and economic development.

LEGAL

I. Governments and their agencies should endeavour to provide simple, clear understandable and stable set of laws and regulations which assure:
a) Legal recognition as a basis for enabling the development of small and medium-scale mining;
b) Easy access to mineral rights;
c) Transferability of mineral rights;
d) Protection of the environment;
e) Recognition of land owners' and indigenous people's rights;
f) Safe working conditions;
g) Adequate protection of the rights of women and children.

II. Governments and their agencies should endeavour to provide an adequate institutional framework and stable business environment by mobilizing and extending social technical and economic support to small and medium-scale mining such as:
a) Technical management, environmental and marketing education;
b) Vocational training;
c) Facilities for marketing of products at fair prices;
d) Technical extension services;
e) Support for development of cooperatives designed to provide services;
f) Promotion of independent interest groups.

FINANCIAL

III. Governments and their agencies should endeavour to provide appropriate progressive fiscal incentives that:
a) Treat small and medium-scale mineral producers like similar scale operators in other sectors;
b) Stimulate productive operations;
c) Are simple to administer and comprehend.

IV. Governments and their agencies should endeavour to establish appropriate financial mechanisms oriented towards the specific requirements of small and medium-scale mining such as:
a) Easy access to available resources, including the removal of barriers for women's access;
b) Savings and loans cooperatives;
c) Special mining trust funds and the availability of risk capital;
d) Credit assistance which accept mineral rights as collateral.

COMMERCIAL

V. In providing support for marketing Governments and their agencies should endeavour to:
a) Facilitate marketing loans and their repayment;
b) Collect and disseminate marketing information;
c) Establish accredited marketing agencies;
d) Provide training in marketing and investment skills;
e) Ensure the funding of marketing institutions.

VI. In supporting investment Governments and their agencies should endeavour to:
a) Establish a mineral development bank with access to foreign currency;
b) Promote the floating of bonds of small and medium-scale mining enterprises;
c) Provide tax incentives;
d) Provide physical infrastructure such as roads and telecommunications;
e) Promote mining projects through the provision of assistance to pre-feasibility and feasibility studies;
f) Establish a fully empowered investment centre for local and foreign investors;
g) Promote partnerships between small, medium and large-scale mining companies.

VII. To ensure an appropriate institutional framework, Governments and their agencies should endeavour to:
a) Establish small-scale mining specialised units at the national, regional and international level;
b) Participate in South-South exchange of information in collaboration with TCDC.

TECHNICAL

VIII. Governments and their agencies have a responsibility to:
a) Identify and promote appropriate technology for small and medium-scale mines and to disseminate information on this;
b) Take advantage of and complement the resources of NGOs and Development Assistance Agencies in assisting and motivating small and medium-scale mines, and promote awareness of relevant experience and information in other countries;
c) Provide training suitable for small and medium-scale miners;
d) Encourage the manufacture of equipment suitable for small and medium-scale mines;
e) Collect and disseminate information and statistics such as the numbers of mines and employment in mining (the latter desegregated by sex), the quantity and value of production, the hours worked and remuneration paid, and the numbers and causes of accidents.

ENVIRONMENTAL

IX. Governments and their agencies should take into account the "Berlin Guidelines" and have a responsibility to:
a) Make the small and medium-scale mining sector aware of their potential to cause environmental damage and their responsibility to minimise it;
b) Ensure effective local monitoring and control systems;
c) Encourage the development and use of environmentally friendly technologies.

SOCIAL

X. Governments and their agencies should endeavour to the best of their ability to:
a) While acknowledging the realities of the small and medium-scale mining sector in many countries, ensure that employment and working conditions of miners do not fall below the standards and norms set nationally and locally;
b) Ensure that health and safety for small and medium-scale mines do not fall below the standards and norms set nationally and locally for all mines;
c) Ensure that medical, educational and other services supplied to the bulk of the population are also made available to small and medium-scale miners;
d) Ensure that women working in the small and medium-scale mining sector enjoy the same status, conditions and facilities as their male counterparts and are not subject to indignities. Additionally their earning capacity should not be disadvantaged by their added domestic responsibilities;
e) The rights of existing groups are not compromised by small and medium-scale mining sector activity.

19 February 1993

NGO RESOLUTION

PREMISE: Given that:
- Small-scale mining in developing countries serves as a means of livelihood as well ads income generating activity for millions of people and enables local people to participate in mineral resources development.
- Small-scale mining plays an important role in reducing the adverse effects of drought, economic recession, structural adjustment and out migration on local communities.
- International and local non-governmental organizations involved in strengthening and supporting small-scale mining are few in number but their contributions are significant and their influence in policy making and grassroots project implementation is considerable.
- These NGOs themselves are constrained by lack of recognition at international and local levels, by limited financial resources and by lack of a common vision.

RECOMMENDATIONS: Be it resolved:
- That international and local non-governmental organizations involved in strengthening and supporting small-scale mining are few in number but their contributions are significant and their influence in policy making and grassroots project implementation is considerable.

- That these authorities and agencies extend their financial and administrative support to NGOs working in this area.
- That NGOs involved in small scale mining endeavour to communicate among themselves and the wider community to harmonize their vision and strategies.
- That NGOs be encouraged to increase their level of activities in information dissemination, networking appropriate technology development, training and education, institution building and financial assistance, with special attention to environmental and gender issues.
- That government, NGOs, multi-lateral agencies and funding institutions work to ensure the establishment of appropriate and realistic enabling conditions based on an integrated holistic approach for the strengthening, promotion and further development of small-scale mining as both a means of livelihood and a wealth generating activity in developing countries.

Resolved this 19th day of February, 1993 at Harare, Zimbabwe. By:

1. INTERNATIONAL AGENCY FOR SMALL SCALE MINING (SMI), CANADA
2. INTERMEDIATE TECHNOLOGY DEVELOPMENT GROUP
3. CEPROMIN, BOLIVIA
4. FEDECOMIN-LA PAZ, BOLIVIA
5. ECUMENICAL DEVELOPMENT COOPERATIVE SOCIETY (EDCS), NETHERLANDS
6. AUSTRIAN ASSOCIATION FOR DEVELOPMENT AND COOPERATION (ADC), AUSTRIA
7. SMALL SCALE MINERS ASSOCIATION OF ZIMBABWE (SSMAZ), ZIMBABWE
8. NATIONAL INSTITUTE OF SMALL MINES (NISM), INDIA
9. MINERAL EVALUATION NETWORK, U.K.
10. THE ASSOCIATION FOR THE PROMOTION OF APPROPRIATE SOCIALLY AND ENVIRONMENTALLY ADAPTED TECHNOLOGIES (AT VERBAND, E.V.) GERMANY

This report was prepared and reprinted courtesy of the United Nations Department of Economic and Social Development, United Nations, New York, March 1993.

Zambia —

THE ROLE OF GEMSTONE AND PRECIOUS METALS MINING IN DEVELOPMENT

SANDFOR H. MAMBWE

A wide range of minerals, energy, metallic and industrial are demanded by society and their availability is a key factor in the development of any nation. According to David Highly (BGS 1992), traditionally in the case of developing countries, emphasis has been placed on the development potential for metallic (Zambian Copperbelt) and energy minerals. Most of these minerals: copper, cobalt, lead, zinc, nickel, platinum, chromium, coal, uranium and petroleum principally are export commodities from developing countries with little local capacity for further processing.

GEMSTONES: WHAT ARE THEY?

Gemstones are any materials or minerals which have sufficient beauty for use in adorning and have a durability to make this possible. They ought to be hard enough to take high degree of polish and uncommon to make them valuable.

CONTRIBUTION TO THE ECONOMY

The Southern African Development Community (SADC) region is well endowed with gemstones among them ruby, sapphire, tanzanite (Tanzania), diamonds (Angola, Botswana, Swaziland), emeralds (Zambia, Zimbabwe), aquamarine (Zambia, Mozambique, Malawi), amethyst (Mozambique, Zambia, Malawi), tourmaline and garnets. In Zambia it is now increasingly recognized that gemstones: emeralds, aquamarine, amethyst, tourmaline, etc., can make a significant contribution to national economic development. Indeed, if properly harnessed, managed and exported, these resources are essentials to future economic growth.

The gemstone industry in Zambia has annual revenues estimated at between 200-300 million $US per annum. Emeralds alone account for almost 200 million $US of this. This is in contrast with the revenues earned from metal sales (e.g., copper, cobalt, lead, zinc and precious metals) at 1,200 million $US. There still remains development potential (in terms of value added industry). The lapidary and jewelry sectors with their value added dimensions.

There is strong evidence to suggest that many Zambian stones are stolen and are sold first at low prices locally, to middlemen. The estimated value of gemstones sales is not accounted for through normal accounting by the government as the producers seldom declare production statistics accurately. The weakness

of the gemstone sector is due to such facors as low capital investment, poor technology, bad security and lack of research and development compared to the copper mining industry. According to Gemstone Corporation of Zambia (GCZ) estimates, it takes about 250,000$US to bring an average emerald mine into production.

LAPIDARY AND JEWELRY INDUSTRIES

From the experience of SADC countries (...), we are going to learn how the lapidary and jewelry industries are developed in those countries. However, for Zambia, although there has been some liberalization in the marketing of gemstones there should be a deliberate policy by government to promote and support downstream processing. There should be new efforts to create acceptable free market arrangements which will be fundamental to the success of the efforts to regularize and upgrade small-scale operations. Ways will also have to be found to bring buyers closer to the miners.

When the lapidary and jewelry industries become locally developed and buyers brought closer to the miners the national benefits such as employment creation, technology transfers, increase in foreign exchange earnings and ultimately the creation of wealth in those rural areas where gemstones are found, will then become a reality. But there will continue always to be buyers for the international cutting and polishing markets as well.

