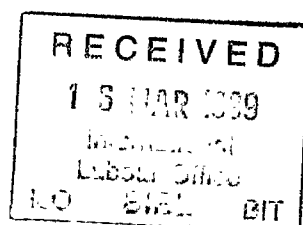


# **Social and labour issues in small-scale mines**

Report for discussion at the  
Tripartite Meeting on Social and Labour Issues  
in Small-scale Mines

Geneva, 1999



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# Contents

<b>Introduction</b> .....	1
<b>1. Setting the scene for small-scale mining</b> .....	3
What is small-scale mining? .....	3
Production from small-scale mines .....	3
Employment in small-scale mining .....	6
Economic impact of small-scale mining .....	6
Major issues in small-scale mining .....	8
Finance .....	9
Skills and training .....	10
Organizations for small-scale miners .....	10
Small-scale mining: Success or failure? .....	11
<b>2. Occupational health and safety</b> .....	13
Safety and health in small-scale mining .....	13
Health and safety in mineral processing .....	19
Mercury .....	21
Community health .....	23
What can and should be done? .....	24
<b>3. Women in small-scale mining</b> .....	27
The extent of women's participation .....	27
Examples of women's activity in small-scale mining .....	28
Africa .....	28
Latin America .....	32
Asia .....	33
Constraints on women's participation .....	34
Overcoming constraints .....	35
<b>4. Child labour in small-scale mines</b> .....	38
Children in small-scale mining in different countries .....	39
Guinea .....	39
Madagascar .....	40
Burkina Faso .....	40
Niger .....	43
Peru .....	46
Philippines .....	49
Viet Nam .....	52
United Republic of Tanzania .....	52
Stopping child labour: What is being done? .....	53

<b>5. Legislation: A path to sustainable small-scale mining? . . . . .</b>	<b>56</b>
Improving the regulatory environment . . . . .	57
Whose responsibility? . . . . .	58
Different needs in different countries . . . . .	59
<b>6. Large-scale and small-scale mining: Cooperation or confrontation? . . . . .</b>	<b>62</b>
Interaction between large and small-scale mines . . . . .	64
Bolivia . . . . .	64
South Africa . . . . .	64
Namibia . . . . .	65
Zimbabwe . . . . .	65
Ghana . . . . .	66
Venezuela . . . . .	67
<b>7. Assisting small-scale mining: Benefits from coordination . . . . .</b>	<b>72</b>
What is being done? . . . . .	72
World Bank . . . . .	72
United Nations . . . . .	74
United Nations Environment Programme . . . . .	76
United Nations Industrial Development Organization . . . . .	76
International Labour Organization . . . . .	77
European Commission . . . . .	79
What assistance does the small-scale mining community want? . . . . .	79
<b>8. Summary and points for discussion . . . . .</b>	<b>81</b>
Setting the scene for small-scale mining . . . . .	81
Occupational health and safety in small-scale mining . . . . .	82
Women in small-scale mining . . . . .	84
Child labour in small-scale mining . . . . .	85
Legislation for small-scale mining . . . . .	87
Links between large and small-scale mines . . . . .	87
Coordinating assistance to small-scale mining . . . . .	88
Suggested points for discussion . . . . .	89
General approach . . . . .	89
Health and safety in small-scale mining . . . . .	89
Women in small-scale mining . . . . .	89
Child labour in small-scale mining . . . . .	89
Legislation for small-scale mining . . . . .	90
Links between large and small mines . . . . .	90
Assistance to small-scale mining . . . . .	90
Role of the ILO . . . . .	90

<b>Annex. Resolutions, guidelines and recommendations on small-scale mining, 1990-97</b> . . . . .	91
Fifth Tripartite Technical Meeting for Mines other than Coal Mines, Geneva, 28 March-5 April 1990 . . . . .	91
Resolution concerning small-scale mining in the informal sector . . . . .	91
United Nations Interregional Seminar on the Development of Small/Medium-scale Mining, Harare, 15-19 February 1993 . . . . .	92
The Harare Guidelines on Small/Medium-scale Mining . . . . .	92
Guidelines for development assistance agencies working in the small/medium-scale mining sectors . . . . .	94
NGO resolution . . . . .	94
World Bank International Round Table on Artisanal Mining, Washington, DC, 17-19 May 1995 . . . . .	95
A comprehensive strategy towards artisanal mining: Agenda for action . . . . .	95
Global Conference on Small/Medium-scale Mining, Calcutta, 2-4 December 1996 . . . . .	96
Calcutta Consensus . . . . .	96
Expert Group Meeting on UNIDO High Impact Programme "Introducing New Technologies for the Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining", Vienna, 1-3 July 1997 . . . . .	98
Recommendations of the participants . . . . .	98
<b>Figures</b>	
1.1 Employment in small-scale mining . . . . .	7
1.2 Major issues in small-scale mining . . . . .	8
4.1 Children's work in small-scale mines, Burkina Faso, 1998 . . . . .	41
4.2 Age profile of children working in small-scale mines, Burkina Faso, 1998 . . . . .	41
4.3 Family situation of children working in small-scale mines, Burkina Faso, 1998 . . . . .	42
4.4 Education level of children working in small-scale mines, Burkina Faso, 1998 . . . . .	42
4.5 Earnings of children working in small-scale mines, Burkina Faso, 1998 . . . . .	43
4.6 Reasons for working in small-scale mines, Philippines, 1998 . . . . .	51
4.7 Symptoms frequently reported, Philippines, 1998 . . . . .	51
8.1 Small-scale mining: Overlapping issues . . . . .	82
<b>Tables</b>	
1.1 Small-scale mines and employment in selected developing countries . . . . .	4
2.1 Annual fatalities in small-scale mines in 23 developing countries . . . . .	14
2.2 Selected small-scale mining disasters, 1992-98 . . . . .	15
2.3 Major reasons for accidents in small-scale mines . . . . .	15
4.1 Activities of trona miners, Niger, 1998 . . . . .	44
4.2 Mining and processing activities of children in gold mining in Niger, 1998 . . . . .	46
4.3 Working children according to age/occupation, Mollehuaca, 1998 . . . . .	47
4.4 Activities of child workers in small-scale gold mines, Sibutad, 1998 . . . . .	50
<b>Boxes</b>	
2.1 Health and safety rules in small-scale mines at Mererani . . . . .	25
4.1 Measures to combat child labour in small-scale mining . . . . .	55
5.1 Calls for legislation for small-scale mining . . . . .	56
6.1 Different approaches to the relationship between large and small mines . . . . .	63

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## Introduction

Small-scale mining has never before been the principal topic of a sectoral meeting at the ILO. It was, however, discussed at a Tripartite Technical Meeting for Mines other than Coal Mines that was held in 1990. A resolution that was adopted unanimously at that Meeting (see annex) noted, *inter alia*, that "small-scale mining in the informal sector is an important phenomenon in many parts of the world and has special needs that require to be addressed". The resolution also pointed to the employment opportunities in small-scale mining but considered that a lack of resources, skills and knowledge meant that many small-scale mining operations suffered from low productivity, inadequate incomes and poor safety and working conditions. Environmental damage from small-scale mining was also mentioned. The resolution called on member States of the ILO and on employers' and workers' organizations to take a range of measures that would enable small-scale mining to work more productively, more safely, and with less of an environmental impact.

These issues are as valid at the turn of the century as they were in 1993 when it was estimated that about 6 million people were engaged in small-scale mining. Today, with better data, the figure is more like 13 million, a significant proportion of whom are women and, unfortunately, children. Between 80 million and 100 million people could depend on small-scale mining for their livelihood.

Since that meeting at the ILO there have been several international meetings on different aspects of small-scale mining that have led to broad agreement on the action to be taken by governments, intergovernmental organizations (IGOs) such as the ILO, non-governmental organizations (NGOs), mining companies and small-scale miners themselves. The ILO participated actively in each of them. The texts of the above resolution and of the other agreements are included in the annex to this report.

At its 262nd Session (March-April 1995) the Governing Body of the ILO decided that a Tripartite Meeting on Social and Labour Issues in Small-Scale Mines would be held in the 1996-97 biennium. This was a departure from the normal type of sectoral meeting since small-scale mining tends to be closer to the informal sector than the formal one, with little or no involvement of the employers' or workers' organizations that is typical of most of the other sectors covered by the Sectoral Activities Programme. Due to financial constraints, the meeting was postponed to the current biennium. At its 268th Session (March 1997), the Governing Body further decided that the governments of the following 18 countries would be invited to be represented at the meeting: Bolivia, Burkina Faso, Burundi, China, Colombia, Ecuador, Ghana, India, Indonesia, Pakistan, Peru, Philippines, South Africa, United Republic of Tanzania, Thailand, United States, Venezuela, Zimbabwe. A number of countries were included in a reserve list from which further invitees would be drawn in the event that a government on the first list did not accept the invitation. The Governing Body decided that 18 Employer and Worker participants in the Meeting would be appointed on the basis of nominations made by the respective groups of the Governing Body. They will not necessarily come from the above list of countries.

This report has been prepared by the International Labour Office as a basis for discussions at the Tripartite Meeting. It is hoped that it will also be of value beyond the meeting to all those concerned with and about small-scale mining and how best to support it as a safe, healthy, productive and sustainable activity. The report was written by Norman Jennings, Senior Industrial Specialist, Sectoral Activities Department, ILO. It is published under the authority of the International Labour Office.

Information in the report was gathered from many sources, including visits to government agencies, trade unions, chambers of mines, NGOs and small-scale mines in Africa, Asia and Latin America. A questionnaire was widely distributed — to governments, employers' organizations and mining unions in these regions — and 81 replies from 43 countries were received, providing much useful information and comment. Unfortunately, there was only a small

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response from employers' organizations and trade unions, possibly reflecting their lack of direct involvement in small-scale mining.

Parts of the report incorporate information in, or excerpts from, papers commissioned by the Office and prepared by Soumaïla Alfa, Oscar Betancourt, Edmund Bugnosen, Chang Da, Jeffrey Davidson, Dulce Estrella-Gust, Thomas Hentschel, Diógenes Roque and Evelyn Taucer, John Hollaway, and Zoila Martínez-Castilla. These papers have been edited and will be published singly or in a consolidated form as Sectoral Working Papers. When published they can be obtained from the Sectoral Activities Department or from the ILO's website <<http://www.ilo.org/sector>>.

The report focuses on some of the major issues in small-scale mining that were highlighted in the responses to the questionnaire and on topics that are important in resolving them. The first chapter sets the scene, putting small-scale mining in context in terms of production and employment, and addresses the issues in general terms. The subsequent chapters on occupational health and safety, women in mining and child labour illustrate some of the problems that exist and are being dealt with. The chapters on legislation, the links between large and small mines, and assistance from IGOs give examples of how some of the issues are being and might be addressed. The final chapter contains a summary of the main points in the report and some suggested points for discussion.

By discussing and clarifying the role of governments, the social partners and the ILO it is hoped that the profile of small-scale mining within the ILO and among the social partners will be raised, leading to increased assistance in providing the means for small-scale mining to ensure safe and productive employment. This will inevitably contribute to the achievement of higher productivity and remuneration, improved working conditions and health and safety, better resource management and a lessening of its environmental impact.

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# 1. Setting the scene for small-scale mining

## What is small-scale mining?

Small-scale mining means different things to different people. To some it is dirty, dangerous, disruptive and should be discouraged. To others it is profitable, productive, or simply the only way out of poverty.

Responses to a question on what defines a small-scale mine varied widely. For some it was the level of *employment*, typically less than 50 workers and ranging from fewer than 20 in Pakistan and the United States to fewer than 75 in underground mines and fewer than 150 in surface mines in India. In some cases *production* was the key, ranging from a maximum annual output of 15,000 tonnes of ore or mineral a year to a maximum of about 250,000 tonnes. In both cases, much depends on the level of mechanization, the type of mine and the mineral being mined. *Capital investment* is another criterion for small-scale mining, varying from specified limits (e.g. \$2.5 million in Argentina, R8 million in South Africa, Rs.300 million in Pakistan, \$1 million in Thailand, \$30,000 in Zimbabwe) to unspecified guidelines (e.g. "small investment and operating cost"). The *size of the claim* being worked is used in some countries (e.g. Ghana, Zambia, Zimbabwe). Others referred to *artisanal operations*, *low levels of mechanization*, the use of *simple equipment* only. Some limited the *depth* to which underground and surface mines could go, either explicitly or by forbidding the use of explosives. Often, a combination of several of the foregoing factors is used. In some cases they are specified in regulations, elsewhere they are guidelines. In many countries small-scale mining is limited to nationals, although foreign partners are increasingly being allowed to help small-scale miners expand their operations in the absence of local investment.

So small-scale mining is really in the eye of the beholder — the relevant controlling agency. Attempts down the years to find a workable definition have proved fruitless. The mines discussed in this report are small-scale mines (and to a lesser extent quarries) that are labour-intensive, with mechanization being at a low level and basic. By and large this means that production is low too. The report does not deal with small-scale mining in industrialized countries, nor with the high-technology small-scale mines that are increasingly being established by foreign mining companies, large and small, to work small deposits, particularly of gold, in developing countries.

Small-scale mining falls into two broad categories: the mining and quarrying of industrial minerals and construction materials on a small scale; and the mining of relatively high-value minerals, notably gold and precious stones. The first is mostly for local markets and exists in every country. Regulations to control and tax these mines and quarries are often in place, and the existence of informal or illegal operations at this level is generally attributable to a lack of inspection and the lax enforcement of regulations rather than to the lack of a legal framework — much the same as for small manufacturing plants. The output from the second category of small-scale mines is generally exported. The size and character of small-scale mining of this type has often made what laws there are impossible to apply or has highlighted their inadequacy.

## Production from small-scale mines

The economic and social impact of small-scale mining is far from small. Some years ago, small-scale mines were estimated to account for 15-20 per cent of the world's non-fuel mineral production.<sup>1</sup> At the national level, the impact in developing countries can be much greater, particularly where high-value minerals such as gold, silver and gemstones are concerned. Minerals that do not normally lend themselves to small-scale mining include copper, iron ore,

<sup>1</sup> N.S. Jennings: "Small-scale mining in developing countries: Addressing labour and social issues", in *Guidelines for the development of small/medium-scale mining* (New York, United Nations, 1993), pp. 90-97.



lead, zinc, manganese, nickel and coal, largely because of the need for economies of scale in production and use. But each of these is mined on a small scale somewhere to meet limited local needs. The most striking example is China, where about 550 million tonnes of coal a year (40 per cent of total production) are produced in small-scale mines employing about 3 million people. Over 400 million tonnes is estimated to come from 51,000 illegal small-scale mines, almost half of which are due to be closed by the end of 1999 as part of a concerted effort by the Government to regulate this sector.<sup>2</sup> Basically, other than for precious and semi-precious metals and minerals, wherever there is a small or dispersed domestic market small-scale mines are more likely to account for a high proportion of national production. As far as the exploitation of precious minerals in developing countries is concerned, small-scale mining accounts for a large proportion of gemstones (90-100 per cent in most countries) and diamonds (80-100 per cent in countries that are not major producers) and for a varying proportion of gold production (up to 100 per cent in several developing countries — Burkina Faso, Cuba, Guyana, Mozambique, Myanmar, Niger; and over 50 per cent in Bolivia, Mexico, Philippines, United Republic of Tanzania).

As large and medium-sized mining companies look farther afield for future production, the proportion of some minerals (mainly gold and diamonds) that is produced by small-scale mines is likely to fall. This does not mean, however, that the amount of production will decrease. Gold production in particular is largely determined by the price of gold, overall economic conditions — especially in agriculture — and other mining activity. A fall in gold price might, paradoxically, increase small-scale mining if workers from large mines are laid off.

The response to a question on whether and by how much small-scale mining activity has changed in the last five years was mixed, but generally positive. Out of 35 developing countries in Africa, Asia and Latin America, small-scale mining had increased in 21, decreased in two and remained constant in 12. Increases in small-scale mining activity that were reported ranged from 1 per cent to 700 per cent, with most countries experiencing a 10-20 per cent increase since 1993. As for the future, small-scale mining was expected to increase in 26 countries, decline in eight and remain constant in three. Those that forecast an increase felt it would be in the range of 10-20 per cent over the period.

The number of small-scale mines reported depends on the definition, the level of production in relation to demand and, most importantly, whether or not their legal status precludes their inclusion in statistics. In 35 developing countries the number of small-scale mines ranged from under 100 (20 in Namibia) to 10,000 or so (Brazil, Colombia, India) to 250,000 (China) (table 1.1). The proportion of illegal mines — those operating without the necessary authorization — varied from 5 to 80 per cent in the 28 countries that provided information. In half of the countries 30 per cent or more of small-scale mines were reported as operating illegally (table 1.1). If these figures can be considered a valid sample, the extent of illegal small-scale mining is very high and so, therefore, are the likely financial losses to the countries and regions most affected.

**Table 1.1. Small-scale mines and employment in selected developing countries**

	Number of mines	Illegal mines (%)	Employment
Argentina	670	...	5 800
Bolivia	1 000	10-20	100 000
Brazil	10 000	±90	250 000-100 000
Burkina Faso	35-60	±20	60 000-70 000
Burundi	...	...	10 000
Central African Republic	...	...	45 000
Chad	2 000	...	10 000-15 000
Chile	7 000	±20	6 000-12 000
China	250 000	±80	4 300 000

<sup>2</sup> *Mining Journal*, 27 Nov. 1998, p. 430.

	Number of mines	Illegal mines (%)	Employment
Colombia	9 600	±70	100 000–200 000
Democratic Republic of the Congo	...	...	150 000
Côte d'Ivoire	...	...	10 000–25 000
Cuba	>300	±10	5 000
Dominica	73	–	125
Dominican Republic	...	...	2 000–3 000
Ecuador	400	...	60 000
Ethiopia	...	...	>100 000
French Guyana	...	...	5 000–10 000
Ghana	400–700	10–50	50 000–300 000
Guinea	...	±80	40 000
Guyana	3 500	±30	10 000–20 000
Haiti	>50	±80	>4 500
India	>10 000	10–60	1 000 000–1 100 000
Indonesia	77 000	...	300 000–500 000
Jamaica	140	±5	1 200
Kenya	>50	±10	30 000–40 000
Madagascar	83	...	5 000–20 000
Malaysia	83	–	4 600
Mali	...	...	100 000
Mexico	2 000	±50	20 000–40 000
Morocco	...	...	5 000–10 000
Mozambique	150	±95	700–100 000
Myanmar	50–120	±5	14 000
Namibia	20	±15	5 000–10 000
Nepal	45	±5	500
Nicaragua	...	...	3 000–6 000
Nigeria	...	...	10 000–20 000
Niger	150	>95	440 000
Pakistan	2 400–3 250	5–20	90 000–370 000
Panama	...	...	3 000–4 500
Papua New Guinea	...	...	15 000–20 000
Peru	1 550	±50	25 000–50 000
Philippines	700	±80	200 000
Rwanda	...	...	5 000–15 000
Senegal	...	...	3 000
Sierra Leone	...	...	30 000–40 000
South Africa	5 500	...	10 000
Suriname	...	...	15 000–20 000
United Republic of Tanzania	4 000	40–50	450 000–600 000
Thailand	500–950	±5	21 500
Uganda	...	...	5 000–10 000
Venezuela	...	...	30 000–40 000
Viet Nam	500–600	±30	35 000–45 000
Zambia	200	±15	20 000–30 000
Zimbabwe	2 000–5 000	±30	50 000–350 000

Sources: Various, including answers to questionnaire, ILO, technical journals, United Nations agencies, World Bank.

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The extent of illegal mining is often linked to difficulties in obtaining permits. Some small-scale mines, however, while “technically” illegal (having no permit), may be operating in a satisfactory manner as far as working conditions and occupational health and safety are concerned. Nonetheless, as long as they are illegal there can be no official control over their activities. But — as can be seen later in the report — serious problems as regards health and safety, the environment, hygiene, and working conditions, including child labour, are widespread. Many of them flourish precisely because the mines are so often outside the law, but unfortunately many legal small-scale mines also flout regulations and are not penalized.

## Employment in small-scale mining

In 1993 it was estimated that about 6 million of the world’s 30 million mineworkers were engaged in small-scale mining.<sup>3</sup> This figure has been widely quoted since then and it was not until more recently that higher estimates of employment in small-scale mining appeared. Table 1.1 shows employment in small-scale mining in 55 developing countries, among which are most of the “major” small-scale mining countries. Where a range of figures is given, it reflects an element of uncertainty because of the lack of data, the extent of illegal mining in some countries and the fact that small-scale mining is often carried out on a seasonal basis, leading to wide fluctuations in employment. Total employment in small-scale mining in these 55 developing countries ranges between 8.25 million and 10.1 million. For 25 African countries employment is 1.6-2.6 million; for ten Asia-Pacific countries it is 6.0-6.6 million; and for 18 Latin American countries it is 0.64-1.0 million.

Extrapolations of limited data can be risky but, taking into account the fact that most of the major small-scale mining countries are included in the table, it can be assumed that 11.5-13 million people worldwide are engaged in small-scale mining. Since twice as many respondents to the questionnaire felt that employment in small-scale mining was increasing rather than decreasing, this number is likely to grow. A regional breakdown is more difficult to gauge. However, figure 1.1 provides an estimate of small-scale mining employment in different regions extrapolated from the data in table 1.1.

With a global workforce of up to 13 million and rising, the number of people who depend on small-scale mining for their livelihood, bearing in mind extended families in many developing countries and a small multiplier effect, could be 80-100 million. This is about the same as the number of people who depend on large-scale mining. A major difference between the small and large mining sectors, however, is that many jobs in small-scale mining are precarious, to say the least, and are far from conforming to international labour standards.

## Economic impact of small-scale mining

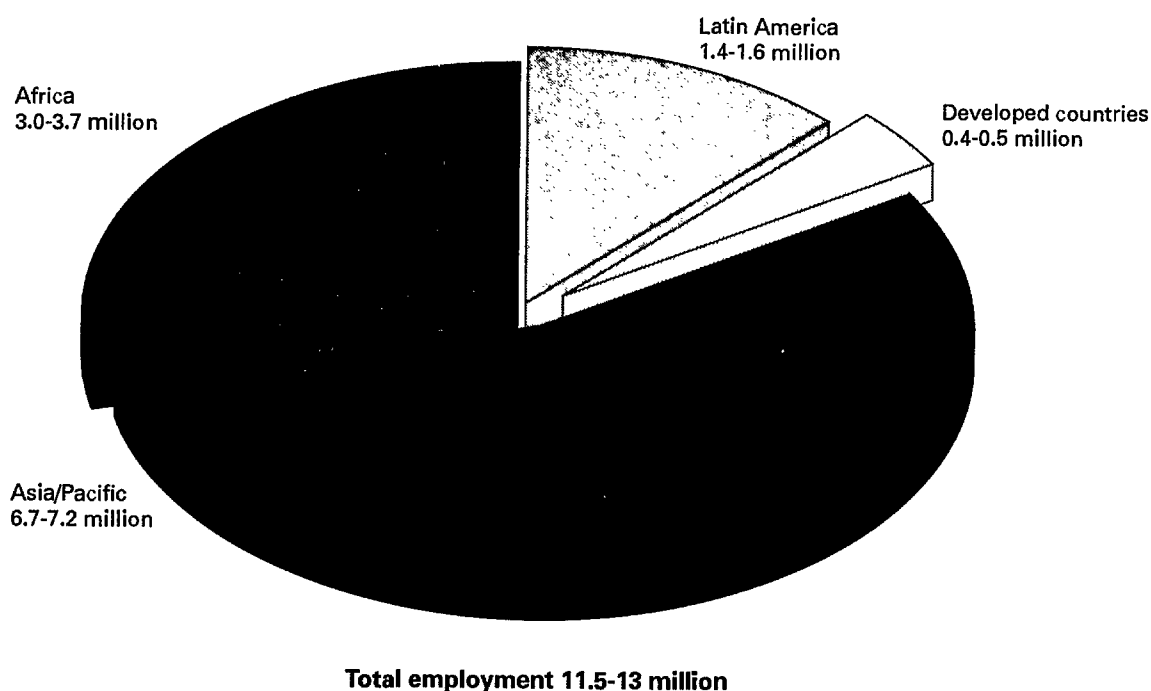
In view of the extent of small-scale mining there is plenty of incentive for ensuring that it contributes fully to economic and social development, particularly at the local level. Small-scale mining can generate substantial local purchasing power and lead to a demand for locally sourced inputs (food, equipment, tools, housing) when they are available, or encourage their production. At the national level, the export of high-value metals and minerals from small-scale mines can make a major contribution to foreign exchange earnings. Gold and gemstones worth \$1 billion a year are estimated to be produced in sub-Saharan Africa.<sup>4</sup> In China, gold production from small-scale mining is currently worth about \$200 million a year; in Bolivia and Brazil about \$180 million (much less than in the heydays of the *garimpeiros* in the late 1980s); \$140 million in

<sup>3</sup> Jennings, *op. cit.*

<sup>4</sup> R. Noetstaller: “Historical perspective and key issues of artisanal mining”, paper presented at International Round Table on Artisanal Mining, Washington, DC, May 1995.

Indonesia; and about \$250 million in Peru. In countries where sales are not transparent and smuggling is rife, much of the benefits to the government are lost. There are plenty of examples of large increases or decreases in statistics of official exports of product from small-scale mines when changes have been made to purchasing arrangements, even though physical production has not changed much. Even when the product can freely be sold at the prevailing market price — as is the case in most of the 35 developing countries that answered the questionnaire — it often passes through several hands at discounted prices before reaching the formal “market price” buyer. In some countries the small-scale miners themselves receive as little as half the value of their production, although some accept this in order to ensure a regular cash flow from small amounts of production. When market prices are not received, this can be due to local prices being set by government, to there being a single buyer (e.g. a cement plant), or to the poor quality of the product. Quality is also an issue in the trading of gemstones. If, as is sometimes the case, payment is based solely on weight, small-scale miners are likely to be disadvantaged. Proof or suspicion of being cheated will quickly lead to a parallel market, particularly in larger stones. Governments have to find a path between paying the full market price at a single centre with expert quality control and making the selling process convenient for the miner by enabling decentralized sales close to the mines, at a cost. Several countries have a system of licensed buyers who visit mines and buy small amounts of product for rather less than the official buying price, consolidate it and resell it at the official price. Provided that there are sufficient licensed agents competition between them should prevent the price they pay from being so low that it leads to black market transactions.

**Figure 1.1. Employment in small-scale mining**



Source: ILO estimates.