A year or so ago, plans were announced by the Government to set up a Gemological Institute to develop expertise in sorting and valuation of gemstones. Many of us hope that these plans will be implemented in a practical reality. There should be capacity for this institute to exist and operate under the umbrella of either a reorganized Geological Survey Department (GSD), or the School of Mines at the University of Zambia. Alternatively Zambia Emerald Industries Ltd., ZEIL, could perhaps be reorganized to carry out this role under the privatization programme.

THE WAY FORWARD: WHAT IS TO BE DONE?

A - BY GOVERNMENT

Government's role in the Gemstone Sector must be clearly defined. First of all, it should provide background research and information. Even geological mapping has fallen far behind in recent years. Then there needs to be technical support readily available, such as envisaged in the setting up of new mining regions.

Miners are often in need of information and advice on geology, mining methods, etc. Many of us believe that the Government should go further and provide educational and financial support. Certainly it needs to ensure that market mechanisms free of government control are put into place. Government must appreciate the miner's sense of insecurity - often mining licenses are for a short period and can readily be repossessed (according to the law even if not often in practice) for nonpayment of fees. It is fair that a miner may be forced to sell his asset -his mine- if he cannot pay what he owes, but not that he should have to surrender it without compensation. Government can also assist the gemstone sector by sourcing, or helping to source, donor funding which may in today's world prefer to help representatives of the private sector rather than Government itself.

Government also will have to work out modalities of how it wants to privatize its present shareholdings in the various gemstone companies. It owns 100% of RMC and ZEIL, 55% of KAGEM and 50% of the two kariba amethyst companies. The decision on KAGEM is the most critical and the most difficult.

B - MINERS ASSOCIATION

Gemstone Corporation of Zambia (GCZ)

GCZ was set up in 1991 to represent the interest of the gemstone community as a whole. Government provided administrative help to get it started and an on-off grant of K2 million late the same year. There has been no further Government help for GCZ.

GCZ's constitution provides for the various sectors - emerald, aquamarine, amethyst, jewelers and lapidaries - to be represented on its Board, together with some independents. There is at present no formal relationship between the other associations and GCZ though many of the emerald miners for instance are members of both GCZ and EMAZ.

GCZ has provided an effective lobby on many issues such as the 50% free use of export proceeds and availability of gold from ZCCM to Zambian jewelers, and both ZGPMA and EMAZ act as lobby groups too. GCZ aims to speak for all sectors but can only do so in reality if there is a reasonable strong membership within all sectors and that has not yet been achieved.

All the organizations are limited in their effectiveness by lack of funds. Although one would like to call on them to carry out numerous functions, one has to be realistic that voluntary organizations, with little money and little or no staff can only undertake limited responsibilities.

The Miners Associations, namely:

- Emerald Miners Association (EMAZ)
- Zambia Gems tone and Precious Metals Association (ZGPMA)
- Lundazi Miners Association (LMA)
- Kalomo Amethyst Association (KAAS)

should clearly state their mandate to the Government: (...) to help and promote the interests of small scale miners in their operations.

The associations should also be a bridge between the individual small scale miner and, (e.g., SADC-MCU, and other national or international experts and donor supported organizations) non gouvernement organizations, both local and international.

The associations should be responsible for arranging regular training workshops (in the mining fields) and vocational training of future mine operators, miners lapidarists and processors, as required in their area of operation. Such facilities cannot be provided sufficiently by our governments, which have to cut back expenditure because of insufficient state income. Only "self help" can lead to progress! Miners associations have to become more active but also will need much higher membership contribution for implementing tremendous tasks ahead of them.

The GSD and Association of Geoscientist in Development (AGID) could be involved in assisting the Government in:
-creating an effective information base to be used for technical, managerial, educational and financial support to the small-scale miners, and
-in formulating effective small scale mining policy, with appropriate legislation to support it.

The Gemstone Miners Associations should also assist the government to regulate and monitor yet at the same time vigorously encourage the growth of the Gemstone Sector by fighting the illegal activities that tend to characterize it. The Associations should also be working constantly to enlighten their members on all aspects affecting the growth of this sector. For example, mine owners have to either directly or through the Miners Associations learn that paying poor or zero wages greatly encourages theft.

C - LAPIDARY AND JEWELRY INDUSTRIES

Investors in the lapidary and jewelry industries should assist government in formulating policies which will promote downstream processing to increase foreign exchange earnings, and promote employment creation and skills transfer.

ILLEGAL MINING ACTIVITIES AND MARKETING PROBLEMS

This whole matter is widely misunderstood. There are many quite different activities which are perceived as illegal; some of them like theft for example, are wrong in themselves and must be fought. Apart from the moral or security aspects, stolen stones on the market depress the price for the legitimate miner. There are other so-called "illegal activities" which should be regulated and indeed encouraged - unlicensed mining in the bush for example, or unlicensed mining of abandoned mines: even the reworking of discarded material as regularly takes place at KAGEM.
Failure to comply with regulations is itself an "illegal activity". Certainly, the many miners who fail (or

actually refuse) to make their returns to the Ministry are harming the whole industry. They are keeping the country in the dark, and there will never be substantial official investment in an industry that will not declare what it is doing.

Government's unwillingness or inability up to now to establish a clear and clean framework for gemstone marketing (following its years of imposing monopolies which exploited the miners) has led to very erratic and unsatisfactory marketing arrangements, most of them technically illegal. For at least 18 months Government has talked about liberalizing the market. Let us hope this is quickly enacted into law.

MINIMIZING ILLEGAL MINING AND MARKETING.

Once the law and the procedures on trading are sorted out - (and that should not be very difficult) - some public education will be required. Presumably gemstone dealing licenses will be introduced. There is an argument for licensing offices to be decentralized from Lusaka to include local government officers in areas of gemstone mineralization namely:

- Kitwe and Ndola City Councils
- Luanshya Municipal Council
- Lundazi, Chama, Mkushi, Serenje, Namwala, Siavonga, etc. District Councils.

If this can be achieved then a degree of rural development can effectively be made a reality as taxation will be administered by the councils. A proportion of prospecting and Mining License fees could similarly be made payable to councils in the particular area of the license. To minimize illegal gemstone marketing governments have to be prepared to put in place a marketing mechanism in which producers are paid competitive international prices in foreign exchange or in local currency tied to free market exchange rates. This has been done for precious metals in Ghana, Chile and Zimbabwe and clandestine sales have been reduced. Recently the Bank of Tanzania overhauled its gold buying scheme and is now offering prices tied to the parallel market value of the shilling.

The government of Guyana is now buying gold at the free market price and making half of the payment in foreign exchange. The most radical departure from past practice has been that of Peru, which is attempting to establish a free and open market for both the sale and purchase of gold.

In the case of gemstone marketing, progress has been more haphazard (Davidson, 1993). For instance the Zambian government sponsored and organized a gemstone auction (15 - 22 July 1991), with buyers in attendance from all the major cutting centers and had mixed success in getting local producers to sell openly.

Colombia, trying to regularize its own emerald trade, hopes to establish Bogota as the international buying/auction center for emeralds.

As long as there is a black money market, there will be a black market for gold and gemstones.

ENVIRONMENTAL CONCERNS

The extent of the environmental risks posed by small-scale mining continue to be debated and activities have become highly intensive in:

- Kafubu Emerald area
- Lundazi Aquamarine and Tourmaline area
- Kalomo Amethyst area
- Itezhi-Tezhi Aquamarine area
- Mkushi Aquamarine and Tourmaline area
- Kariba-Siavonga Aquamarine- Amethyst areas.

In these areas river systems should be protected from siltation resulting from overburden washed down by rain water and uncontrolled mechanized stripping of river banks and beds. Agricultural land and forest resources must be protected from undue damage caused by poor management of small-scale mining. Recoverable by-products of small-scale exploitation of pegmatite namely, beryl, apatite, feldspars, REE, kaolin, etc., should not be wasted by lack of research in areas where small scale mining is taking place. The government should move in swiftly to establish a regulatory framework that would facilitate supervision and the minimization of resource waste, and environmental damage from manual mining along public waterways in forest areas and in agricultural land.

Sandfor Mambwe is a senior project geologist with Zambia Industrial and Mining Corporation LTD (ZIMCO) specializing in industrial minerals development.

Brazil —

The Yanomami Indians Face the Amazonian Mining Economy

Gordon MacMillan

The recent massacre of 19 Yanomami Indians in northern Brazil is a sharp reminder of the very real social conflicts generated by mineral extraction in the Amazon basin. This rainforest, which is home to some of the world's most isolated indigenous communities, contains mineral deposits worth an estimated US$ 1.6 billion. In an economy characterised by a highly inequitable distribution of income, neither the rich nor the poor have overlooked this spectacular subsoil wealth. Throughout the 1980s, approximately half a million independent prospectors have contested the exploitation of these mineral reserves with private companies. As the decade progressed, the corporate mining sector tightened its grip over the most accessible deposits in the Amazon's relatively developed eastern and southern fringes, displacing the wildcat miners into its very remote northern water-shed. Tragically, these geologically rich uplands have been the final refuge for isolated Amerindian groups, like the 18 000 strong Yanomami, who for centuries have recoiled from contact with colonist society.

Between 1987 and 1990 approximately 30 000 informal sector gold and tin miners illegally invaded the lands of the Yanomami in the state of Roraima. The Indians died in their hundreds. Having been denied state medical treatment, they succumbed to malaria and tuberculosis which the prospectors inadvertently brought into the area. According to the Brazilian Indian Agency, FUNAI, the population of the Yanomami fell by 15% between 1987-1992. While illness undoubtedly accounted for most deaths, a number of violent conflicts between Indians and prospectors compounded this mortality rate. The attack at Haximu is by far the largest clash yet reported and the first in which women and children accounted for the majority of the dead. Although it occurred on the Venezuelan side of the watershed, Brazilian miners are now known to have been responsible for this attack.

Most of the gold miners working in this area have migrated into the Amazon from the Brazilian Northeast, an area of drought, poverty and violent land conflict. Having arrived in the gold camps they form two groups of workers. The vast majority are opportunists who have temporarily left their jobs in the urban or rural areas to earn supplementary income from mining. For example, approximately half of the 3000 colonist farmers who live in the state of Rotalma, gained seasonal income from mining in the Yanomami Reserve between 1987-1990. Although their fortunes

The end Product, Paulo is holding about 15 grams of gold

fluctuate, they generally earn 15 to 25 grams of gold per month (US$ 225-375), during their three month long sojourns into the mines. This is a considerable income by peasant farming standards.

The second, much smaller group are the 'professional miners' who work all year round, deriving virtually all of their income from mining. With greater commitment to and experience of the trade, they play an important role in the genesis and management of the placer mines. The poorer 'professional miners' tend to provide prospecting and managerial services in the gold fields, while the better-off own mining equipment, boats, and aircraft. At the peak of this hierarchy, a small elite of very wealthy individuals exert considerable political influence in the Amazon. These regional heavyweights, who support mining on Indian land, have consistently challenged Federal Government initiatives which threaten their access to mineral deposits.

It appears that the same elite form a bridge between the corporate and informal sectors of the Amazonian mining economy. In the Yanomami Reserve it was cassiterite (tin ore), rather than gold, that attracted the interests of larger companies. Due to its greater bulk/density ratio, tin ore is not as easily transported as gold and its production became rapidly dominated by the small number of professional miners who owned aircraft. They would buy cassiterite (which itself was a by product from the gold extraction process) in the gold fields, fly it back to Boa Vista by light aircraft and then sell it on to larger companies via intermediaries. There were two principal buyers in Boa Vista during the 1987-1990 rush in the Yanomami Reserve. Mamore, a subsidiary of the Brazilian national Paranapanema (which owns the world's largest open-cast tin mine at Pitinga in the Waimiri-Atroari Indian Reserve, Amazonas) and Campanhia Industrial Amazonense (CIA), which is jointly owned by Best Metals and Solders (5%) and Brascan (95%). Essentially, Paranapanema was buying tin ore from informal sector producers in order to maintain its virtual monopoly of Amazonian cassiterite production.

Although anybody with an aircraft in the goldfields dealt in cassiterite, tin production was rapidly dominated by two producers who seemed to be backed by international capital. Jose Altino, head of the wildcat miners union (USAGAL) and Lauro Texeira, a retired officer in the Brazilian Airforce, both invested large sums of money in competing operations. They each constructed 1200 metre long airstrips in the Serra de Surucucú, a formation which has a 15 000 tonne deposit of 70-72% pure tin ore. By the end of 1989 both producers were flying tons of cassiterite out of the Yanomami Reserve with DC3 aircraft and stockpiling it on ranches outside Boa Vista. The ore was subsequently trucked down to Manqua, reputedly in repayment for the initial loans from their creditors.

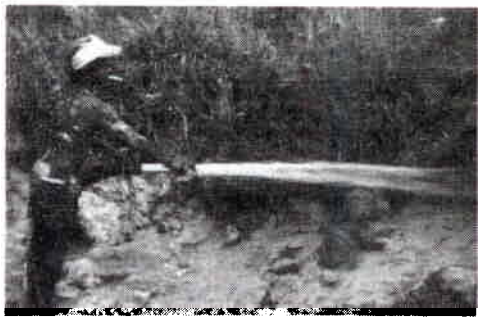
Garimpo operation in Roraima

Interestingly enough, these cassiterite operations had very far reaching political and economic ramifications. In exploiting these resources, Roraima's miners made themselves extremely unpopular amongst the international community of tin traders. Following the collapse of the International Tin Cartel (ITC) in 1985, the Association of Tin Producing Countries (ATPC) had been struggling to restrict global supply, by encouraging member states to accept production quotas. The prospect of thousands of tons of high grade Surucucú cassiterite flooding onto the world market was sufficiently concerning to depress an already weak tin price in the second half of 1989.

The response of the ATPC is clearly visible in the minutes of its Executive Committee's thirteenth Session, held in Canberra, Australia, in October 1991. At this meeting, Brazil (who is only an observer of the Association) came under considerable pressure to restrict Amazonian informal sector tin production. This international desire to reduce the production of tin ore in Roraima, clearly favoured larger producers like Paranapanema. This company, which is one of the largest cassiterite producers in the world (accounting for 13% of global production in 1987), would clearly benefit from higher prices brought about by a contraction in supply. Throughout the late 1980s, Lacombe the politically influential head of this corporation, had been urging the government to implement policies aimed at achieving precisely this.

It is hard to know the extent to which corporate interests such as these influenced the Brazilian government's decision to intervene in Roraima's informal mining economy. International concern for the welfare of the Yanomami, as expressed by groups like Survival International and Cultural Survival, was probably a much more significant factor. Even so, it took a change of government before these pressures, which had been staunchly resisted by the Sarney administration, were translated into policy. In March 1990, a week after taking office, Fernando Collor de Mello authorised the expulsion of the miners from the Yanomami Reserve. Under a blaze of publicity the army set about dynamiting all of the airstrips that had been constructed in the reserve. It is perhaps no coincidence that the operations run by Jose Altino and Lauro Texeira were the first to go up in smoke.

Since then, the military operation 'Free Forest', has been set the unenviable mandate of policing the Yanomami Reserve, an area the size of Portugal. Now in its third year, the operation has enjoyed only mixed success. Its grip has been sufficiently tight to squeeze out the large numbers of temporary workers, but has proven too weak 'to throttle the activities of the professional miners. Approximately 1000 of them continue to mine illegally in the Yanomami Reserve, which, as the Haximu conflict demonstrates, has very serious ramifications for the welfare of its indigenous residents. Their numbers are likely to fluctuate according to changing mineral prices, the time of year, the cost and availability of fuel, and the intensity of police vigilance.



A Pressure hose is used to blast into the gold bearing sediments

These are important observations. For while it has been argued that no amount of intervention can ever provide an effective cordon around the Yanomami Reserve, these points suggest that more can be done to strengthen the efficacy of operation Free Forest. To start with, greater attention could be paid to the wider social inequalities in both Amazonia and beyond which continue to fuel migration onto Indian lands. Secondly, the policing operation itself could be strengthened if the authorities exercised a more rigorous control over the sale of aviation fuel, the movement of air traffic and the trade in minerals throughout the region. Finally, potential trespassers might be less willing to invade this and other Indian Reserves, if miners and companies who are caught working illegally within them, are prosecuted.

It will be interesting to see whether the shock waves emitting from the Haximu' massacre are sufficiently jarring for the protagonists of Operation Free Forest to take any of these observations on board.

Gordon MacMillan PhD is based at the Unversity of Edinburgh. He spent 16 months in Roraima from 10/90-04/92 examining the social and environmental impacts of the gold rush in the Yanomarni Reserve. This was part of a four year long doctoral research project sponsored by the Economic and Social Research Council (ESRC).

India —

NATURAL REGENERATION OF FOREST IN MINING AREAS: Two Case Studies

S. L. Chakravorty

INTRODUCTION

The very process of mining involves an unavoidable disturbance of the environment. Positive action should be therefore called for to minimize the ill effects of mining, and the entire mining community is conscious about their responsibilities in this regard. While pointing out the mistakes and providing advice on ways to regenerate and revive disturbed ecosystems may be welcome, reckless accusations can be counter-productive, delaying the process of environmental repair.

In this context it is of interest to consider regeneration processes in areas disturbed by mining. Human efforts to replant and regenerate forests and ecosystems are well known and should be encouraged, but there is also regeneration by nature. The natural evolution of ecosystems has mitigated the ill effects of many natural disasters throughout recorded history. The recent example of volcanic eruptions on Barren Island in the Andaman & Nicobar islands in the Bay of Bengal is an interesting case in point. Within a few months after the eruption, the trees which were badly affected by lava flows have started sprouting green leaves, according to reports by the Geological Survey of India.

This is an example of the inherent strength of natural regenerative processes, which are attracting the attention of many scientists. Restoration of disturbed lands by nature and by human efforts can be mutually supportive, but we need proper study and understanding of the scope of natural regenerative processes in order to supplement them with human efforts.

I present here two case studies from climatically different areas, one arid (Noamundi), the other humid tropical (Joyanti).

NOAMUNDI

In the iron mining district in and around Noamundi, in northeastern India, the Tata Iron and Steel Company Limited is making detailed studies not only of the restoration of mined-out areas through human effort but also on the scope and limitations of natural regenerative processes.

One environmental restoration strategy followed in Noamundi is linked to the original forest type. Regeneration is a process of plant invasion and succession that depends on soil type and the distances from natural forest locations which harbor the "mother" plants and the seed and pollen vectors. In order to understand how hostile are the natural ground conditions and how strong are the possible supportive elements, a cursory glance at the environmental background of Noamundi area is needed.

The area is arid, with average maximum temperature of 47°C and a minimum of 5.8°C, with a moderate annual rainfall of 145-165 cm. About 45% of the time winds are calm, but high wind speeds may be present for periods of an hour or so before the rains in May and June. The soil is an iron-rich, predominantly alkaline, sand or sandy loam. Topsoil depth is limited to few mm in many steep slope areas, mainly due to surface run-off. The soil texture is sandy to sandy-loam with high infiltration rates and high erodibility. Ca, Mg and N contents are low. The soil conditions are favourable to horticulture and forestry, but amelioration is necessary for agriculture.

The area is about 65% forest and 35% non-forest land, with major reserve forests not too far distant. The general forest type is Champion and Seth's type 5 B/C, i.e., Dry Peninsular Sal (Shorea robusta) with a preponderance of other species. Despite mining activities for over 60 years producing about 80 million tons of iron ore, the upper slopes of the mined ridges still contain the natural forest from which the original vegetation can be inferred.