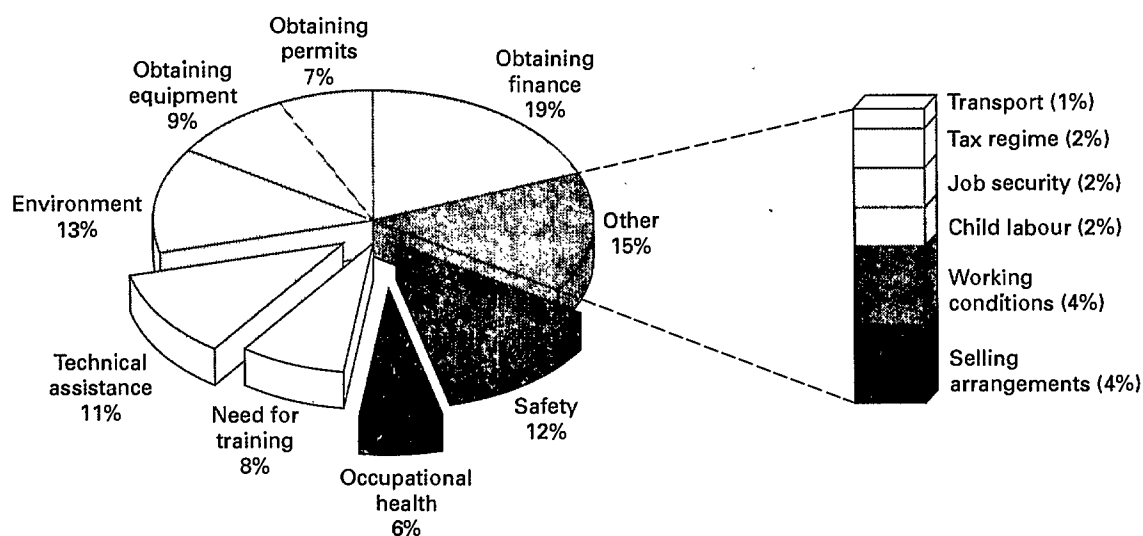
Illicit marketing is primarily the result of inadequate government policies. When official prices are too low, black markets develop. Also, an overvalued currency and high inflation depress the effective price. The traditional strong ties established by traders (legitimate and illegal) through the pre-financing of small-scale mining operations is another means that can prevent the miner from obtaining the full value of production.

More governments are steadily trying to reconcile the important direct and indirect economic benefits of large-scale mining at the local and national levels with the needs of the small-scale mining community. Small-scale mines are often the reason the large company arrived on the scene in the first place. Unfortunately, the direct benefits of large mines often do not flow back to the community; they are garnered by the national exchequer and disbursed according to national priorities. This is not to understate the importance of the infrastructure provided by large mines — such as improvements to schools, health clinics, roads and housing, employing local labour, allowing access to the mine’s hospital, and making regular purchases from local enterprises — but these might well bypass small-scale miners and even lead to price increases in the community to their disadvantage.

## Major issues in small-scale mining

In its questionnaire, the Office listed 15 issues that affect small-scale mining and asked respondents to nominate the three most important, state their reasons and suggest what should be done to improve matters. Figure 1.2 shows a breakdown of the 242 “nominations” (the issue of discrimination did not receive any).

Figure 1.2. Major issues in small-scale mining



Source: Responses to questionnaire.

The overriding single concern is access to finance. Taken together with the difficulties in obtaining equipment to which it is closely related, financial issues account for 28 per cent of the total. Labour issues, however (training, health, safety, working conditions, child labour, job security), accounted for 34 per cent of the total; more — 58 per cent — if the related issues of technical assistance and the environment are included.

The low priority given to the issue of child labour (2 per cent) might seem surprising, but it reflects the rank of the problem rather than whether or not it exists. The respondents seem to consider that until other issues (particularly access to finance and obtaining permits) are adequately dealt with, much small-scale mining will be unable to operate in a way that will lead to the elimination of child labour. Once small-scale mining is on a satisfactory footing the “need” for child labour will decline. Hence the need for the considerable external assistance that is being provided to accelerate the removal of children from small-scale mines (Chapters 4 and 7).

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## Finance

Access to credit was the major issue cited by respondents to the questionnaire. The lack of capital is an obstacle to mechanization and improving efficiency. These in turn lead to low productivity, low revenues and, where they are paid, low wages. As a result, miners tend to ignore health, safety and environmental measures. Mine owners and mineworkers generally have few if any assets that banks and other lending institutions will accept as collateral. It is not until they start producing something saleable that they can get credit. Obstacles to obtaining formal credit can be overcome if governments recognize mining claims and issue mining rights that can be freely traded, sold or pledged as collateral. This point has been raised time and again at international forums and underpins the establishment of a sustainable infrastructure for small-scale mining. Even when mining rights exist, however, banks are not readily prepared to take them as security because of the geological risk of unmined reserves, the mobility of many small-scale miners and the widespread lack of enforcement of laws and regulations. Moreover, banks traditionally require borrowers to provide some equity from their own resources (15-25 per cent is typical), which can be a formidable task for many small-scale miners who then find themselves caught in a vicious circle:

low revenue from mining ⇒ low savings potential ⇒ inability to invest in tools and equipment ⇒ inability to meet health, safety and environmental standards ⇒ low productivity ⇒ low returns ⇒ low revenue from mining<sup>5</sup>

Since even a modest investment in tools and equipment can improve productivity and resource utilization and result in more revenue to all concerned, it is in everyone's interest to break this circle, create self-sustaining financing mechanisms and provide access to credit for small-scale miners.

Special finance programmes for small-scale mining were reported in 15 countries. They included tax concessions (in five countries) and the waiving of import duty on equipment. The latter is unlikely to be of much benefit in view of the low level of mechanization of most small-scale mines, while the former, depending on the arrangements, could be an inhibiting factor to expansion — for example, if a marginal increase in production led to a cessation of tax concessions. Alternatively, it might merely lead to the under-reporting of production, with consequential losses in government revenue. Ten countries (Burkina Faso, Chile, Ecuador, Ghana, Mexico, Mozambique, Namibia, Pakistan, South Africa and Zimbabwe) reported the existence of loan guarantees, credit schemes (some from specific mineral development funds), equipment leasing and/or hire purchase arrangements to assist small-scale mining.

Most small-scale mining, however, is self-financed, using savings or raising capital through the sale of assets. Private credit arrangements include loans from family and friends, from concession holders, from equipment suppliers or from traders. Starting up is the main problem (as in any business) and there is a high risk of being bonded in debt when starting and initial operating expenses are underwritten by the claim owner.

When purchasing arrangements are transparent and efficient, it should be possible for their "operating cost" to include an element that could be used to finance small-scale mining operations. Since many miners currently only receive 50 per cent of the value of production, if they could sell it for about 80-85 per cent (even small amounts) they would be better off and the agency concerned would have a revolving fund for loans — creating a virtuous circle instead of the vicious circle being perpetuated.

Further discussion of credit and finance is beyond the scope of this report but access to credit is the key to enabling sustainable small-scale mining and hence enabling efforts to focus on addressing the many labour and social issues that accompany it.

<sup>5</sup> World Bank: *Artisanal Mining Round Table: Issues for discussion*, background paper for the World Bank International Round Table on Artisanal Mining, Washington, DC, May 1995.

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## Skills and training

Few small-scale mineworkers have any formal mining skills — less than 10 per cent in most countries (typically about 5 per cent). Those that do obtained them during their former jobs as miners in large mines. That is not to say that many small-scale mineworkers are not very experienced, having benefited from on-the-job training in large mines before turning to small-scale mining following redundancy. Other small-scale miners pick up skills from these experienced workers. Formal or semi-formal training is sometimes provided to small-scale miners by mines inspectorates or ministries of mines, by national vocational training institutions, by large mining companies in one or two cases, or as part of development assistance projects. For the most part, however, opportunities for training are few and far between. Even when they are available, many small-scale miners cannot afford to take time off work for training or to travel to training sessions. The need for mobile training facilities was cited as an important contribution to assisting small-scale mining that development agencies could make (Chapter 7). Several trade unions have expressed a willingness to assist in training small-scale miners, provided they are given the resources to do so.

Most of the external assistance that is directed at small-scale mining includes a training element, specifically in increasing the capacity of officials in minerals commissions or mines inspectorates to provide training (e.g. in the use of mercury retorts, explosives, mine rescue, simple chemical analysis) to small-scale miners and to active owners and managers. Although training opportunities are theoretically available to small-scale miners, encouraging them to take part is another matter. The linking of training to different aspects of small-scale mining, from the granting of permits to the purchase and use of explosives and mercury, might work if it were carefully packaged. Too heavy an approach would merely lead small-scale miners to move out of the sphere of official supervision. Also, training in more than the technical aspects of mining is required, including business management and marketing. Technical problems are easy to solve, whereas creating a lasting, sound human and organizational environment is more difficult. Training can play an important role in achieving this.

## Organizations for small-scale miners

In half the countries that responded to the questionnaire a proportion of small-scale mineworkers belonged to trade unions, or were members of a cooperative or small-scale mining association (100 per cent in Cuba, Malaysia, Viet Nam). One or more small-scale mining associations exist in 22 of the countries that replied. In Bolivia, which has a strong cooperative movement, 70-90 per cent of small-scale miners were estimated to be members. Elsewhere in Latin America, Chile and Dominica were the only respondents to note a high degree of union membership (75 per cent and 60 per cent respectively). In Pakistan, where much of the coal is produced in small-scale mines, the extent of union membership varies among regions (30-60 per cent). In China hardly any of the more than 4 million small-scale miners were reported as belonging to a trade union. As might be expected, the extent of trade union membership is linked to the number of informal mines and the proportion of the workforce that is estimated to be in the informal sector. In half of the countries that responded to the questionnaire, 50-100 per cent of those engaged in small-scale mining worked in the informal sector, with no union membership. Even where small-scale mineworkers might want to join a union, the sparse resources of the union itself often make it impossible to organize small groups of widely dispersed workers. Helping miners' organizations to deliver training could be a quick, effective way of strengthening these organizations and linking them more closely with small-scale miners and with mines inspectorates and mining commissions. Some unions have expressed the wish to help small-scale miners, even without organizing them. If they had the resources they would be well placed to provide training in many aspects of small-scale mining.

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## Small-scale mining: Success or failure?

At the macro-level small-scale mining has rarely achieved its full potential. The much vaunted ability of small-scale miners to find deposits, particularly of high value minerals, is one thing; the knowledge, ability and will to exploit them fully are another. Output and productivity from small-scale mines are lower than they could be. Returns to the economy are certainly less than if effective tax, purchase, pricing and foreign exchange regimes were in place and implemented. Unattractive or unworkable schemes lead quickly to illegality and smuggling. When the central bank's monopoly on purchases has been abolished and licensed dealers allowed to trade freely, official exports have risen dramatically. Cash flows from small-scale mining operations more quickly than from large operations, with all of the surplus spent locally.

At the micro-level small-scale mining has generally fared better. Mining company operations have sometimes coexisted with small-scale mining, giving them assistance and thereby having an influence on their activities (Chapter 6). Others, however, have sought to stamp out small-scale mining that might affect them. NGOs have worked hard and effectively at the local level to introduce appropriate technologies to improve efficiency and mitigate the environmental and health impact of small-scale mining. IGOs have now passed the stage of undertaking studies and developing guidelines and are increasingly funding large and varied programmes. These include child labour, taxation and land title reform, environmental impact and the role of women and indigenous peoples, but there is little coordination between the agencies (Chapter 7). Moreover, for any external assistance to be successful the active support and participation of governments is needed, but in many countries small-scale mining remains low on the government's list of priorities.

Unfortunately, despite considerable efforts, there seems to be limited interest among many small-scale miners in using cheap, readily available and effective technology, such as retorts to capture mercury, particularly when there is no economic incentive for them to do so and when other benefits (such as health and environment) are hidden or long term. Moreover, particularly in the case of itinerant miners, there is frequently no long-term interest in preserving the land for use after mining has ceased.

Governments have typically intervened in small-scale mining: to improve revenue flows; on behalf of indigenous people; following a disaster in order to improve safety and health; or at the request of large mining and exploration companies. Specific policies for small-scale mining that cover its development and operation, sometimes including labour issues, are slowly being developed, together with legislation (Chapter 5). But many small-scale mines are still outside the coverage of mining laws. Even where there are regulations, the overwhelming problem facing governments in attempting to regulate small-scale mining is the lack of a trained inspectorate with adequate resources. The result has been an inability to introduce controls or a failure to follow-up or monitor mining operations, so that problems have not been dealt with at an early stage and projects to improve matters have foundered. The result has been the continuation of unsatisfactory practices.

The geographically scattered nature of small-scale mining, its rapid rise during "gold rushes", the lack of resources in mines inspectorates, and a desire to avoid drawing attention to illegal or quasi-legal mining have perpetuated the lack of information on what is increasingly an activity of considerable economic importance and the only way out of poverty for many people. The fact that small-scale mines are generally outside the scope of activities of employers' and workers' organizations — which in the large, formal sector have rights, obligations and an influence on mining operations — means that the State has had to shoulder all the responsibilities for managing small-scale mining. As it is rarely equipped for this task, in many cases it has not been able to do so. Hence the need for external assistance to bolster the size and technical competence of mining inspectorates and to move small-scale mining into the formal sector.

The unregulated or underhand way in which much small-scale mining is carried out means that governments are missing out on much-needed revenue. Moreover, in the long term, the



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inefficient development of mineral reserves that is an inevitable part of much small-scale mining results in forgoing considerable future sources of revenue. Mineworkers themselves often lack the basic skills, training and supervision to make their work safer, healthier and more productive. Tales of the exploitation of small-scale miners are legion. Moreover, entrepreneurs and managers of small-scale mining enterprises often lack the necessary business knowledge, even though they might be competent miners.

A major disadvantage of much small-scale mining is the low throughput of material despite arduous physical labour. Measures to improve working conditions and output need to focus on the *quality* of work in small-scale mining rather than the *quantity*. Any increase in the quality of human input will be more than matched by increases in the quantity, quality and value of output from more efficient production and higher value added at the primary processing stage prior to sale.

Assistance to small-scale miners should demonstrate that, without unduly constraining their activities, there might be a better way — better in terms of health and wealth, better for the land, and better for the country. Unless small-scale miners can be convinced there will be immediate tangible benefits from doing things differently, there is little point in continuing down the same old path.<sup>6</sup> The way forward is to bring small-scale mining into the formal sector without stifling entrepreneurial zeal but at the same time improving the lot of the 13 million or so who work in small-scale mining and the much larger number — 80-100 million — who depend on it for some or all of their livelihood. If this can be achieved, small-scale mining will be a success.