In addition to extensive plantations on abandoned mine faces and old overburden dumps, a systematic study is being made by the mine authorities of natural forest regeneration and natural colonising plant species. Various soil amendment trials are being made with different plant species and grasses in old mined out areas. While conclusive results from these studies have yet to come, the author has made some preliminary observations in the areas adjacent to Noamundi with similar geo-climatic conditions. In one such area the growth of grass has been noted, even on manganese workings abandoned 7 to 8 years ago, where a few millimetres of soil and lime dust and moderate rainfall have sustained growth.

Along with the grass, shrubs of different varieties have also appeared, depending on the depth of soil, the dominant variety being Lantana. This is very resistant to dry climate and grows extensively in surrounding areas. The grasses and shrubs that grow naturally in a few years time with isolated bigger trees growing in between, after abandonment of mines, hold the soil and prevent excessive erosion. This allows time for proper replanting.

JOYANTI

This is a dolomite mining area in the foothills of the Himalayas on the northern part of West Bengal State, adjacent to the southern boundary of Bhutan. The dolomite has been mined manually on a small scale for over 60 years now on the slope of forested hills under the administrative control of the Buxa Division of the State Forest Department. At present a private lessee and a government company are operating here.

The climate here is tropical, with 6 months dry and 6 months monsoon with a heavy rainfall of about 500 cm. The temperature ranges in the hot months of May and June and in the rainy season from 32-35°C by day and 27-28° by night. Winter temperatures are somewhat cooler - 7-8° by night and 20-21° by day.

Landslides are common in the area, most occurring in shale and sandstone terrains. Observations over many years in this mining belt indicate that landslides do not generally occur on dolomite, partly because of its inherent strength and partly because of the paucity of clayey material to act as a lubricant. Small-scale mining operations do not induce landslides. The Geological Survey of India is studying landslides here, as well as the effect of mining on the environment. A report is expected to be published soon.

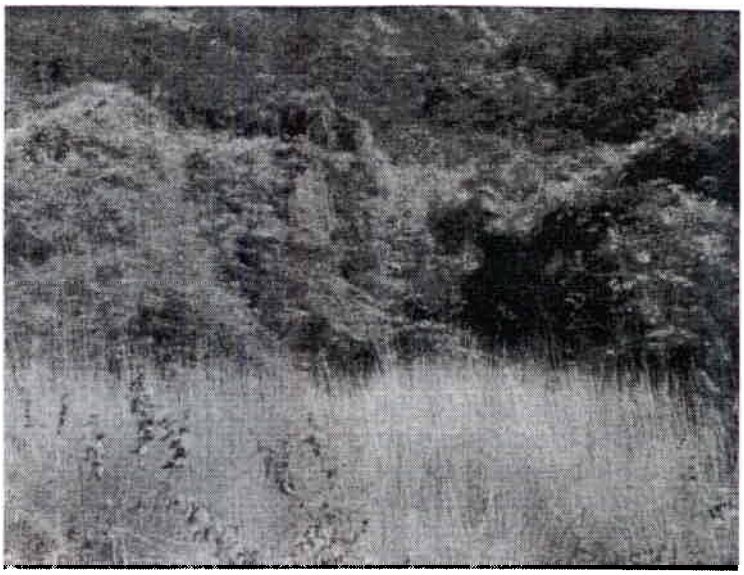
Dolomite has been mined on a small scale by the government enterprise since the early 1980s and by the private company since 1931. Since that time the latter has produced only about 0.3 million tons on an area of 30 hectares, and about 0.7 to 0.8 million tons on another area of 20 ha since 1961. Even so the original forest still survives in the entire area because of the indirect influence of the lessees and despite local activities of the villagers such as grazing, forest -burning, and collection of firewood. Moreover, the lessees by their physical presence discourage unauthorised large-scale harvesting of trees by timber merchants. Climatic and soil conditions are obviously conducive to quick growth of grass, shrubs and plants. The natural regenerative process here is so intensive that abandoned mine faces cannot be recognized, as they are overgrown in 2 to 3 years (see photograph) due to plant invasion and succession.

Many of the dumps of dolomite dust and overburden waste (containing some soil), some 100 to 120 metres along the hillside, are naturally overgrown by grass and other plants in two years and develop a deep green cover instead of being completely washed away by heavy rains. The original dumps can no longer be easily identified.

Some of the common varieties of the plant species of the original and still surviving forest are: * Acacia catechu (locally known as Khaer). The trees are about

5 metres high and grow naturally and prolifically from wind-blown seeds. * Pterospermum acerifolium (Hatipaile). These big plants mature in about 20 years and grow from wind-blown seeds. * Garuga pinnata (Dabdabe). Big plants maturing in about 20 years and growing from wind-blown seeds. They also grow when branches are cut and planted. About 80 % survive. * Tetrameles nudiflora (Moyna). They grow very fast (about 2 m/yr) and have deep green leaves. * Lagerstroemia parviflora (Shidha). These big plants, which mature in about 30 years, meet the timber needs of local people. * Saccharum sp. (Kher). A local variety of grass which grows abundantly and quickly. The roots are strong and hold the ground very well, and help to stabilise loose topsoil from heavy erosion by rain, assisting other plants to survive and grow.

Kher is the main natural vegetation above a certain altitude in the upper reaches of hillsides where, mainly because of the lack of adequate soil, few big trees can grow and survive.



Joyanti area dolomite mine

Unfortunately no systematic studies on environmental restoration are being made in the area either by the mining companies or by the Forest Department. The small mine owners have however made some plantations on an ad-hoc experimental basis in an effort to mitigate the environmental degradation caused by mining activities. Although no special care was taken, about 40% of the teak (Tectona grandis) plantations over relatively small areas have survived. Scattering Acacia catechu seeds over bare ground with very little soil have also yielded a survival rate of about 40%. Experience shows that natural regenerative process plays an important role in this area.

Here as in many other areas, there is a balance between growth and survival of flora, resulting in natural preservation of the original forest species. This is possible because the ground disturbances due to the mining operations are small. The proximity of the forest together with the wet tropical climate assist in prolific new growth. Where very large mining operations are concerned, depending on ground conditions, such natural regeneration may be difficult and slow, unless physically helped by replanting.

Small mines cannot and should not escape their responsibilities in the matter of protection and regeneration of environment. There is no doubt that constructive co-operation between the lessees and the Forest Department and a little bit of human effort in the regenerative process can work wonders in resto-ring the area completely and fully.

CONCLUSION:

In the context of mining-induced environmental disturbances, the natural regenerative process needs more careful and sustained study under different geo-climatic conditions. What is true in Arctic regions may not be true in the wet tropics or in deserts. It is there-fore necessary to carefully study and consider the geo-climatic influence on the environment, rather than trying to see all the regional problems through one set of spectacles.

If supplemented by positive human efforts, regeneration of environmental conditions and ecosystems to near original conditions will not be difficult. Achieving environmental balance and stability can never be a static process. NOTE: The information on the Noamundi area has come from my own studies and information on meteorology, soil, flora and land-use patterns collected by Tata Iron and Steel Company, Limited. For the Joyanti area my own studies have been supplemented by information from Mr. D.K. Roy of Bengal Mine and Stone Company, Limited and Mr. A.B. Chowdhury of the Indian Forest Service -Retd.

Mr. S.L. Chakravorty is the former Managing Director of the West Bengal Mineral Trading and Development Corporation. He now serves as Honorary Secretary of the National Institute of Small Mines (NISM), INDIA, and sits on the SMI's Board of Directors.

Small-Scale Gold Mining in Guinea

Siafa Coulibaly

Introduction

Nature has endowed Guinea with a diverse range of exploitable mineral resources. In addition to large deposits of bauxite and iron ore, the subsoil of the country contains diamond, copper, various radioactive minerals, gold, manganese, zinc, cobalt, platinum, granite, among others, but gold has been known in Guinea from early times. The great empires of Mali traded heavily in gold from the Boure and Seke regions of Siguiri. Gold mining activity persists to this day. While mining techniques have historically remained simple, total output has been appreciable, reaching a maximum of about 3,000 kilos in the first half of this century.

Current status of small-scale gold mining in Guinea

Small-scale gold mining permits are issued by the Ministry of Mines to teams of miners numbering no more than ten persons.

Mining at this scale is limited to Guinean nationals only. The licence is initially valid for one year, but is renewable on an annual basis. The size of a licence area is a standard 1,000 square meters.

Small-scale mining in Guinea has become an important economic and social activity which yields substantial income to a large number of the local people. The output from this activity is difficult to evaluate because an important part of it escapes state control. The quantity of output produced by small miners has exceeded 3 tons per year during certain periods.

Geology of gold deposits

In Guinea, gold deposits are situated in the Birrimian formation, which is represented by crystalline schists, amphibole-pyroxene gneiss, phyllites, and, more rarely, by marble. In the lower strata, it is represented by quartzites and migmatites, with impregnation of basic and acid eruptive rocks.

The deposits are alluvial or occur in veins. Gold deposits are classified as follows:

- veins, where some of the material is exploited by small miners;
- placer deposits, which are mined exclusively by local people, either manually or semi-mechanically.

In the case of placers, exploitation "teams" have been organized. The depth of the deposits is 8 to 15 metres. The thickness of the gravel layer is 0.5 to 1 metre. The water table is located at a depth of 3-7 metres on an impermeable surface. The water flow in the pits is 10-15 cubic metres per hour.

A young girl is washing gravel

Traditional extraction and washing methods

The current techniques are based on the principle of abandoned pits, galleries and pillars. It involves the digging of an 8-15 metre deep, circular vertical pit (0.7 m diameter) which goes beyond the auriferous layer, reaching the bedrock. When the maximum depth is reached, the diggers start removing the gravel to the extend which is nearest to slide. Then they leave the pit and start digging another one at a short distance, using the same method. As a result, placers are pierced with a large number of pits randomly and unsystematically located, since the only objective of the diggers is to remove as much gravel as possible.

The current method of washing the gravel with a calabash results in a major loss of gold, allowing recoveries on the order of 55%. The clay content of the gravel further complicates recovery.

The minimum in situ grade of these gravel deposits ranges from 3 to 6 grams per cubic metre. The grade calculation is based on the concept of a calculated exploitable grade limit (i.e. pay limit), which can be expressed as an "index." This "index" ranges from 1 to 1.25 and represents the quantity of gold contained in the volume of the gravel to be extracted from the pit only (but not from the galleries dug in this pit).

The grade of volume of the gravel in situ is calculated by the following formula:

$$(g1;g2) = \frac{1.25}{e \times 0.38}$$

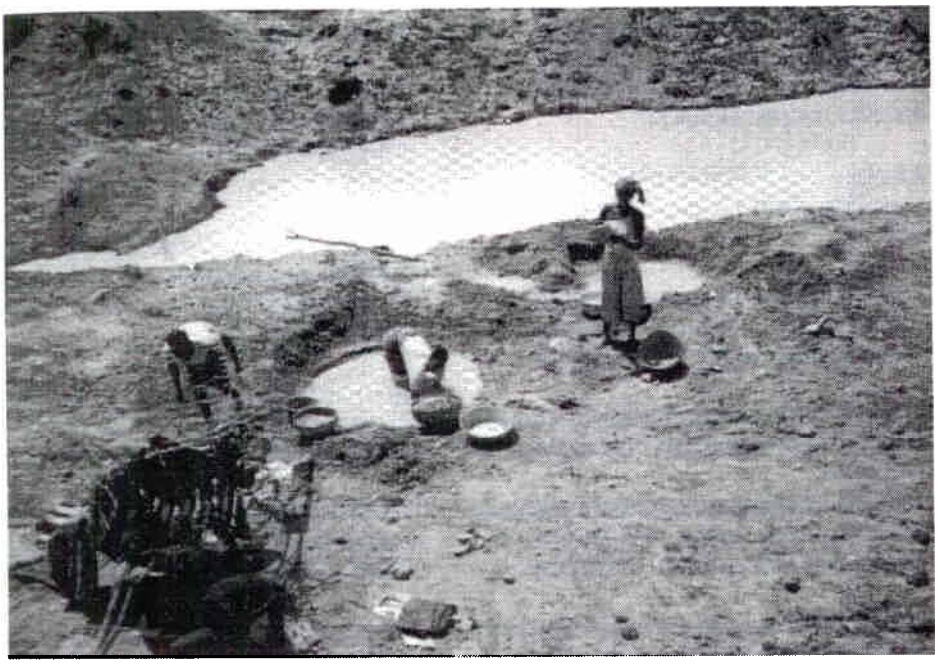
g1;g2 = grades
e = thickness of the gravel in m ($0.5 < e < 1$)
0.38 = area of the pits with 0.70 diameter, in square metres.

This index, called "narakambo" in Upper Guinea, is for the small miner a tangible reality because the quantity of gold thus mined is shared among the members of the team of the pit as soon as the bedrock is reached and before starting the digging of the gallery.

Marketing of the gold

Small scale mining in Guinea is presently very attractive. Gold production was estimated at 4,000 kilos in 1987.

The National Bank (BCRG) was able to purchase part of the production in 1987, 864.18 kilos. The quantity of gold purchased by BCRG increased to 1,600 kilos in 1989 and 3,000 kilos in 1990. As a consequence of the poor legal and financial infrastructure, a significant quantity of gold (90%) is usually smuggled and sold outside the country.



The women's washing area

The National Bank of Guinea (BCRG) has the local monopoly on gold export. It buys gold either from the small miners or from the authorized gold dealers. The objectives of the Bank are:

- to increase its currency offer on the auction market in order to stabilize the exchange rate of the currency;
- to capture as much of the daily output of gold as possible and thus minimize the loss of foreign exchange potential that results from smuggling;
- to create a good relationship between gold dealers and the state and promote a climate of trust and confident co-operation.

In order to encourage the commercialization of gold activity, the BCRG is expected to establish agencies in Kankan and later on in Siguiri to buy the output of the small miners operating in these regions.
In 1986, 237 Guineans obtained annual mining licences. But the condition for renewal of their permit is to sell their output to the BCRG. This requirement discouraged the development of legalised activity and the number of permits actually decreased by 1989 to only 122 people.

In order to support the establishment of good working relationships between the Bank and the miners, the government needs to become more flexible vis a vis gold exportation and alleviate tax perception.

The challenge of small scale mining in Guinea is how to improve upon the traditional approach to gold mining, how to better equipment and tools, improve gravel washing, pit dewatering, and safety practice. It will also be important to seek information about the exact diagram of the pillar-drawing, and about the percentage of gravel that is left over.

Currently, small scale miners in Guinea are working in an ad-hoc, disorderly manner, with little regard for safety or regulations.

Reflections on the promotion of small scale mining in Guinea

Any further production of traditionally mined gold will require attention in the areas of exploration and mining. It is necessary to study the present mining techniques and identify improvements that can be made in the short term, based on limited mechanization. Other issues that would need to be addressed include high grading of deposits, output levels of mining operations and working safety.

A preliminary study should aim at:

- analyzing the present state and future potential of mining;
- identifying improvements to mining methods in the short term, based on a limited mechanization or on local materials using available means;
- working out a program of cooperation and technical assistance for technical and economic studies so as to enhance projects related to mining and have them implemented.

For the execution of the study, the mining sector needs technical and financial assistance from financial organizations like IDRC, UNDP, CAID, USAID, etc.

References

Blouin, M. 1953. "Mission d'études sur l'orpaillage en Haute-Guinée."
Coulibaly, S. 1978. "Gold in the Republic of Guinea," The Future of Small-Scale Mining. Meyer and Carman (Eds.), UNITAR, 253-254.

M. Siafa Coulibaly is an engineering geologist with the Direction Nationale des Mines in the Republic of Guinea.

Guinea —

New Mining laws in Guinea

Siafa Coulibaly

Guinea: Artisanal mining and marketing of diamonds and semi-industrialized mining activities are legalized in the Republic of Guinea.

1. Law 92/004 (April 1, 1992)

This law authorizes the artisanal mining and marketing of diamonds and other gemstones (Article 1).

Artisanal mining

The grant of an authorization to mine diamonds and other gemstones is restricted to individual citizens of Guinea and to legal entities whose share capital is at least 50% owned by citizens of Guinea. Artisanal mining is forbidden to public servants and civil or military employees of the state or of the local governments. These latter cannot obtain artisanal mining authorization (Article 5).

An artisanal mining authorization for diamond mining is valid for a maximum of one (1) year. It is renewable.

Artisanal miners are required to maintain, on each site, monthly statistics of their diamond production and sales.

The administration and technical support of the artisanal mining will be organized by the Ministry Responsible for Mining.

A "Special Mining Brigade for Precious Materials" has been constituted. It is charged with maintaining security in the diamond mining regions and with the recording of infractions to mining regulations (Article 13).

At the time of the granting of the authorization to mine, the miner will provide a guarantee to ensure the performance of the obligation to restore the mining site (Article 19).

Marketing and Buying Agencies

Diamonds and other gemstones recovered by mining are sold exclusively to authorized marketing agencies at buying centres established by such agencies, and to duly authorized buying agents or their representatives (Article 20).

Only authorized buying agencies have the right to import and export diamonds and other gems. Diamonds and gems which are bought must be recorded on a numbered bill of sale indicating the price paid. The bill of sale is registered in books certified by the Direction Nationale des Mines (Article 21).

The authorization to exploit marketing agencies and buying centres is conditional upon the payment of an amount, as surety, into an account with the Banque Centrale. The amount deposited is refundable at the end of activities.

The delivery and renewal of the authorization will be subject to a fee (Article 23).

A tax of 3% of the total value of the diamonds and gems exported is paid to the public treasury by the marketing agencies. This tax is paid at the time of the export of the diamonds and gemstones (Article 24).

The marketing agencies and their buying agents must keep a record of their purchases and sales as well as of their inventory, by weight and by value, of diamonds and other raw gems (Article 28).

A Bureau d'Expertise has been created under the supervision of the Ministry Responsible for Mining (Article 30).

The marketing agencies are required to present their diamonds and other gemstones to the Bureau d'Expertise before exporting them, so that they may be valued.

2. Law 92/005, Regulating of semi-industrial mining activity in the Republic of Guinea

Semi-industrial mining activity concerns precious, semi-precious and other minerals, with the exception of those specified in Article 73 of the Mining Code.

Semi-industrial mining activity may be conducted in all regions not reserved for industrial mining activity (Article 4).

Semi-industrial mining activity is subject to the granting of an exploration or a mining permit delivered by the decree of the Ministry Responsible for Mining. Each of these permits constitutes a mineral title (Article 5).

Mineral titles may be granted to any legal entities under Guinean law whose share capital is at least 50% owned by Guinean nationals, or to any individual Guinean citizens (Article 6).

The area for which the exploration permit is granted cannot exceed 4 square kilometres for the zones where survey maps of 1/200,000 are available and 16 square kilometres for zones without survey maps.

The area for a semi-industrial mining permit can not exceed four square kilometres. For the dredging of river beds, the authorized distance can not exceed 3 kilometres (Article 7).

Exploration permits are valid for one (1) year and may be renewed once; mining permits are valid for five (5) years and may be renewed more than once (Article 8).

The delivery of any mineral title, including any renewal, is subject to payment to the public treasury of a "DROITS DE TIMBRE ET REDEVANCE" (Article 9).

Precious and semi-precious substances recovered by semi-industrial mining will be presented to the Bureau d'Expertise, before export, in order that they may be valued. The costs of expert valuation will be borne by the exporter (Article 10).

References

Journal Officiel de la Réublique du Mois d'Avril relatif Lois Nos. 92/004 et 92/005 du 1er avril 1992.

Chile —

THE RURAL YOUTH ARTISAN MINING SECTOR

Tomás Astorga S. Nicanor Durán M.