<sup>6</sup> N.S. Jennings: "Small-scale mining: Time for deeds not words", in A.K. Ghose (ed.): *Small/medium scale mining: A global perspective* (New Delhi, Oxford & IBH Publishing Co., 1997), pp. 9-16.

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## 2. Occupational health and safety

Small-scale mining is an important part of the social and economic infrastructure in many developing countries and should be accorded sufficient attention to ensure its continued contribution to local and national well-being. This contribution will not be fully realized until more attention is paid to improving the occupational health and safety of mineworkers and their communities. In several countries in Africa, Asia and Latin America, the small-scale production of gold and gemstones ranks in the top five of national production, yet small-scale mining is largely ignored as far as safety, health and the environment are concerned. Indeed, prevention measures for accidents or occupational safety, if they exist, are minimal and rarely enforced.

Small-scale mining has a poor reputation for safety, but there is little data to support or rebut claims that it is inherently unsafe with high levels of fatal and disabling accidents. Rather, problems relating to occupational health are more serious and pervasive, touching all who work in and around small-scale mining and processing operations, and their families.

As with most aspects of small-scale mining, occupational safety and health and environmental issues at the mine, at the processing plant and in the community are closely linked. Because the same people are often involved in both small-scale mining and processing, safety and health issues in these two parts of the mineral production process will be discussed together. Overshadowing them both, however, is the question of community health in the vicinity of small-scale mines, the poor state of which is frequently directly linked to the mining and processing activities. It is not possible to do other than highlight here this important issue as part of the overall social fabric of regions that are affected by small-scale mining.

### Safety and health in small-scale mining

It is widely acknowledged that accidents in small-scale mines are under-reported or not reported at all. Illegal operations have no wish to draw attention to themselves and the fact there is frequently no form of compensation or social security provision for injury and even for death can mean that reporting an accident will merely lead to unwanted administrative, legal and operational problems. Anecdote, observation and news of the occasional disaster in the media throw some light on the situation, but not much.

A combination of lack of resources, lack of or non-application of safety regulations, lack of awareness, illiteracy, lack of training, inadequate equipment and remote location all point to the likelihood of there being more accidents in many small-scale mining operations than in larger, more formal, more public mines. On the other hand, the nature of small-scale mining (low level of mechanization, low intensity of operation) means that some of the risks can be lower than in large, formal mines. Be that as it may, many fatal and disabling accidents do occur in small-scale mines and, as elsewhere, can be considered to be preventable.

Underground and surface mines have different hazards and degrees of risk, with underground coalmines at the forefront in view of the risk of fire or explosion arising from the ignition of methane and/or coal dust. Data from the questionnaire show that the three countries with the highest number of small-scale underground coalmines (China, India, Pakistan) have significantly higher numbers of fatal accidents, even when the size of the workforce is taken into account, than is the case in non-coalmines. In China over 6,000 fatalities are estimated to occur in small-scale mines each year. In Hunan Province, where 25 million tonnes of coal a year are produced in 5,220 small-scale mines employing 200,000 workers, there were 232 deaths in 1997; 70 per cent of these deaths were due to gas or coal dust explosions. At this fatality rate (9.1 per million tonnes of coal mined in 1997) 4,500-5,000 fatalities in China's small-scale coalmines would occur each year. In India 50 or more deaths in small-scale mines are estimated to occur each year. In Pakistan there are 45-90 fatalities in the country's small-scale coalmines. Information from other countries that do not have a significant small-scale coal-mining sector

indicates over 30 deaths a year in a very few cases; over 20 in some; with many reporting fewer than ten (table 2.1).

**Table 2.1. Annual fatalities in small-scale mines in 23 developing countries**

Bolivia	>40
Chile	10-24
China	>6 000
Cuba	±1
Dominica	±1
Ghana	5->20
Guinea	±15
Guyana	±2
India	15-50
Kenya	±5
Malaysia	±2
Mexico	5-18
Myanmar	0-5
Namibia	±3
Nepal	1-3
Niger	0-27
Pakistan	45-90
Peru	±7
South Africa	±10
United Republic of Tanzania	10-100
Thailand	<10
Zambia	5-7
Zimbabwe	10-30

Source: Replies to the questionnaire.

In some cases the numbers are inflated by disasters, such as those in the United Republic of Tanzania (70 killed in flooding in 1998; 100 in 1997), Niger (27 killed in flooding in 1998) and Bolivia (100 killed a landslide caused by rain in 1992). Table 2.2 shows some small-scale mining disasters that were deemed newsworthy in 1992-98.

Responses to a question seeking the main *reasons* that accidents in small-scale mines occurred were varied, but could be grouped under two broad categories — management/operation-related; and equipment/work-environment-related (table 2.3). In many cases the fact that the nearest source of first aid can be 10-20 km away, often over difficult terrain, and the nearest hospital with facilities for dealing with serious injuries can be 100 km or more away, lessens the chances of quick recovery, or even survival.

**Table 2.2. Selected small-scale mining disasters, 1992-98**

Year	Country	Deaths	Cause
1992	Bolivia	≥ 100	Landslide after rain
1993	Colombia	18	Explosion (dynamite)
1994	China	51	Flash flood/landslide
1994	China	10	Landslide
1995	China	16	Inundation by water
1995	China	21	Gas explosion
1995	Nigeria	≥ 80	Landslide
1996	China	91	Gas explosion
1996	China	84	Gas explosion
1996	China	227	Gas explosion
1996	China	9	Gas explosion
1996	China	14	Flooding after dynamite explosion
1996	Colombia	8	Elevator fall
1996	Peru	≥ 14	Earthquake
1997	China	86	Gas explosion
1997	United Republic of Tanzania	≥ 100	Flooding
1998	China	> 30	Explosion
1998	Colombia	12	Cave-in
1998	Colombia	± 100	Mudslide after rain
1998	Niger	27	Flooding
1998	United Republic of Tanzania	≥ 70	Flooding

Sources: Various, including *Mining Journal*, BBC radio, news agencies.

**Table 2.3. Major reasons for accidents in small-scale mines**

Management/operation	Equipment/work environment
Lack of awareness of safety	Rock falls; cave-ins; subsidence
Violation of regulations	Misuse of explosives
Negligence	Lack of ventilation
Lack of inspection	Unprotected equipment
Ignorance and lack of training	Poor access/exit
Poor management/supervision	Obsolete equipment
Anarchic exploitation of resources	Lack of maintenance
Over-exertion	Improper use of equipment
Substance abuse	Lack of or failure to use personal protective equipment
Lack of regulations	Poor working conditions and work practices

Source: Replies to the questionnaire.

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The five most frequently cited *causes* of accidents in small-scale mines were:

- rock falls; subsidence;
- lack of ventilation;
- misuse of explosives;
- lack of knowledge; lack of training; violation of regulations;
- obsolete and poorly maintained equipment.

The three *types* of accidents most frequently cited were:

- trips or falls (at the same level, or from one level to another);
- being hit by machinery or a moving object (including rocks, stone chips, tools);
- effects of cave-ins or rock falls (e.g. fractures, sprains, contusions).

Two closely linked factors stand out — human and financial. Even if attitudes towards improving mine safety can be improved and those concerned motivated to take and sustain action to achieve a lasting improvement, the resources necessary to achieve the results are too often lacking. Human factors, such as superstition, cannot be underestimated. In the United Republic of Tanzania, for example, the spiritual notion of the earth needing a sacrifice in return for giving up its treasures means that a fatal accident presages increased mining activity in the belief that the gods have been appeased. Clearly, for accident prevention to succeed, neither the worker nor the conditions of work can be considered in isolation.

Inadequate, inappropriate or unsafe equipment are real problems in many small-scale mines, including in some cases equipment provided as part of technical cooperation programmes. Such equipment leads to increased risk as workers try to adapt it to their needs.

For example, in a federation of tin mining cooperatives in Bolivia, where about 4,000 miners work in a former mine of the Corporación Minera de Bolivia (COMIBOL), there are reportedly an average of three fatalities and 10-15 other accidents each month — equivalent to almost 1 per cent of the workforce being killed each year. Wage-earning miners unable to work due to injury or injury receive no sick pay. When a miner is killed, the members of the cooperative collect money for the funeral, and that is that. Members themselves, however, do have some benefits, being able to send someone to work on their behalf in return for payment in cash or kind. On the other hand, the members of a Bolivian gold-mining cooperative contribute to the government social security scheme and receive benefits if they are unable to work. Wage workers, however, receive no pay if they are not working. The 26 cooperative members and 18 wage workers at this underground mine had recorded no fatal accidents in its ten years of operation; other accidents were said to be “few and minor”.

A typical gold mine in Zimbabwe is a shallow underground operation in stable rock. No machinery is used, apart from the occasional use of a leased compressor and pneumatic drill. The mine has no shaft, uses explosives intermittently, is fairly well ventilated and has no electricity. Its workers are therefore less exposed to most of the hazards that are common in larger mines. Nonetheless, small-scale mining in Zimbabwe has a well-established reputation for a disproportionately high number of fatalities. These are mainly caused by miners re-entering closed mines illegally to win gold from the pillars, and from alluvial miners burrowing into uncompacted river banks.<sup>1</sup>

Many small-scale mines are supervised and managed by local government or by decentralized arms of central administrations. It is therefore important to define clearly the distribution of management duties between different government agencies for planning and coordination purposes. If not, a complete lack of safety management will result. Safety inspection

<sup>1</sup> J. Hollaway: *Small-scale mining in Zimbabwe: A case study of the Button Mine*, study commissioned by the ILO to be included in a forthcoming Sectoral Activities Department Working Paper on small-scale gold mines.

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is weak and the quantity and quality of safety inspectors are insufficient in view of the nature of the task and the number and wide dispersion of small-scale mines. Even when inspections are made, focus is often more on verifying production to ensure royalty payments are correctly calculated and collected than on safety and health. Having different agencies responsible for safety and health, production permits, working and living conditions, and migrant workers inevitably means that responsibility and action can be pushed from one part of the bureaucracy to another.

Many small-scale coalmines in Hunan Province in China are badly designed, with outdated mining techniques and a lack of safety equipment.<sup>2</sup> About half do not comply with the basic mining safety standards and some illegal mines have a single shaft. Gas explosions, coal outbursts and gas blow-outs cause about 70 per cent of the many fatalities (between 232 and 411 each year in 1990-97). The overwhelming majority of mineworkers are peasants with at most a basic education. They normally receive no formal training and lack the knowledge and skills to prevent accidents occurring and to deal with them when they do occur. In 1998 this lack of knowledge and insufficient gas detection equipment in Hunan led to the death of five people trying to rescue others after a fire.

In some countries, however, notably in Latin America and parts of Africa, many small-scale miners have worked in the formal mining sector, turning to small-scale mining after losing their jobs. On the other hand, many owners and managers of small-scale mines who are not miners themselves are unfamiliar with safety regulations; some are reported as ignoring them in search of greater profit. Illegal miners often make inroads into the territory of adjacent larger mines, including for example in Hunan where the removal of supports and coal pillars has sometimes had disastrous results.

Self-employed miners in the smallest underground mines typically work in unsupported tunnels drilling and removing rock with hand tools and loading the ore into small sacks which are carried to the surface. Over-exertion, cave-ins, perpetual dampness and lack of ventilation are the major hazards. The close proximity of the shafts and tunnels to one another — sometimes only about 3 metres — increases the risk of subsidence or a cave-in.

Work in larger, more organized — but still small-scale — mines is similar. The exploitation of different galleries in an old large gold mine in Ecuador is carried out by wage earners having specific tasks. The highest ranked is the driller who prepares the shot holes. Access to galleries up to 50 metres high is by rope and the risk of falling is considerable. Pneumatic drills, occasionally with water sprays to dampen dust, are used. The lack of masks or gloves means that the effects of dust, noise, vibration and oil leaks are not mitigated. Heat, humidity and cramped conditions make work more difficult. The safety risks facing these workers are similar to those in surface mines who drill while suspended from ropes, but the health risks are greater because of the confined space. Many small-scale surface mines in Thailand, for example, do not have benches cut to facilitate the drilling and extraction of ore by limiting the height of the vertical face. The reasons are largely economic — many of the mines are exploiting reserves in a narrow, steep location that makes benching difficult and costly. It is far “easier” to have a number of workers, each suspended by a rope from the top of the cliff, drill the holes with pneumatic drills then place and link up the explosives. The drillers then climb back up the cliff face, the explosives are detonated and the ore falls to the foot of the cliff to be gathered by a front-end loader and transported by truck for processing. The workers who carry out this highly dangerous work are either employees of the mine or contractors. Whatever their employment status, they are almost all illegal migrant workers who are prepared to undertake this potentially dangerous work. This practice persists despite regular inspections by government officials. Elsewhere, following blasting in underground mines, ore is loaded into sacks which are carried to the surface

<sup>2</sup> This and other sections on Hunan Province, China, are drawn from Chang Da: *Strengthening management and ensuring safety in small-scale coalmines*, unpublished study commissioned by the ILO, 1998.

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on workers' backs or, where the terrain is flat, in hand carts. Dynamite charges are prepared and used in a casual manner whether or not their use is allowed.

Apart from humidity and heat, all underground workers are exposed to post-explosion nitrous gases and dust. Forced ventilation is almost non-existent. Moreover, the safe practice of not re-entering the mine workings until all the gases have dispersed is seldom respected. Indeed, it is not unknown for one group to detonate while another is still working elsewhere in the mine, due to a lack of coordination between competing groups. The resulting inhalation of noxious gases can lead to respiratory irritations and even pulmonary oedema or asphyxiation. The risk is aggravated by the lack of ventilation and the fact that masks are not used.

There is usually no collective or individual safety protection apart from that bought by the workers themselves. The majority of workers wear shorts, trainers and, sometimes, a shirt; helmets are occasionally worn; hardly anyone uses earplugs, mask or gloves; and there are no safety procedures for work in high or confined places. Liquid replacement is by drinking abundant quantities of water of dubious quality, without sugar or electrolytes. Few mines provide adequate latrines or showers; most provide only a tap where workers can partially clean themselves; some must make do with a stream. There are seldom separate areas for eating during the 30-60 minute midday break in an eight to ten hour shift. After working a shift of this nature, workers often complain of headaches, dizziness, bone or muscle pain and the discomfort of being wet almost the whole day. Many have skin lesions on their hands and feet.

If data on accidents in small-scale mines are deficient, they are for the most part completely absent as far as occupational health is concerned. Screening and disease prevention programmes are rare or non-existent.

The five major *health risks* in small-scale mining and processing that were highlighted in answers to the questionnaire are:

- exposure to dust (silicosis);
- exposure to mercury and other chemicals;
- effects of noise and vibration;
- effects of poor ventilation (heat, humidity, lack of oxygen);
- effects of over-exertion, inadequate work space and inappropriate equipment.

In addition, many respondents highlighted the importance of community health. Problems such as poor sanitation and lack of clean water, malaria, typhoid, dysentery, tuberculosis, sexually transmitted diseases (including AIDS), malnutrition and substance abuse are commonplace. They increase quickly, sometimes to epidemic proportions, when small-scale miners flood to a new region setting up makeshift dwellings and operations.

Small-scale mine shafts in Africa are commonly not lined, whereas in Latin America many have a wooden lining. Access to the narrow (less than 1.5 metres in diameter) tunnel where ore is extracted is by climbing down the shaft (up to 90 metres deep), using hand and footholds cut into the earth or rock wall, or attached to the wooden lining, or by hanging onto a rope using a manual or motor-driven winch. Bags of ore are hauled up. Artificial ventilation is sometimes provided, using electric fans or diesel-driven compressors. The working tunnels are also used to store sterile material to avoid having to haul too much material to the surface, making movement back and forth very difficult, particularly in an emergency. Larger mines with several working levels typically have fixed wooden ladders to move from one level to the next. They are often slippery and loose. If there is any electric light, it is usually close to the entry. Where electricity is not available, working light is provided by a torch attached to the miner's helmet or head by a rubber band or, in Latin America, by carbide lamps or, occasionally, by battery-operated mining lamps. In some small-scale mines (e.g. in the United Republic of Tanzania) naked lights are not allowed underground. Used torch batteries are a significant part of the debris found in and around mine entries.

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Few if any small mines have facilities for delivering medical care. Some have rudimentary first-aid kits, typically containing a few analgesics, plasters, bandages and sometimes anti-malaria drugs. Miners invariably depend on public health services, which are often far away. Illegal miners are in a difficult position since attending a public hospital could trigger an enquiry into the mining activity. Private doctors have been known to ask no questions. But many injuries and illnesses are not treated until they become life-threatening. The hospital at a large gold mine in Ghana, which is also used by the community outside the mine, has considerable evidence of widespread silicosis in men, women and children as young as 14 who are engaged in small-scale mining. These are the people who crush gold-bearing ore in their villages using a pestle and mortar, activities that are generally carried out fully or partially under cover. No dust masks are used and the amount of effort required means that the people are breathing deeply, inhaling respirable dust to the maximum on a regular basis.

Apart from workers in government-owned or controlled mines there is no regular health screening of small-scale miners, and attendance at hospitals and clinics generally only follows serious injury or illness. As small-scale mining becomes covered by specific legislation and regulations, and as donor agencies contribute more to small-scale mining development, training in occupational safety and health is slowly being introduced. The ILO has set up a safety training centre in China for small-scale coalmines and has trained and equipped mine rescue crews for small-scale mines in Pakistan. The World Bank and other agencies are now including safety and health in the scope of their development assistance projects. Some large mining companies are taking small-scale mines under their wing, giving safety and health advice and assistance and ensuring a rescue service if necessary (Chapter 6). Enlisting the services of existing schools of mines in universities could be an effective way to develop and deliver safety and health training for small-scale mineworkers.

The frequency of mining accidents is low compared with the health hazards and sickness in mining communities, which are commonly overcrowded, poorly ventilated makeshift huts with a lack of adequate sanitation facilities. Water for domestic use is the same as that for mineral processing. Where crushing and grinding are carried out within living quarters, large amounts of respirable dust are released into the compound. Ignorance of the risks and dangers of silicosis is widespread. Protective equipment, in both mineral extraction and beneficiation, is non-existent. Miners have cuts from rocks due to lack of safety boots and gloves; some work under hanging roofs of open stopes without any safety helmets. Pneumatic drills are commonly used without any water for dust suppression, and operators do not wear ear protection. Crushing and grinding are all dry processes and the risks are greater because much of the gold is contained in ore with a high silica content.

## **Health and safety in mineral processing**

The processing of mined ore entails a combination of some or all of the following steps: hand picking of high-grade ore (this often starts in the cramped, hazardous underground workplace with the separation of ore-bearing rock from the surrounding sterile rock and with large rocks being often broken up by hammers to reduce the amount to be transported to the surface in sacks); transport from mine to processing site; various size reduction steps (crushing, milling, grinding); separation by sieving; concentration of mineral (physical and/or chemical); separation of mineral from inert waste (physical and/or chemical); smelting to produce a mix of metals; refining to produce pure metal. Some of the processes are carried out more than once, sometimes by different groups of people who buy product or waste (tailings) at different stages of the process. The processing of non-metallic minerals from small-scale mines, such as coal, limestone and gemstones, is largely a dry, physical process that relies on classification by size and observation. The major stages are transport, size reduction, sorting and, depending on the final product, packing it into sacks before loading it onto trucks, or loading it in bulk, for final dispatch. Crushing and milling processes are notoriously hazardous because of the unprotected



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machinery, noise and vibration. Workers who participate in wet processes, such as sluicing and collecting concentrate, have their hands and feet permanently wet and a high degree of skin maceration and cuts are evident; waterproof boots or gloves are rarely used.

The main hazards in such processing operations are linked to the use of tools and machinery (such as crushing equipment, mechanical sieves and conveyor belts), as well as strains and sprains from over-exertion and slips and falls. Unguarded machinery and practices such as hand sorting while sitting adjacent to inclined, elevated, moving conveyor belts increase the likelihood of accidents. In plants where women and men fill sacks with powdered limestone, load them onto trolleys and transport them to waiting trucks, or carry the sacks on their backs, the dust is pervasive. Sometimes scarves or dust masks are worn, often not. In India it is common for women and sometimes teenage girls to carry on their head baskets of clay or stones that weigh 25-30 kg, sometimes up slippery inclines, and tip the contents into crushers, hoppers, or onto a stockpile. The repeated lifting and carrying of sacks or baskets of material are precursors to lower back problems, aggravated by poor posture during mining in confined spaces, panning and amalgamating.

Once heat, liquids and chemicals become part of mineral processing, hazards and the risk of accidents increase markedly, particularly burns (from chemicals or heat) and scalds (from hot liquids).

For example, small-scale gold processing plants in several countries operate 12-24 hours a day, all year round. Workers complain of irritability, sleeping disorders and loss of appetite; a few mention domestic problems. The plants' caretakers are particularly vulnerable. They clean and prepare the mills, transport the cyanide containers and empty the tailings pools. Occasionally they participate in amalgamating, burning, smelting and refining. Their homes are their place of work and they live in the midst of activities that never cease, sharing these conditions with their families.

The following gold production and processing activities observed in Latin America illustrate some of the occupational health and safety risks and hazards. Concentrated gold-bearing material is amalgamated with mercury. Workers, at times youths and children, grind a mixture of mercury and the mineral on a copper plate with a stone. The objective is to free the gold and silver from other minerals that prevent amalgamation. They continue until a ball of mercury and metals, including gold and silver, is obtained. There is little evidence of protective clothing being used to guard against the effects of mercury or chemicals. Only when it is essential, such as when handling molten metal, is protective clothing seen.

The extraction of gold from mill and amalgamation tailings involves the use of lime, sodium cyanide, nitric acid and heat. Large tanks are filled and emptied by hand. Rudimentary chemical analysis during the various stages means that, as with mercury, far greater amounts of chemicals are used than are necessary, affecting both workers (fumes and direct contact) and the environment (highly contaminated waste material). Also, it is often thought that "more is better". Excess chemicals and poor process control can also lead to side reactions that create toxic by-products, such as sulphuric and hydrocyanic acids.

Gold is recovered from the cyanide solution by precipitation in electrolytic cells, with the precipitate being heated to produce a grey calcined dust which, in turn, is heated to about 750°C, when everything melts. As the molten mixture cools, the impurities rise to the top and the precious metals, together with some lead, copper and zinc remain at the bottom of the crucible. This gold doré contains up to 50 per cent of gold. During these processes a minimum of precautions against the heat have to be taken but few efforts are made to extract smoke during smelting.

The final stage is the refining of the gold doré to separate the gold and silver from the other metals. This is achieved by using heat and nitric acid to dissolve all the metals but gold. Salt is added to the solute to precipitate the silver. Nitric acid is handled without gloves and the nitrous vapours that are emitted are extremely corrosive to human tissue. All the partners tend to

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participate in these final stages to protect their interests, and are thus all exposed to these hazards. The only protection used is a damp handkerchief placed over nose and mouth, or by keeping upwind. The gold and the silver precipitates are smelted separately by blowtorch to obtain nuggets containing 90 per cent gold and others containing 70 per cent silver. The other metals are discarded as waste.

## Mercury

Whether the effects of silica dust or mercury are more significant in small-scale mining is a moot point. Both affect miners' health. Mercury does so directly during processing and indirectly by its impact on the environment. Mercury has been used in the recovery of gold for over 2,000 years. Its use is widespread because it is effective, simple and cheap. At about \$20 per kg, mercury is less than 0.25 per cent the price of gold, so large amounts can be and are used in the belief that more gold will be recovered at little extra cost. But its use poses the greatest threat to the health of those who work with it and, to a lesser extent, to the health of those in the community. Alternative processes are seen as more costly, complicated and less effective. The individual aspect of much small-scale mining and the need for constant and regular cash flow, even of very small amounts, mean that it is difficult to promote techniques that have the benefit of economies of scale. In some small-scale mining operations, for example, transactions involving as little as 0.1 gm of gold (worth less than \$1) take place.

The toxicity of mercury depends on its chemical and physical form. Mercury vapour, which is released when mercury-gold amalgam is heated in an open cycle, is ingested through the lungs (up to 80 per cent of what is inhaled remains) where it becomes soluble as methyl mercury and is absorbed into the bloodstream causing:

- colic, vomiting and gastroenteritis;
- complaints of the kidneys and urinary tract;
- acute enteritis; and finally
- ulceration of the gums combined with extreme sensitivity to light.

If mercury vapour is inhaled over a long period, chronic mercury poisoning occurs. The mercury penetrates the brain and causes tremors, speech disturbances, lack of concentration and mood swings.

There is little chance of eliminating the use of mercury in gold production. Because mercury is not perceived as an environmental or health problem by most of those using it, it is difficult to convince small-scale miners to use less mercury or work differently. Also, there is widespread distrust of processes that conceal the amalgam from the operator at the crucial stage of separating the gold. Making its use illegal will most likely just increase its price and stifle attempts to introduce techniques to lessen its impact on people and the environment. Attention is therefore focusing on controlling the amount used and limiting losses (emission and rejection with waste) by the use of closed-circuit treatment processes and waste collection techniques. There are several programmes to eliminate or lessen mercury use, particularly in Latin America.<sup>3</sup> Experience has shown, however, that only solutions having a positive economic impact will have the remotest

<sup>3</sup> See, for example: UNIDO, Expert Group Meeting on UNIDO High Impact Programme: "Introducing New Technologies for the Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining", 1-3 July 1997, Final report; T. Hentschel et al.: *Manejo ambiental en la pequeña minería* (La Paz, MEDMIN/COSUDE, 1998); M.M. Veiga: *Introducing new technologies for abatement of global mercury pollution in Latin America* (Rio de Janeiro, UNIDO/UBC/CETEM/CNPq, 1997); *Boletín minero* (Loja, Ecuador, Fundación CENDA/PMSC), various issues.

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chance of success in the short term. In the longer term, education and community pressure will also contribute.<sup>4</sup>

Amalgamation is one of the most important processes in gold production from small-scale mining in developing countries. Gold in a concentrated ore sludge is mixed with mercury to form an amalgam which is heated to release the mercury as a vapour, leaving the gold. Metallic mercury is also lost when the amalgam is separated from the waste material, especially if excessive quantities of mercury are used. The successful introduction of cleaner technologies depends as much on socio-cultural aspects as on technical-economic factors. Gold produced by burning an amalgam in an open crucible is clean and shiny: when closed retorts are used the gold is often dark and unattractive looking, decreasing its value. Although the use of very small amounts of mercury at the end of the treatment process can restore the lustre, this is more work, therefore not popular. Moreover, many miners are reluctant to heat the amalgam in the sealed bowl of a retort since they cannot see what is going on. Some believe that there is scope for some of the gold to be retained in the system. A small glass retort is available, so everything can be observed, but it is extremely expensive and more delicate than a metal one. Also, the glass bowl is likely to become discoloured by heat in time and no longer be transparent. So, while technically efficient, if retorts are not widely accepted the mercury problem remains. Less efficient processes, such as ovens linked to devices that collect and condense mercury vapour while allowing the operator to see what is going on, have caught on in some areas. Even though they are less efficient, their widespread use has resulted in a greater overall reduction in mercury losses than was the case with the minimal use of a few retorts that capture and condense virtually all the mercury vapour.