INTRODUCTION

Small mining is a sector relatively unknown in Chile, though it is an important source of production and income. At present it annually produces about 42,000 tons of copper, 2,200 kilograms of gold and 8,500 kilograms of silver. In 1991 small scale mining activities generated over 100 million dollars in revenues.

In the rural areas, the small artisan miners subsist in an extreme state of poverty and are being further marginalized. Their productive activity is primarily limited to the extractive phase i.e. mining and the larger part of the benefits generated by them remains with the "patrones".

The objective of the present work is to survey the realities of life of the rural mining youth, their problems and needs, and to build a data base upon which to promote policies for their benefit. This paper concerns itself particularly with the young people that labour as artisan miners ("pirquineros") or associate with this type of activity.

SMALL ARTISAN MINING

Small Artisan Mining is that sector constituted by independent workers who individually or in association, dedicate direct physical effort to the exploitation of absentee owned mineral deposits. They become the legal owners of the mineral they extract by paying the owner of the mineral property a small fee in the form of a royalty. As a general rule the provisioning of the mining operation with explosives, tools and other supplies occurs on the workers' account and at the worker's risk. This form of work has been given with the name of 'pirquen', and the worker is called a 'pirquinero', while the owner of the mining property, a 'patron'.

The greatest portion of the artisan miners work in region II to V (see fig.1), in gold and copper mining. A high level of activities also exists in Region VIII, related to the exploitation of coal. In the remaining regions, there is no important or observable presence of artisan mining except for very particular points were a few gold bearing sands exist.. Artisan mining takes place in rural areas, constituting in some areas of the North, the principal economic activity.

In the central and southern regions there are variations in mining occupation related to agricultural activity and/or with seasonal elements . Twenty percent of the pirquineros of the Region VIII who participate in the exploitation of coal during the spring and summer, work in agriculture during the winter time. In the north there is practically no seasonality in pirquinero activity, except in the high cordillera, where labour from other sectors, having no alternative income in the winter months, join the pirquinero.

Pirqueneros are also involved in the mining industrial minerals such as barite, sulphur and lime. Significant numbers work in quarries of ornamental rocks, exploiting "limparita" and granites. The products are employed locally in construction and stone crafts. Finally, there are the artisan miners who exploit rocks which contain semiprecious minerals, such as agate, lapis-lazuli, garnet, onyx and others. In this last cases, pirquinero activity is comparatively marginal and rather sporadic.

CHARACTERIZATION OF ARTISANAL MINING IN CHILE

The most important features of small artisanal mining in Chile, listed below, also highlights its problems.[1]

- Involves minimum capital and low productivity indexes.
- Generates a relatively limited value added, the pirquinero is principally a miner whose production is limited to minerals that can be delivered to concentration or lixiviation minerals, minerals for direct smelting and amalgamating minerals. In the case of coal, he only delivers run of mine coal without any sorting of cleaning or leaning of any kind.
- Low level of technology. The machinery and tools are rudimentary, the exploitation methods are based on personal experience and knowledge transmitted through tradition, from generation to generation.
- Production is informally organized . Tasks are divided in such a way that the administrative and executing functions are confused and are assigned in a consensual manner. Furthermore, no rigid work norms are established for work days, assignment of tasks, etc.
- It is commonly perceived that miners, and in particular the pirquineros and small artisan miners, lack entrepreneurial capacity.
- The small artisan mining does without the labour of the wage earner. This relationship is produced in the group of the small mining entrepreneurs. The artisan miners utilize a kind of learning contracts by example through the so called "child today".
- High costs for the levels of production actually achieved.
- Lacks concern attention to occupational safety.
- The income and profitability are uncertain for the individuals who participate in this activity.
- It takes place on absentee owned deposits. The lack of discipline and system with which deposit is worked vs. an entrepreneurial, undertaking.

ECONOMIC PRODUCTIVE DIMENSION

The population economically active in this sub-sector is considerable, around 15,000 people in the whole country. This figure is based on a review of recent studies made in regions II to V and on projections and extrapolations of data provided by (ENAMI) and from the National Service of Mining Geology (SERNAGEOMIN). Of this total, it is estimated that young people, defined as individuals between 18 and 25 years of age, comprise around 7,000 people.

Entry of Youth into the Labour Force

In general, young people become involved in artisan mining production through family or social connections in the area of residence. Involvement commonly begins at a relatively early age (14 to 15 years and sometimes as earlier as 12 years).

Two distinct motivations for entry into the labour force have been recognized. One is the attractiveness of the "pirquinero" lifestyle, with the almost romantic connotation of the search for minerals (in particular gold) and the prospect of striking it rich. The young person, under the influence of economic and social pressures, is not averse to migration between rural zones, or even from urban zones to rural ones. In such cases, entry into the mining labour force is, perceived as a more valid alternative to staying at home and/or in school.

The second motivation is related to sociocultural aspects, strongly dominated by the family character of the artisanal mining labour. In the rural zones of the north, "generations of pirquineros" exist and have established strong traditions on a family and regional level. There

Fig I: Map of the Regions

1 In CESCO, Sept. 1990, "Diagnostic of the small artisan mining for the regions III, IV, and V"

artisan mining is often the only possible career path generating both prestige and social security. To this is added the perception that work on the 'pirquen' is independent. In the southern zones, there also exists a coal mining tradition. However, participation in pirquinero activity is rooted in the most marginalized and poorly prepared sectors of the population. The characteristics of the mining operations cause many young people to band together sometimes with experienced miners to establish their own pirquines. One particular activity, is the almost exclusive domain of young people is (that of "chinchorrero", which is the recovery of coal on the beaches).

In both cases, the pressures on young people to enter into the labour force is influenced by the cyclical character of prices and the mining activity of the country. Other factors are adverse economic conditions or crises which can provoke unplanned entry into the labour force.

Characteristics of apprenticeship.

Initially, the young miner does not receive working tools and acts as an apprentice or helper to, more experienced miners. Because underground mining work is high risky, his training begin on the surface, hauling tools and elements, transporting ore, and undertaking tasks that require no specialization. Frequently he is occupied in the sorting of the high grade mineral ("pallaqueo"), often alongside women and elderly. When he goes into the mine, it is to bring tools, explosives, provisions and other materials, to the miners or to assist in their removal. At the beginning, the apprentice receives no cash remuneration. Access to the experience and knowledge of his senior pirqueneros is regarded as adequate compensation of itself.

In due time he receives informal practical training that eventually permits him to operate productively and generate an income. This training is not simply the learning of the use of tools and equipment. It is also concerned with understanding the nature and occurrence of pay minerals as well as the basics of mine geology and its peculiarities. At the same time he learns and assimilates the culture of the miner in relationship to his peers, acquiring the marked individualism which characterizes the "pirquinero". In this period the young miner establishes a working reputation, which could culminate in a contract with the owner of the mining property for the exploitation of a face adjacent to another more experienced "pirquinero".

In all cases, entry into the work world of pirquinero mining, is very difficult. Pirquen demands great physical effort and ability in the handling of tools and heavy loads in the underground galleries. Outside of the mine, there are extended working periods under the sun, often without protection or with in poor or inadequate shelters. Adult pirquineros frequently suffer work related health problems including bronchial conditions, back problems, fractures and bruises. As a result the younger miners are often put in the position of having to take a more active role in the extraction of the minerals than they are really ready for.

In the long and troubled learning process, young miners are exploited until they are able to become employed or to, settle on their own. In this last case, once they become adult and with a family, the cycle of teaching and learning the pirquinero craft repeats itself, with his children.

Barriers to entry.

The principal barriers to the entry of workers, into the pirquinero activity stem from the lack of sufficient capital to underwrite their initial efforts. Money is required to purchase tools and until such time as one can be extracted and sold.

The existing conditions of informality, in conjunction with the precariousness of the activity, impedes attempts to obtain reliable data on the rate of unemployment and labour movements in and out of the pirquinero sector. The young are most apt to change activity in response to changed working conditions, prices, seasons, et al.. In one moment they are pirquineros; of the next, peasants, urban workers, seasonal crop workers ("etemporeros") or something else.

Incomes.

The cash returns to the pirquinero are directly related to his productivity. The average monthly production of a pirquinero is approximately 10.2 tonnes, depending on the type of mineral, the mining method, the type of equipment and tools used, and the access to the working faces in the mine. According to recent studies carried out in regions II to V, the most difficult conditions yield 4 tons per month. The maximum is 30 tons per person and corresponds to the use of capital equipment such as compressors, winches and other semi-mechanized mediums. The basic tools utilized are shovels, handcarts, (hand steel) "picos", pillories, hocks, mallets and wood "tornos". In the most highly coveted tasks, the drilling and extraction equipment have more capacity, which results in greater productivity and therefore higher incomes.

The income corresponding to the exploitation of auriferous and cupriferous minerals of medium quality vary between 20,000 and 60,000 pesos per month per person, with the median at 45,000.

The high cost of mining investment prevents the younger pirquinero, from establishing for himself reasonably productive conditions since the mineral resources. Since the mineral resource is often not well understood and usually has not been explored or properly assessed, there is a high degree of uncertainty attached to finding payable minerals in commercial quantity and quality. This situations leads to low incomes and high turnover for younger workers.

The CESCO study referred to previously, has discovered that when a miner is reasonably equipped the average income will remain within 40,000 and 76,000 pesos monthly. The other critical element is availability of working capital.

SOCIOCULTURAL DIMENSION

The biggest stimulus to participation in mining activity (principally gold) is the lure of quick enrichment and the financial and social independence that comes with it. The miners planning horizon is typically very short. In general pirquineros live from day to day, do not save and hope that the next day will be their day of discovery. This often generates a marked individualism, or "loner" mentality.

Family and social tradition are integral parts of the learning experience as well as of the social structure of the pirquen. Family members assume different functions within the mineral exploitation system. Youths, women, elderly and even children take on specific roles which have a determined status. The family situation also accounts for the informality with which work contracts and relationships are entered into.