In some cases those that live downstream of gold processing operations, including miners' families and the providers of drinking water, have become involved in mitigating the disposal of tailings containing mercury into water courses. However, sampling and screening to demonstrate that mercury levels in water and fish are high are costly, take time and may be at odds with the physical evidence in view of the time taken for mercury poisoning to become apparent.

The size of gold grains and the nature and size of the accompanying rock have a considerable effect on concentration and gold recovery. Generally, coarse gold is easier to recover than fine particles. Each gravity concentrating device has a range of grain size for which it is most effective. Thus it is important to classify gold by its grain size in order to select the most appropriate concentrator. Suboptimal recovery will occur if inappropriate equipment is used. When proposing portable or centralized treatment plants (an attractive project for donor agencies) these factors must be determined and taken into account at the planning stage. If not, the plant will fail, along with the credibility of its promoters.

Mercury is lost each time material is discarded. Losses are particularly high when grinding and amalgamation take place simultaneously, for example in edge mills or stamp mills, both of which are commonly used in small-scale gold mining. The high energy levels lead to the formation of "floured" mercury (small inert spheres) and its subsequent discharge. If amalgamation and grinding are undertaken in two stages the mercury losses are less.

The amalgam-mercury mixture is separated by pressing it through leather or a cloth (often the shirt of a miner) leaving a highly viscous amalgam comprising 50-60 per cent by weight of mercury and 40-50 per cent gold. Gold is obtained by heating the amalgam, wrapped in paper, in an open ceramic crucible by means of a blowtorch at temperatures of 350-600°C. The vaporized mercury that escapes directly into the atmosphere at this stage accounts for 50-60 per cent of the total mercury emissions.

By concentrating the ore to the maximum extent possible before amalgamation, less mercury is required to form an amalgam. Equipment that is suitable for wet mechanical gravity separation

<sup>4</sup> <<http://www.hruschka.com/hg-net/mercurio.html>> is an Internet-based network for the exchange of information on the use of mercury in small-scale gold mining.

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includes fluidized bed centrifuges, spiral concentrators, cone separators, and fine-grain washers such as jigs, tables and sluices. Final enrichment — discarding accompanying minerals by magnetic separation — leads to further improvement of the preconcentrates. Comparatively small amounts of concentrate can therefore then be amalgamated in equipment such as closed amalgamating barrels or mills. This equipment also allows the addition of reagents to improve the surface activity of mercury, reducing the amount of mercury needed. If process changes cannot be introduced heavy product traps to catch the floured mercury should be installed and properly maintained.

There are several alternatives to amalgamation for obtaining gold but few have been generally accepted. Careful demonstration and promotion will be required if they are to replace amalgamation in small-scale mining. The cyanide process in conjunction with gravimetric concentration such as in centrifuges and combinations of equipment that allow the efficient production of concentrated ores whose eventual conversion into marketable products takes place in a single stage, for example by the smelting of gold concentrates to gold and slag by the miners themselves, might find a market in some countries, provided it works and is affordable — a major uncertainty.

Swiss-funded projects in Bolivia and Ecuador have shown that it is possible to take an integrated approach to improving occupational health and the environment in gold mines that captures the self-interest of those involved — they do better by following a course of action that also reduces risks to health and the environment. The cost of an agreed suite of measures developed for and put in place by a group of processing plants was less than the fines levied for not complying with environmental standards. There is agreement that non-compliance with the new measures will result in heavy fines or closure, so there is a strong economic incentive to comply. Moreover, compliance has included more careful control of the chemical processes, which has led to significant savings in the amounts of sodium cyanide, mercury and nitric acid used.

In a region of Peru where about 9 tonnes of gold are produced each year from small-scale mines, mercury use was up to 18 tonnes, most of which was lost. An information and sensitization programme plus the free distribution of 750 retorts and mercury reactivators led to an increase in the use of retorts from 1.9 per cent of miners to 55 per cent. As a result, almost 10 tonnes of mercury are being captured, cleaned and reused instead of being lost and adversely affecting workers' health. Similarly, at a small-scale mining operation at San Simón in Bolivia, where 250 miners produce about 380 kg of gold a year, almost 14 tonnes of mercury was emitted to the atmosphere — 36 kg for each kilogramme of gold produced — with only 10 per cent being captured. Changes in equipment and operating conditions and procedures resulted in improved gold recovery (by about 10 per cent) and a reduction in mercury use by a factor of 40, 98 per cent of which was recovered. This combination meant that the cost of the new equipment was quickly amortized — a true win-win solution.<sup>5</sup>

## Community health

Problems of insufficient clean water and inadequate sanitation, and the sickness and diseases that follow, underpin much of what is unsatisfactory about small-scale mining, particularly in areas that have seen sudden influxes of people in search of a living through mining. Where small-scale miners live at the mine site, or where processing is carried out in nearby communities, health and sanitation conditions are generally poor. Most people use pit latrines or the open bush — with obvious health consequences. Malaria, cholera, tuberculosis bilharzia and enteric

<sup>5</sup> T. Hentschel et al.: *Estudio monográfico sobre la explotación minera pequeña: Ejemplo San Simón (Bolivia)*, study commissioned by the ILO to be included in a forthcoming Sectoral Activities Department Working Paper on small-scale gold mines.

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infections are common. Even long-term miners are unwilling or unable to afford the construction of hygienic sanitation facilities. Transient miners have little incentive to do so. Where water for domestic use is collected from open wells there are often serious health implications. Only boreholes and protected wells can be considered to provide safe water. The use of river water for domestic purposes is of particular concern since these rivers are also used for panning and bathing. Associated problems of lack of education facilities (generally associated with high levels of child labour), crime, prostitution and sexually transmitted diseases quickly follow.

Any successes from programmes to improve occupational health that do not address community issues will be short-lived. Unfortunately, years of neglect at the community level, even where small-scale mining is legal, mean that the problems are deep-rooted and will require changes in the approach and outlook of all concerned, as well as injections of cash and other resources. Nonetheless, improving community health is a straightforward task that, given determination and adequate resources, can be undertaken quickly and will produce immediate, tangible, benefits as the incidence of infectious diseases is reduced.

## **What can and should be done?**

Bringing small mines under the umbrella of regulations and providing technical and administrative support and training are increasingly the focus of government and donor agency activity. An increasing number of ministries with responsibility for mining have set up small-scale mining units to improve control and provide assistance. Despite their best intentions, however, many of them lack resources. Several World Bank programmes are, *inter alia*, aimed at strengthening these units (Chapter 7). It will remain important for them to focus on occupational health and safety issues, not merely on permits and tax collection.

For example, the incidence of silicosis can be significantly reduced by the use of effective and affordable techniques and methods of dust control. In small-scale mines the important areas are the isolation or enclosure of dusty operations (such as grinding), modification of work practices to reduce exposure, the use of personal protective equipment, ventilation, appropriate handling and hygiene practices such as the provision of washing facilities and clean places to eat in. Regular inspections can play an important role in ensuring that these conditions are met.

Why would a rational small-scale miner pay for a piece of equipment — such as a mercury retort — which produces no more gold but which requires more effort? Since mercury is relatively cheap (typically 0.25 per cent of the price of gold) the cost of even a cheap retort that collects mercury for reuse will take time to recoup. Moreover, since there is considerable unease among many miners about letting the amalgam out of sight in a closed container during the burning process, free retorts might not be widely used either. For these reasons, less efficient solutions, such as open ovens that collect and condense the mercury vapour, have been more widely accepted, resulting in some cases in a greater net saving in mercury emissions. Retorts have had some success, however, particularly when their introduction and use have been accompanied by education, training and demonstration.

If miners or a community can be shown that for an expenditure of \$50 the return will be \$100, there might be some interest in changing the way things are done. But if extra effort or expenditure does not quickly produce a tangible net gain, nothing will be done. Thus, at least at the start of an improvement programme, the cost of achieving intangible gains, such as fewer accidents through the use of protective equipment and improved health through not inhaling quite as much dust or mercury vapour, or less frequent bouts of malaria or diarrhea, will need to be wholly or partly met from outside the mine and its community.

In response to the high rate of accidents in small-scale mines in China, the Government is promoting “ten-word principles” — support, reform, rectification, cooperation, improvement (ten words in Chinese) — to ensure safe production. The Government assists the small mines with adequate coal resources that do not affect the safety of large mines nearby to meet the provisions

of the "Safety Regulations of Small-scale Coalmines". It also acts to close unsuitable and illegal mines. This has led to fewer mines and a reduction in accidents. In some areas of Hunan Province, for example, government inspectors oversee safety in small-scale coalmines. Where problems and hazards are discovered, a report containing suggestions for their rectification and reform, including a time limit for the implementation of the recommendations, is issued. Safety inspectors can order the withdrawal of workers from mines having serious hazards and can order mines to close. These measures, which are in accordance with the provisions of the ILO's Safety and Health in Mines Convention, 1995 (No. 176), have had positive results and inspections are being stepped up. Clear lines of responsibility are being established within the local bureaucracy, including the legal responsibility of mine managers to act in accordance with the regulations.

However, many initiatives to improve safety and health arise from accidents or disasters that triggered a knee-jerk response rather than as a result of a planned and funded programme. Box 2.1 contains the results of tripartite discussions on improvements to mine safety in the Mererani district of the United Republic of Tanzania one month after floods inundated many small tanzanite mines killing about 70 people. Unfortunately, once the initial furor has abated, things all too often go on much as they did before, particularly if funding is lacking or runs out. It is to be hoped that the tripartite nature of this programme will ensure that it is sustained. In Ecuador the written agreement mentioned above between processing plants, the Government and an NGO, which ensures that certain health, safety and environmental standards are funded, implemented and adhered to, has a good chance of being sustained over the long term.

**Box 2.1**  
**Health and safety rules in small-scale mines at Mererani**

The following health and safety rules/regulations are to be strictly observed by each member of the mining team involved in tanzanite production.

1. Following a mining disaster, all mine waste must be cleared in the area concerned and thrown into the identified pits, which must then be sealed and abandoned.
2. Walls/shaft collars of timber or concrete at least 1 metre high must be built around all openings of the Mererani mines.
3. All mines must have ladders to allow miners to go in and out of the mines.
4. The mining area must be kept tidy all the time; narrow tunnels should to be widened to allow free movement within the mines while working. It is not allowed to leave heaps of waste inside the mines.
5. Walls that appear weak need to be strengthened by use of pillars made of strong timber.
6. On all mine openings/entrances some kind of shade must be built to prevent rain from going inside the mines. Cottages must be built around the mining area for mine caretakers to use as shelter from rain or sun, as well as a resting place for the miners themselves instead of them resting dangerously in the mine pits.
7. During the actual mining exercise, two holes/mines may join together. If this happens while it is raining, all work must be stopped immediately.
8. For the mine owner to monitor who are in and out of the mines, he has to have an attendance register and at any specific time must be aware of the number of workers inside or outside the mines.
9. Mine owners must henceforth provide/install communication systems so miners at work can communicate more easily with those outside the mines (e.g. battery operated bells, hand telephones). The use of messengers to carry messages to and from the mines is strictly forbidden.
10. Mine owners must provide each miner/employee with proper protective tools for working (helmets, boots, gloves, etc.).
11. Tunnels that were built during the mining work prior to the accident must be strengthened and maintained.
12. Mine owners must provide toilets for their employees.
13. It is prohibited to use/employ children under the age of 16 in the mines.
14. Every mine owner must have a first-aid kit.

May 1998

Source: United Republic of Tanzania Mines and Construction Workers Union.

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The underlying theme of this report is that all issues affecting small-scale mines need to be considered together, or at least linked. Merely adding a single piece of equipment (such as a retort or centrifuge) will not bring about the desired improvements in health or safety. In proposing measures to improve them, the fact that the benefits will be tangible, quickly realized and exceed the cost must be guaranteed and demonstrated in the working environment. Relying on the results of examples from elsewhere is unlikely to prove convincing. The development of action programmes must involve the active partnership of all concerned in an atmosphere of confidence and trust. Campaigns of sensitization, information, education and awareness-raising by means of audiovisual aids, posters, informative pamphlets, seminars and workshops can help create this atmosphere. Due to the specific characteristics of each mining operation a general solution to technical problems is normally inappropriate. Also, when making technological changes, well-trained technicians, mechanics and engineers must be on hand for sufficient time to advise and provide training so that new processes become accepted. It is preferable to start by adapting existing simple technology before introducing new sophisticated equipment. Equipment produced locally at a low cost with reasonable efficiency is more likely to be used. Moreover, before new equipment is introduced its functioning and reliability must be assured. Equipment failure could easily wipe out the trust that has taken a long time to instil.

Unless small-scale miners themselves (permit holders, employers, workers) are involved in the development of, and are part owners of, any programme that concerns them, the chances of success are slim. Something they have paid, even partly, for is more likely to be used and cared for than something that is simply passed on. The different layers of ownership, control and employment in small-scale mining mean that careful targeting of approaches is necessary. What is ideal for a tightly knit Bolivian cooperative will not work in a situation where groups of workers in the same mine or concession share the proceeds of production with the mine owner after the cost of food and equipment are deducted, or where workers mine on their own account. It is no use focusing on the mine owner or permit holder and not the mineworkers who might be two or three steps removed through intermediaries and informal subcontracting arrangements. Government involvement can be helpful, but it will not guarantee success, especially if past performance (poor image, lack of control and/or application of the law, corruption, lack of acceptance on the part of the beneficiaries) has been poor. Fortunately, there are success stories and their dissemination and adaptation will be the most effective means of making improvements in safety and health.<sup>6</sup>

<sup>6</sup> This chapter has also drawn on the following: O. Betancourt: *Estrategias de intervención para la mejora de la condiciones de seguridad y salud en la pequeña minería del oro*, unpublished report for ILO/MDT, Lima, Feb. 1998; J. Hollaway: "Small-scale mining: How to combine development with low environmental impact", in *Industry and Environment* (Paris, UNEP), Oct.-Dec. 1997, pp. 44-48; Peru, Ministry of Energy and Mines: *Minería aurífera aluvial: Exposiciones técnicas* (Lima, 1997), and *Manuel del pequeño minero* (Lima, n.d.); M.M. Veiga and C. Beinhoff: "UNECA Centres; A way to reduce mercury emissions from artisanal gold mining and provide badly needed training", in *Industry and Environment*, op. cit., pp. 49-51.

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### 3. Women in small-scale mining

#### The extent of women's participation

Unlike their low level of participation in the large-scale mining sector, women play a significant role in small-scale mining. In fact the smaller the scale, the more pronounced is their involvement, and it has been steadily increasing in recent years. Statistics on small-scale mining rarely show the extent of women's involvement, either directly in mining and processing, or indirectly as purveyors of goods and services. Of the world's 11.5-13 million small-scale mineworkers, about 3.5-4 million could be women, many of them working part time. A further 1.5-2 million women could be involved indirectly. The few answers to the Office's questionnaire that provided data on women's employment showed that 5-50 per cent of the estimated small-scale mining workforce were women, ranging from 5 per cent in Malaysia to 30 per cent in India, 40 per cent in the United Republic of Tanzania and 50 per cent in Zimbabwe. Other estimates show that the proportion of women varies from about 10-30 per cent throughout Latin America to 60 per cent or more in several African countries. The proportion in Asia is lower, less than 10 per cent in many regions.

Although estimates of the extent of women's participation in small-scale mining are vague, they are consistent enough to show that women play a substantial and sometimes dominant role — a role that is different in different regions and in different aspects of small-scale mining. A few women are permit holders and entrepreneurs in a few countries; more are members of cooperatives or less formal groups in others; but the vast majority do unskilled, menial work, particularly in mineral processing, or provide goods and services to mines and mining communities. While some women receive equal pay when they do the same job as men (e.g. Bolivia, Thailand, Viet Nam), the fact that certain jobs are proscribed for, or others seem to be restricted to, women means they commonly earn less than men who work in small-scale mining. In some cases, however, women have demonstrated a certain advantage or found a niche that they can exploit — for example, in more "delicate" tasks such as panning — notably in Africa. Also, mainly in Africa, women have been able to breach the barriers of tradition to become the owners of mining titles. In some Bolivian cooperatives the trend is in another direction. Women who are members of a cooperative by virtue of their status as former employees of COMIBOL, can cede their share only to a male relative when they decide to retire or leave. While they are members, however, they receive the same benefits as other members.

The growth in women's involvement in small-scale mining has been brought about by several factors. The impact of structural adjustment programmes, low commodity prices or drought on public and private employment, trading, farming and inflation has led many people, especially women who relied on subsistence agriculture, to seek new, alternative or additional paid employment for a better quality of life or, more usually, just to survive. Also, an increasing number of women are heads of households in many countries, having to seek employment where they can. In rural areas in particular, small-scale mining is often the only means of earning cash without moving to the nearest city. Moreover, the closure or restructuring of former state-owned mines has made many experienced male mineworkers available to undertake small-scale mining; women, as family members or seeking opportunities on their own behalf, have joined them. Thus many women come to small-scale mining from necessity — either because they move to a site with their partners, or because of adverse conditions in their other activities.

When subsistence farming does not produce enough crops to barter or sell, the next rung up the economic ladder, because of the lack of opportunity for other wage employment, is often small-scale mining. It holds out a promise of cash earnings, with the additional prospect that — a bit like holding a lottery ticket — there could be a large windfall sometime in the future as long as one remains in the game. However, when commodity prices have risen from time to time, women's activity — at least that of women with partners — has tended to fall as they no longer



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need to work, confirming small-scale mining as an occupation of last resort as far as some women are concerned.

While some women are involved in “upper” aspects of small-scale mining — as entrepreneurs, owners, employers, hiring out equipment, or trading in gold or gemstones — they are in the minority and certain roles remain closed to them in some countries. Mostly, women are carriers, loaders, crushers, sievers, washers, panners and purveyors of goods and services at the mine and in the mining community.

Where women live close to mine sites their entry into small-scale mining has, not unexpectedly, been easier than when they live far away. The presence of children assisting their mothers, including schoolchildren working after school or instead of going to school, is largely because the mothers have no alternative to keeping them by their side. Leaving children unattended at home would, in many cases, be considered a worse action.

The participation of women as entrepreneurs rather than as labourers in small-scale mining can contribute to improving the status of women generally. Women entrepreneurs can serve as role models and can and do offer opportunities to other women. Women entrepreneurs have more options open to them, including the ability to earn extra cash to fund other longer term activities, as well as offering an alternative to subsistence farming. Most important of all, however, is the opportunity, for women who want to, to lead more independent lives than would normally be possible because of limits on their status and independence imposed by tradition.

In some countries (Zimbabwe is one example) financial gains from small-scale mining have been used by women to finance other ventures. Mostly, however, the reverse is true, with the proceeds of non-mining commercial activity being invested in mining, partly because credit is either not available or is easier to obtain by virtue of existing commercial activities other than mining.

There is a “Catch 22” situation that prevents women from improving their participation in small-scale mining. On the one hand, there is generally no special provision for women in small-scale mining programmes because there is no demand from them for technical or financial assistance; but, on the other, women do not apply for any assistance because none is available. Education and sensitization of women miners, government agencies and other groups (including male miners) is clearly necessary to break this circle. The large number of women engaged in small-scale mining activities in southern and eastern Africa, where their impact as mine owners is strongest, has triggered moves to form a regional association to protect their interests which will be affiliated to the national associations. This should pave the way for greater awareness and action throughout the region to improve women’s role in small-scale mining.<sup>1</sup>

## **Examples of women’s activity in small-scale mining**

### **Africa**

In Africa women play a key role in society, especially in rural areas where small-scale mining mainly takes place. They dominate food production, the provision of domestic energy and the trading of basic goods. Engaging in informal commercial activities is an opportunity for many women to branch out while still being able to undertake the domestic and family responsibilities that society has placed on them and is reluctant for them to relinquish.

<sup>1</sup> The SADC Women in Mining Trust was established at the end of 1997. National associations from eight countries (Angola, Botswana, Namibia, Mozambique, Swaziland, United Republic of Tanzania, Zambia and Zimbabwe) are affiliated members and are seeking to mobilize all women miners in SADC countries. The objectives of the Trust include: lobbying for support, recognition and advancement of women miners; identification of training and technical needs and conducting training; setting up a revolving loan fund and a collateral guarantee fund; facilitating marketing; and establishing a database and library on mining.

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Figure 1.1 shows that there are between 3 million and 3.7 million people engaged in small-scale mining in Africa. The Economic Commission for Africa has estimated that 45-50 per cent of total employment consists of women participating directly or indirectly in small-scale mining activities.<sup>2</sup> This could mean up to 1.8 million women engaged in small-scale mining in Africa, much of it in part-time, informal activities.

Where any productive activity takes place at the family level, women and children play a role. Gold rushes often mean that entire families decamp to the mining area and work together. Whether or not women work directly in mining or processing, they are inevitably involved in the supporting activities of supplying food, water, energy and child care — what is generally unpaid “reproductive” activity rather than paid “productive” activity.

The extent of women’s involvement varies from country to country, depending on the minerals being mined, the type of processing undertaken and certain socio-economic factors. In Guinea and Mali one-third of the gold mining workforce is made up of women; in Ghana it is about 15 per cent and in Gabon about 5 per cent. Women rarely, if ever, work underground and seldom participate directly in the mineral extraction phase in surface mines — except when it involves scratching the surface with hoes or rakes, or panning in streams. They are actively involved in processing — crushing, grinding, sieving, washing, and in carrying minerals from one place to another. In some centres these activities are dominated by women. Where grinding and sieving are undertaken in villages, even at home, the health risks are significant. In non-metal mines and quarries (clay, gravel, limestone, salt) women workers predominate. Women also dominate the service side of mining, supplying food, drink, tools and equipment; many provide sexual services. The established skills of African women as traders have facilitated their entry into the service side of small-scale mining, including trading in gold and sometimes gemstones. In Mali, for example, women gold traders are highly regarded as tough but fair negotiators. Sometimes women move to trading in gold when they are paid in gold for their wares. Where concession owners do not provide tools and equipment for mineworkers (and later recoup the cost), some women have found a niche in hiring out the necessary equipment (shovels, torches, picks, mortars) to mining teams that are just starting up.

Reasons for the participation of women in small-scale mining include: their established social role of maintaining a traditional family structure; a lack of alternative employment opportunities; the effects of drought on farming activities; opportunities for trading in mining communities; and the pursuit of greater economic independence.

Custom and tradition often determine to what extent women can become small-scale miners. In one region of Burkina Faso only women may mine, store and sell gold. Attempts to increase production by having men involved have been rebuffed by the indigenous people themselves.<sup>3</sup> Elsewhere, an apparent reluctance to make any additional effort to increase productivity can be seen. It is as if once a satisfactory threshold of income has been reached and key needs are being met, there is no point in doing any more.

The strong socio-cultural constraints associated with women’s domestic role mean that they are unable to devote much of their time to mining activities, except possibly when activities such as grinding and sieving are carried out in the home. In some communities women are considered to bring bad luck if they engage in mining; in others they are denied access to sites during their menstrual period. So the opportunities for increasing their earnings are limited. As women make the transition to mine owners, operators and leaseholders, they often encounter a reluctance among male employees to obey them — because of tradition and, possibly, because the men

<sup>2</sup> P.A. Traore: *Socio-economic aspects and gender issues related to artisanal gold mining in Africa*, paper prepared for the Expert Group Meeting on UNIDO High Impact Programme “Introducing New Technologies for the Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining”, Vienna, 1-3 Jul. 1997 (Addis Ababa, UNECA), p. 7.

<sup>3</sup> *ibid.*, p. 5.

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might possess, or believe they possess, superior knowledge and experience of mining. These hurdles can hamper the acquisition of credit and permits and be detrimental to production. They are found in countries such as Ghana, Guinea, Mali and Zimbabwe. There are, however, signs of some improvement in this regard as women increasingly make a success of their small-scale mining businesses.

Where women can be severely disadvantaged is in how and how much they are paid for their mining activity. When the work is carried out in a family context, women have little or no access to, or control over, financial matters. The head of the household normally obtains and disburses the income that is earned, whether as wages or, as is often the case, as a share of production. Thus many women do not see any fruits of their labour or, if they do, they have little idea what proportion they receive of the income they generated.

When tasks are distributed and paid accordingly, women workers tend to be more fairly treated. Those who wash gold-bearing ore down sluices often receive a certain quantity of ore for each day's work which they wash on their own account when they have finished their tasks. Their fortunes, therefore, are linked to those of the rest of the workforce.

Women play an important but largely unrecognized or unrewarded role in small-scale mining. Native culture often gives men the role of head of the family, with women being mothers and wives. This distinction leads to a division of labour that is based on gender. In addition to their role as mother, women are responsible for providing food, water and fuel and for housekeeping. Women's responsibilities also extend to caring for elderly relatives. All these tasks limit their ability to leave the confines of the home, let alone work on a regular basis. Women have, however, worked as traders in mining regions. Since some were prepared to be paid in gold, they branched out into gold trading and developed an increased interest in mining. Recently, more women have been working in gold and diamond mining areas, either with their husbands or in groups of women. Moves to mining areas have not been easy, particularly as far as family and community life are concerned, when the effects of isolation and separation can be severe.

In some countries the work of women in crushing and grinding ore and washing it to retrieve gold has largely been supplanted by children. Knowing that there is more benefit in being directly involved in gold production rather than in ancillary service activities, women are increasingly seeking payment in ore for their work. Selling the gold they retrieve provides instant cash, whereas the sale of goods and services often involves accepting credit.

In Ghana the rate of women's participation in small-scale mining is about 6 per cent as licensed buyers, below 10 per cent as concession holders, and 15-20 per cent as sponsors of work groups, members of cooperatives or mining groups. Their involvement in other forms of small-scale mining (clay, stone quarries) where they sieve, wash and carry, and in illegal *galamsey* mining is much greater, up to 50 per cent. In salt production 75 per cent of the workforce is made up of women. Compared with other activities, such as trading, women often consider mining to be too risky, with an uncertain rate of return to invest their savings or loans in it. The need for women to use male agents to act on their behalf as a means of overcoming discrimination has caused problems, as has the use of unsuitable relatives or friends for such tasks. Women's level of functional illiteracy (about 77 per cent) is higher than that of men (58 per cent), putting them at a further disadvantage vis-à-vis men.<sup>4</sup>

Since 1989 when small-scale mining in the United Republic of Tanzania was included in legislation, over 500 mining licences have been granted to individual women, cooperatives, groups or companies headed by women. Also, the Precious Minerals Marketing Commission, which buys gold and diamonds at close to the world price, provides income-generating opportunities for several thousand licensed buyers, over 500 of whom are women. Unlicensed

<sup>4</sup> Esther O. Ofei-Aboagye: *Women's participation in artisanal mining in Ghana*, paper prepared for the World Bank International Round Table on Artisanal Mining, Washington, DC, May 1995.

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women buy undeclared gold production — the proceeds of treating stolen ore or rewashing legal production — thereby avoiding the need to prospect or mine illegally or to undertake hard physical work (washing, crushing, sieving, panning). But there is always a risk of their being cheated or robbed.

A study in Zimbabwe undertaken on behalf of the United Nations Development Fund for Women (UNIFEM) found that, despite the Government's positive attitude towards women's involvement in economic activities there is no policy that specifically addresses the situation of women in mining.<sup>5</sup> There has been no attempt to collect gender-specific data, and there is no means to assess whether women in the sector benefit from government programmes aimed at supporting small-scale miners to the same extent as men.