Generally pirquineros have a low level of formal education (in average not above "tercero basico" i.e. high school). Alcoholism is also problematic for both young and old, often consuming bulk of a pirquinero's.

NORMATIVE- INSTITUTIONAL DIMENSION.

Chile's mining code does not contain legislation specifically addressing the issue of youth in the work force. The labour laws specify that minors under age 18 years are not permitted to be employed in underground operations, nor is that are unhealthy, dangerous, unsafe or corrupting to the moral fibre. In practice, however, such legislation has little bearing on the pirquinero reality, material and technical support for the sector has come from agencies under the aegis of the Ministry of Mining namely ENAMI, SERNAGEOMIN, and various, recent Ministry programs..

The program for Support and Modernization of the Artisan Mining (PAMA) for instance, integrates components of social, economic and technical development. Furthermore, these programs will be coordinated with initiatives promoted by the Ministry of Planning and Cooperation. There are, however, no dedicated institutions which work specifically with pirquineros, let alone young pirquineros. Some non government organizations (NGOs) have touched on the activities of young pirquineros as minor asides to programmes aimed at alleviating rural poverty. This situation is noted principally in region VIII and one NGO (ENACAR) has developed work assistance programs for pirquineros. No similar activities are known to occur in the country's northern regions.

CONCLUSIONS AND RECOMMENDATIONS

Despite its shortcomings, pirquinero mining can be a viable activity for its participants. The main impediments to the sub-sector are a lack of capital resources, inadequate legislation and a cultural environment which is not conducive to market driven productive activity. Only the implementation of policies addressing these impediments will allow for the possibility of higher incomes, labour stability and better training for the miners. The subsector is one of the most marginal in the economy are made as a basis for the development of appropriate policies and programmes for artisan mining as a whole.

It is necessary to complete a general diagnostic of the sector. This must include aspects such as localization, social and economic conditions, potential, focus groups, expectations and requirements.

On the basis of a clear definition of the pirquinero and the artisan miner, it is recommended to incorporate this category in the Mining Code, and to form a national registry for those over 18 year of age which engage in said activity.

Schemes must be created to form a capital risk fund which permits supporting investment in this activity.

In the Regions hosting rural miners-artisans, provide access to adequate education and technical training in the particularities of the sector.

It is necessary to develop mechanisms which allow the artisan miner access to the ownership of mining property. This could be through concessions, accommodative leases and other innovative forms. Within such a mechanism, it is valid to propose that government seeks to lower the cost of access to ownership of mining property.

Establish credit, institutional, and technical assistance programs, with the objective of promoting and regulating the activity of the artisan miner.

In the mining districts with significant artisan mining activity, promote productive associations formed by youngsters, which integrate pirquineros with more experience in the activity.

Establish productive enterprises between organized pirquineros and entrepreneurs with the aim of obtaining capital to adequately exploit the resources.

It is necessary to improve the formalization and the contractual relation of the pirquinero activity. This should include market, acquisitions, hiring, payment of rights, pirquen contracts aspects.

Develop a system which allows the pirquinero access to health and social services and supports improvements in occupational health and safety.

Develop specific support for the pirquinero activity in local and regional institutions.

TOMAS ASTORGA SCHNEIDER
is an adviser in the Ministry of Mining with special interest in small scale mining. He sits on the SMI board of Directors.

NICANOR DURAN MARDONES
Manager of Development and an associate member of the SERCAL Fondation. Formerly held responsibility for the program of micro-business at the Fund for Solidarity and Social Investment (FOSIS) and was executive secretary of the FOSIS-ENAMI accord.

BOOK REVIEW

Precambrian Industrial Minerals of Karelia, Russia.
By Vladimir Shchiptsov (Editor). Russian Academy of Sciences, Karelian Research Center, Institute of Geology. Petrozavodsk 1993.83 pages, 16 separate maps. Available from: Institute of Geology, 11 Pushkinskaja Street, Box 185610 Petrozavodsk, Russia.

This publication is a reference book on Precambrian industrial minerals of Karelia. It was prepared by the staff of the Institute of Geology, Karelian Research Center, Russian Academy of Science on the occasion of the International Conference "The Industrial Minerals of the Baltic/Fennoscandian Shield and New Technologies" held in Petrozavodsk from 7 to 14 September 1993. The book briefly summarizes current information on the Precambrian stratigraphy of the Karelian Republic and the sequence of geologic events during the formation of polychronous ore-forming pegmatite systems in the Belomorian belt. Commodity chapters with geological, mining and technological data include muscovite, feldspathic raw materials, quartz, kyanite, talc and soapstone, graphite, shungitic rocks, diamonds, apatite, fluorite, garnet, quartzites, carbonate rocks, raw materials for stone smelting, pyrite, ilmenite, natural stone and gemstones. In the Appendix a list of major mining and processing enterprises is provided.

The publication is intended for mining companies interested in investment opportunities in the industrial minerals sector of Karelia for which it provides essential geological and technical background information in a clear and concise format for easy reference.

The publication is available to members of SMI at US $10 plus shipping and handling charges.
To order, contact:
Small Mining International
2020 University St.
Box 102
Montreal, PQ, H3A 2A5
Fax: (514) 398-2871
E-Mail: CYMA@musica.mcgill.ca

Publications received

Tools for Mining: Techniques and Proceses for Small Scale Mining by Michael Priester, Thomas Hentschel, Bernd Benthin. Pub: Freidr. Vieweg and Sohn Vertagsgesellschagt mbH, Brawnschweig, 1993. ISBN 3-528-02077-6.

Digging Deep, the hidden costs of Mining in Indonesia by Carolyn Marr. Pub: Down to Earth, the International Campaign for Ecological Justice in Indonesia and Minewatch, 1993.

SMALL SCALE MINING: A global overview. ed. Ajoy K. Ghose. Proceedings of International Conference on Small Scale Mining organized by Mining, Geological and Metallurgical Institute of India at Calcutta, 3-5 October 1991. Pub: Oxford and IBH Publishing Co Pvt. Ltd., 66 Janpath, New Delhi 110 001, 1994. ISBN 81-204-0763-6.

CALENDAR OF EVENTS

April 25-27, 1994
International round table conference on foreign investment in exploration and mining in India in collaboration with UNDP.
Details: Mr. Joseph Mathew, Under Secretary to Govt. of India Ministry of Mines. Shastri Bhavan, New Delhi - 110 001, India.
Tel: Office: (91)-(11)-386284
Telex: 31-66601,
Fax: (91)-(11)-386 402

April 25-29, 1994
Land Reclamation and Mine Drainage, conf., Pittsburgh.
Details: Devvie Lowanse, U.S. Bureau of Mines, P.O. box 18070, Pittsburgh, Pennsylvania, U.S.A.
Tel: (412) 892 6708
Fax: 892 4067.

May 1-4, 1994
Toronto 94 - CIMM annl. meeting.
Details: Toronto 94, 555 Burnhamthrope Rd., Suite 607, Toronto, Canada M9C 2Y3.
Tel: (416) 591 7999
Fax: 622 3132.

May 3-5
RAMM94 - Recent Advances in Materials and Mineral Resources, conference, Penang.
Details: Dr. Zainal, PPKBSM, Universiti Sains Malasia (KCP), 31750 Tronoh, Malaysia.
Tel: 60 605 367 6901
Fax: 60 605 367 7444.

May 10-14, 1994
Mining Latin America/Expomin 94, Conf. and exhib., Santiago, Chile.
Details: Liz Munro, Conf. Officer,
IMM, 44 Portland Place, London WIN 4BR, U.K.
Tel: 44 (0) 71 580 3802
Fax: 436 5388

May 16-21, 1994
Mineral Project Evaluation Techniques and Applications
Details: Norma Procyshyn, Coordinator, Professional Development Seminars,
Department of Mining and Metallurgical Engineering, McGill University,
2020 University Street,Box 102,
Montreal, Quebec, Canada H3A 2A5.
Tel: (514) 398-4383
Fax: (514) 398-8379

May 23-26, 1994
Mining 94 - International Mining exhibition, Birmingham, U.K.
Details: Mining Industry Promotions Ltd., 28 Church St., Rickmansworth, Herts WD3 1DD, U.K.
Tel: 44(0)923 778311
Fax: 776820.

May 23-26, 1994
Mining 94 - International Mining exhibition, Birmingham, U.K.
Details: Mining Industry Promotions Ltd.,
28 Church St., Rickmansworth,
Herts WD3 1DD, U.K.
Tel: 44 (0) 923 778311
Fax: 776820

May 24, 1994
Soil Remineralization and Sustainable Agriculture
Details: National Aggregates Assoc.,
900 Spring Street,
Silver Spring, MD 20910, U.S.A.
Tel: (301) 587-1400
Fax: (301) 585-4219

May 30-June 2, 1994
Geology, Exploration and Development Potentiel of Energy and Mineral Ressources of Vietnam and Adjoing Regions
Details: Mary Stewart, Secretary-Treasurer
Circum Pacific Council
5100 Westheiner, Suite 500
Houston Tx.
77056
Tel: (213) 622-1130
Fax: (213) 622-5360

June 1-3, 1994
Agrogeology: Geology in the service of agriculture
Details: Norma Procyshyn, Coordinator, Professional Development Seminars,
Department of Mining and Metallurgical Engineering,
McGill University,
2020 University Street, Box 102,
Montreal, Quebec, Canada H3A 2A5.
Tel: (514) 398-4383
Fax: (514) 398-8379
Telex: 05-268510

June 6-10, 1994
Introduction to the minerals industry for the non-specialist
Details: Norma Procyshyn, Coordinator, Professional Development Seminars,
Department of Mining and Metallurgical Engineering,
McGill University,
2020 University Street, Box 102,
Montreal, Quebec, Canada H3A 2A5.

CURRENT OPPORTUNITIES

Sierra Leone
Small manufacturers of cement floor tiles seek technical assistance, know-how and equipment to improve the quality of their products and expand their production range to materials such as marble, granite and terrazzo. A. Duramani, Project Coordinator, Cooperative Tilers, Wellington, Freetown.

Nigeria
Entrepreneur seeks joint-venture partners to set up a company to quarry, cut and process high-quality marble for structural and other uses. Samples of finished products are available on request by interested investors. Deposit of marble and labour available. Toba Afun, Managing Director, SJMAF International Company Limited, P.O. Box 2701, Warri, Delta State.

Zaire
Cottage industry of alluvial-gold and diamond mining seeks joint-venture partner with financial assistance to mechanize the quarry and process its products. Tombo Tshirala, Alcom S.A., 6, rue Kasansa, Quartier du 20 mai, Kinshasa.

Ghana
Entrepreneurs with a concession for gold mining seek investors with technical know-how. Large gold reserves available. Details of the Ghana Investment Code and feasibility report for the project will be sent on request. Tetteh Agbettor, ACME Finance & Investment Trust Ltd., P.O. Box 2547, Accra. Telefax: (233-21) 223032.

Russian Federation
Technical and financial assistance sought for the industrial processing of a clay deposit. The mineral is used in oil and gas production and as an absorbent. Regional backing obtained A.V. Deriagin, Head of the Kaluga region Administration, sq. Staruj Tor 2, 248661 Kaluga.

United Republic of Tanzania
Trader, wishing to diversify, seeks joint-venture partner with financial assistance and machinery to start a small-scale gold mining project. Valid prospecting licences, surveyed sites and manpower available. The Director, Southern Gold Mining Ltd., P.O. Box 2527, Mbeya. Telefax: 3708.

Iran (Islamic Republic of).
Owners of a copper mine with an estimated mineral reserve of 3 million tonnes seek technical assistance to set up a copper-concentrate processing plant. A. Ruhalahi, Managing Director, Kavir Copper Industries Co., Pasdaran Ave, 4th Dashtesan, Shahid Nategh Nouri Ave. No. 17, Tehran. Telex:22675. Telefax:(021)8015982.

Kenya
Lime-producing company seeks technical and possible financial assistance to increase the capacity of lime production and to improve product quality and efficiency of the burning operation, by modification of the existing mixed-feed shaft kilns or by installing new kilns. J.P. Brooks, General Manager, Kenya Calcium Products Ltd., P.O. Box 90142, Mombasa.
Telex: 21394 kclime. Telefax: 2540.

United Republic of Tanzania
Entrepreneur with gold mining concessions seeks financial and technical assistance on a joint-venture basis. Technical data and information on survey available. A.A. Kasungu Project Promoter, Mining Enterprise, P.O. Box 1499, Mbeya.

Uganda
Tin mining company seeks joint-venture partner with technical know-how and financial assistance in order to improve the quality of its finished product. Feasibility study available. The Executive Director, Alfa and Omega Uganda Limited, Box No. 8814, Kampala. Telex:61272. Telefax:256-41-245597.

Republic of Cameroon
Small scale gold mining company seeks joint-venture partner with technical know-how and financial assistance in order to improve operations. Prince John Akpo Mukete, Managing Director, Cameroon Mineral Marketing Company, Krammer Avenue, P.M.B. 1102, Kumba, Telex: 5822 KN. Telefax: 23743-30-48.

India
China day mining and processing firm seeks joint-venture, equity partners. Intent on increasing production and improved quality control and mineral conservation. Mr. Akshyadeep Mathur, Partner, A.S. Mathur & Company; Sriram Niketan, New Colony, Jaipar -302 001, Telephone: 91-75411-91.

Nigeria
Dimension stone mining company seeks buyers and or joint-venture partner to develop granite, charnoekite deposits. Chief Mrs Yunka Agbebi, Yunka Commercial Enterprises (Nig.) Ltd, Kilometer 2, Iyin Road, P.O.Box 111, Ado-Ekiti. Telephone: (23) 030-240347 & 030-240338.

Colombia
Venture partner sought to exploit small high grade copper-gold deposit. Details Sr. Luis Alberto Molina Arroyave, Ingeniero Geologo, calle 20 No.30-54, Tulua Valle, Colombia, Fax:57 22 244817.

Extrated in part from recent issues of the UNIDO Newsletter.

NETWORK

MINING AND ENVIRONMENT RESEARCH NETWORK

This collaborative programme of network research investigates environmental management in mineral producing countries and analyses the relationship between environmental regulation, technical change and competitiveness in the minerals industry. Three areas of research are in progress:

- **Environmental performance and production efficiency**

Environmental management in the firm is more closely related to production efficiency and capacity to innovate than to regulatory regime. Environmental degradation is greatest in operations working with obsolete technology, limited capital and poor human resource management Since the latter problems characterise much of the mineral production of developing countries they are a special focus of analysis

- **The limitations of current environmental regulation and alternative environmental policy options**

Stricter environmental regulation may not pose problems for the economies of new mineral products, but there may be major costs and technical challenges involved for older, particularly inefficient, operations. Fast-changing, incremental 'command and control' regulation may lead to shut-downs, delays and reduced competitiveness, the costs of which get transferred to the public sector which has neither the resources nor the technical skills to deal with the problem. Environmental regulation tends to deal with the symptoms of environmental mismanagement-pollution, rather than the causes - lack of capital, technology, skills and capacity to innovate. Building on analysis of the limitations of current environmental regulation, the research investigates a range of alternative policy approaches to achieve sustained and competitive improvements in environmental management.

- **Towards 'best-practice': corporate environmental trajectories**

Technical change, stimulated by the environmental Imperative', is reducing both production costs and environmental costs to the advantage of those companies that have the resources and capacity to innovate. Research compares trends in environmental best-practice in different socio-economic and policy contexts, drawing out the lessons for both corporate strategy and government policy.

Network teams and associates are located in centres of excellence in the following mineral producing countries: Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, China, India, Ghana, South Africa, Zambia, Zimbabwe, Australia, Canada, France, Switzerland, UK and USA. The programme covers non-fuel minerals and small and large scale enterprises. The network is directed by Dr. Alyson Warhurst of the Science Policy Research Unit at the University of Sussex in the UK. Central resources and services for network members include: a growing information database of companies, technology, regulatory frameworks and literature on mining and environment issues; newsletters to inform of ongoing research findings, network progress and relevant news; a traveling exhibition; a programme of visiting fellowships; a working paper series; studentships and training; annual workshops; fund-raising and overall coordination. Three senior industrial consultants, Dr. A.K. Barbour, Mr. P.M.J. Gray and Mr. C. Morgan, provide technical input and serve in an advisory role. The network researchers are experienced and dynamic and a major aim is to build up an international pool of research expertise in the area of mining and environment.

The target audience of the network includes: decision-makers in relevant government ministries; mining and supply companies; donor agencies and development banks; international organisations; research organisations; community groups and NGOs. The output of the network involves ongoing publication of research articles and reports, conference papers, books, including edited volumes of case-studies, newsletters and briefing papers for sponsors, national and international conferences, and educational videos.

Sponsors of the network include: the John D and Catherine T MacArthur Foundation the International Development Research Centre, Canada; the Overseas Development Administration (ODA), UK; the OECD Development Centre, Paris; the US Bureau of Mines; the Canadian Ministries of Industry of Science and Technology and of Environment; Colciencias, Colombia; and the British Council. As the network members develop research capability and define new areas of work, and as demands on the network. As central resources increase, new funding is being sought. The benefits to network sponsors include: full access to network central services and all research findings, which include the results of detailed empirical studies in most of the major mineral producing countries, in addition to a network of contacts which includes well placed centres of excellence in most mineral-producing countries.

Director: Dr. Alyson Warhurst, Science Policy Research Unit, University of Sussex, Falmer, Brighton, BNI 9RF, UK.
Tel: (273) 678172 or (273) 686758; Fax: (273) 685865; E-mail: prfb8@syma.sussex.ac.uk

ENVIRONMENTAL MANAGEMENT IN MINING AND MINERAL PROCESSING: CHALLENGES FOR SUSTAINABLE DEVELOPMENT

A COLLABORATIVE RESEARCH NETWORK

SPRU, IDS, University of Dundee and PREST	**UK**
University of Sao Paulo	**Sao Paulo, Brazil**
CETEM	**Rio de Janeiro, Brazil**
CEMYD	**Bolivia**
CESCO	**Chile**
Universidad Pontificia Bolivariana and ETNOS TV	**Colombia**
INSAP and Pontificia Universidad Catolica del Peru	**Peru**
Eco-Environmental Research Centre Academia Sinica	**Beijing, China**
Tata Energy Research Institute	**India**
Mining Sector Coordinating Unit Southern Africa Development Community	**Zambia**
Minerals Commission	**Ghana**
University of Zimbabwe	**Zimbabwe**
University of Witwatersrand	**South Africa**
University of South Australia and Murdoch University	**Australia**
Centre for Resource Studies	**Canada**
Colorado School of Mines	**USA**
US Bureau of Mines	**USA**
East-West Centre	**Hawaii**
University of Mining and Metallurgy	**Poland**
École des Mines	**France**
Raw Materials Group	**Sweden**

SMI Bulletin
Published by the
International Agency for Small-Scale Mining
L'Agence Internationale pour les Petites Exploitations Minières

SMI is a non-profit organization dedicated to strengthening and supporting the small mining sector as an aid to rural social and economic development, especially, but not exclusively, in developing countries.

Small Mining International - SMI
2020 University St., 21st Floor, Room 149
Montreal, Quebec
CANADA H3A 2A5
Telephone (514) 398-2871
Telefax (514) 398-8379
email: michael@smi.minmet.mcgill.ca

Contributions in English, French, and Spanish on all aspects relating to small-scale mining, including up-coming events and new publications, as well as comments and suggestions, are welcome.

Requests for information on membership and subscription requirements can be addressed to SMI's Secretariat at the above address.