The majority of women miners in Zimbabwe are involved in gold mining and, to a limited extent, in mining precious and semi-precious stones. There is limited interest in base minerals because of a lack of information about them and their markets. Although problems related to financing and marketing are less with gold than with most other minerals, women still face difficulties in gaining access to sufficient credit to run efficient mines, and in getting technical training and assistance.

The UNIFEM study found that only 6 per cent of women miners had been able to obtain a loan to invest in their mining operations, largely due to a lack of collateral and the negative attitudes of bankers towards women in business. Institutions that offer alternative sources of finance to small businesses have been unwilling to assist small-scale miners. This situation is also reflected in the support given by government to indigenous businesses, only about 1 per cent of which goes to the mining sector — none of it to women. As a result, women miners rely heavily on personal savings and family contributions for funds, and their mines tend to be undercapitalized. Of the 50 women miners surveyed, 80 per cent had invested less than Z\$100,000 in their mining operations, whereas up to Z\$500,000 are needed for a fully equipped and efficiently run mine.

Women mine owners do not have a professional mining background, although some have been associated with mining through family connections. Even though several of them have extensive experience in running businesses of other types, their lack of mining skills and knowledge often makes it difficult for them to run an efficient mining operation. Training courses and the provision of technical advice and assistance geared specifically to women's needs and circumstances have not been available in Zimbabwe, and women have faced difficulties in participating to the same extent as men in the few schemes that help small miners. Women, for example, have been able to make little use of the custom milling and other services offered by a central processing plant because of difficulties they have experienced in arranging the transportation of their ore from their mine to the plant — they are less able than men to take it by hand and their family responsibilities can also be a constraint.

In one area of Zimbabwe 25 per cent of the gold panning groups — each of about four people, two to three of whom were panners — were headed by a woman. The mean age of men was 27 and of women 22 (30 per cent of the females were under 16). Most of the workers were transients, even those who had been there for two or three years. Single men tended to move on whenever another opportunity arose.<sup>6</sup> The fact that the rivers are too full to work in during the rainy season means that there is no seasonal overlap between farming and panning. Nonetheless,

<sup>5</sup> M. Carr, D. Laurence and R. Svatwa: *Environmental protection and its employment effects on miners in small and artisanal mines in Zimbabwe*, Sectoral Activities Programme Working Paper SAP2.65/WP.119 (Geneva, ILO, 1998), pp. 6-7.

<sup>6</sup> G.R. Milne and D.A. Marongwe (eds.): *Economic costs and benefits of small-scale alluvial gold panning in Zimbabwe*, draft results of a pilot study in Mashonaland Central Province for 1993 (Harare, Ministry of Environment and Tourism, Oct. 1994), mimeo., pp. 13-31.

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only 26 per cent of the panners had a field to cultivate, so most of them worked at panning for ten months or more a year.

The dubious economics of gold panning under these circumstances are highlighted by the fact that the panning units produced an average of 2.5 gm of gold a week (about 1 gm/panner) which was sold initially for 50-60 per cent of the world price. The large number of panners makes a buyer's market for gold, with 80 per cent of the buyers being claim holders. Panners accept these low prices as they are not willing to travel to the nearest official buying bank with such small quantities of gold. Moreover, having a constant need for regular cash payments, they are not in a position to consolidate their production into larger amounts. Also, official sales are paid for by cheque, and most panners, particularly women, have no bank account; government prices have overtones of government control; and most panners are unlicensed. Buyers who sell consolidated amounts of gold stand to make up to 100 per cent profit.

## Latin America

In Latin America about 20 per cent of the small-scale mining workforce consist of women (over 300,000). A further 1-2 per cent are estimated to have a leadership role.<sup>7</sup> There are plenty of examples of women and children scavenging for gold, gemstones and tin ore, and others where women and men work side by side in cooperatives for equal pay, or for an equal share in the proceeds of production. Women often carry out the primary concentration of ore by breaking up large stones with hammers. They seldom, however, undertake the next stage — grinding the ore — since the tools used, *quimbaletes*, are too heavy and cumbersome. But they are very much involved, as frequently are children, in sieving, washing and concentrating the ground ore, including using mercury to amalgamate and separate the gold. Women mineworkers, particularly scavengers and guards, are frequently criticized for neglecting their children, leaving them while they work, but there is often no alternative; work is essential for survival. The double burden of family work and production is a hard test for family unity. Sickness, from working constantly while standing in water and at high altitudes is common in several countries in the region. Respiratory problems that are caused by the weather are aggravated by dust. Diarrhoea and malnutrition are common, particularly among children.

In Bolivia there are two major branches of small-scale mining: tin and other metals that were formerly mined by large mining companies; and gold, which only now is becoming the focus of the formal sector. Recently, small-scale miners have been drawn to gold mining as prices of other metals have fallen. Women work in both. Their activity ranges from being full members of a cooperative, to representatives (working instead of members for an agreed wage), to “volunteers” who do the same work but are paid 20-30 per cent of what they produce in a shift, to traders, to *baranquilleros* who are at the bottom of the hierarchy and undertake precarious, unorganized, clandestine work at the sites, to *palliris* (scavengers). Mining cooperatives, of which there are over 100 in Bolivia with over 60,000 members (about 7,500 of whom are women), provide the basis for association for women miners, but far more women work informally. For example, over 8,000 women work in gold mines north of La Paz, where the working conditions, as for most women miners in Bolivia, are arduous, involving long hours at high altitude, often working in polluted water with no protection for low pay, no social protection and no possibility of improvement. The *palliris* collect and sort mine waste or tailings from processing plants, which they sell to intermediaries, take to processing plants, or wash themselves to extract small amounts of metal (mainly tin). Leftovers from dredging operations are also collected and washed. Some women work in alluvial pits up to 20 metres deep extracting metal-bearing sand with picks and

<sup>7</sup> M.M. Veiga: *Mercury in artisanal gold mining in Latin America: Facts, fantasies and solutions*, paper prepared for the Expert Group Meeting on UNIDO High Impact Programme “Introducing New Technologies for Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining”, Vienna, 1-3 Jul. 1997, p. 6.

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shovels.<sup>8</sup> The arduous nature of all gold mining, especially that of *baranquilleros*, means that few women miners are over 40 years of age.

Many *palliris* are the widows of former miners. Women who are employed to guard mine workings (mainly widows too) also work as *palliris* to supplement their wages. In view of the low grade of the material they collect, *palliris* often also grind and concentrate minerals produced by cooperatives that have taken over old mine workings (although working independently, they are sometimes also associated with the cooperative where they work). *Palliris* earn as little as 25 per cent of the statutory minimum wage and mine guards 50-66 per cent. Wives of miners sometimes work as *palliris*, but for no pay. Rather, they enhance the earning capacity of their husbands.

Another group of women (*rescatiri*) sometimes work as intermediaries between the *palliris* and the wholesalers who consolidate the small amounts collected by scavenging for resale to processing plants. Some have their own capital, others are financed by the wholesalers they deal with. Although of dubious legality, because the women are not licensed, this work is common in cooperatives, freeing both men and women workers from the need to negotiate with mineral buyers.

## Asia

Women in Asia often work at sorting, packing and loading bagged minerals onto trucks. In Thailand, for example, they are paid the same as men doing the same work, generally the statutory minimum wage plus an unspecified bonus once a year. In some of these small mines women comprise 25-40 per cent of the workforce (including one or two office workers), which ranges from 25 to 75 in most quarrying and surface mining operations. At least half of them live at the mine site with their families in crude but free accommodation; their husbands generally work at the mine too.

In India, where women transport minerals in baskets on their head, from the point of mining to trucks, stockpiles or treatment plant, they are generally paid the minimum wage. If not, they are paid piece rates and can earn slightly over the minimum wage. Few men, however, are paid as little as the minimum wage; they do more skilled work, or carry heavier loads further. Women scavengers in India commonly pay permit holders to scavenge on the floor of stone quarries, picking up debris from mining and rocks that have fallen from trucks.

In the Birbhum region of West Bengal, for example, a thriving small-scale stone mining sector has been established with government assistance. Of the 5,500 workers engaged in mining, crushing and sorting the stones, about 1,700 are tribal women, often working with their husbands. Children are looked after by older family members or work breaking rocks with small hammers before their mothers carry the rocks to mechanized crushers. Women workers, who are paid piece rates for the baskets of stones they transport, are regarded as being more responsible than their male counterparts and less prone to take time off work. If they are able to retain their earnings — and this is not always the case — their contribution to the family budget goes a long way towards keeping the family together, thereby acting as a stabilizing force in a poor tribal community. The State Mineral Development Corporation played a major role by opening its own mine so that it could exert control over the project and provide rapidly the necessary infrastructure. It also undertook to buy and market the production from the small private mines that started up. Control of development, particularly in the early stages, was ensured by the local entrepreneurs being awarded yearly renewable licences rather than mining leases which could have been sold to outsiders. The mines support about 40,000 tribal people in the vicinity. Some of the entrepreneurs have set up stone-based industries (e.g. for making concrete electricity poles) to add value to their products and these have created more local employment.

<sup>8</sup> Centro de Promoción Minería: *The participation of women in small-scale mining in Bolivia*, paper prepared for the World Bank International Round Table on Artisanal Mining, Washington, DC, May 1995.

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## Constraints on women's participation

Small-scale mining can offer opportunities for men and women, provided the right conditions exist. But despite efforts to improve small-scale mining, gender issues remain, so women face additional constraints to increasing the level and scope of their participation. Regardless of the region or the type of mining there are common problems that beset women who work or want to work in small-scale mining other than at the most menial level. These include: lack of access to credit and finance; less technical know-how than their male counterparts; lack of representation and support; lack of management and administrative skills, compounded by widespread illiteracy; socio-economic perceptions about their status; and cultural traditions that impose a heavy family burden and limit their independence and mobility.

Legal, administrative and financial constraints prevent women's participation in small-scale mining or limit it to basic wage-earning, often in informal, illegal mining. These constraints centre on the granting of mining licences and gaining access to credit. In addition, cultural barriers can affect women's participation even when the others have been overcome.

Women who are not considered to be the head or joint head of a family and have no property or income in their name find it very difficult to get credit. Even when they can, the permission of the male head of household is generally necessary. Although prospecting and registration certificates may be issued to both men and women (for example, in Zimbabwe) without any reference to the individual's sex, in practice many women face obstacles to owning and operating small mines. Married women in particular face opposition from their husbands and families to running a business which takes them to remote areas for long periods of time, thus making it difficult to combine work with family and other household responsibilities. In addition, mines operated by married women are often registered in the names of their husbands, even though it is the wife who does the work. In the event of death or divorce, this makes such women very vulnerable. A survey of small-scale mines in Zimbabwe found that 24 per cent of the population sampled were single women, while the husbands of less than half of the married women were involved in the mining business, even though their names appeared on official documents.<sup>9</sup>

Without credit, women are generally trapped at a subsistence level of mining, extracting what is easiest, possibly to the long-term detriment of the available mineral reserves, and confining themselves to a precarious existence. Most married women hand over the gold they have panned to their husbands. They benefit from their work only to the extent that their husband provides for the family. Single women, however, are more able to be independent, panning and selling gold as they see fit. In many areas, women who are paid directly are considered to be far more responsible in managing their money than are male workers, who are prone to squandering much of their earnings.

Complex and lengthy administrative procedures, a lack of technical knowledge and, in many cases, the lack of a basic education militate against women's access to finance. Moreover, financial institutions that are not used to granting loans to women err on the side of caution, even more so where mining is concerned, even though there are well-documented cases of success among women entrepreneurs who have received and repaid speculative loans and created successful businesses. Notwithstanding increased involvement by development agencies, credit guarantees and venture capital agencies that focus on small business, women's access to mining finance is still neither straightforward nor certain. Unfortunately, possibly because of their rural location, they are often not aware of the existence of such agencies. The situation is made more difficult by the fact that, in many developing countries, the administrative machinery does not change quickly enough to meet the new demands being placed on it as economies become freer and the external and internal efforts to bolster the small-scale business sector bear fruit creating

<sup>9</sup> Carr et al., *op. cit.*, p. 6.

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new entrepreneurs. Being unable to afford any form of fee-for-service advice or assistance, potential small-scale miners have no alternative but to wait for overstretched ministries to help them with their claims and proposals. Where corruption exists, the poorest are even further disadvantaged.

Because mining is often seen as “men’s work” it has influenced women’s attitudes to it and the attitude towards women of other groups, including male miners, government agencies, banks and NGOs. Women’s perceived inability to cope with much of the physical side of mining, superstition, implicitly extending bans on women working underground to other activities that are not proscribed, the fear that women’s presence might lead to “indiscipline”, and the general unsavoury atmosphere of much small-scale mining all affect their participation. Family responsibilities also restrict the time many women can devote to mining activity, reducing their productivity and earning capacity.

Women employers need to establish their authority over male workers while maintaining good relations and ensuring that they are not cheated. Since assertiveness in women is frowned on in many societies, it is a big hurdle to overcome. Employing a male manager or agent has been used as a means to avoid discrimination, but it can cause its own problems. Other problems can arise when unsuitable friends or relatives are engaged as a means of guarding against these risks. Women’s strong tradition as sole traders, in several African countries for example, can mean that delegation becomes a problem in self-help or cooperative working groups. As such groups tend to be formed for short-term, specific tasks, it is difficult for lasting partnerships to be developed.

Despite a long tradition of entrepreneurship, particularly among many African women, there is often a reluctance to take risks in ventures such as small-scale mining where the returns cannot be controlled or predicted, particularly in view of restrictions on prospecting, short-lived leases and a lack of geological knowledge. Moreover, as soon as productivity starts to wane workers tend to move on, leaving women concession holders with the problems of engaging more workers, paying for their equipment or abandoning the site.

The anarchic nature of much small-scale mining and the poor working and living conditions at mine sites are sometimes sufficient in themselves to prevent women from engaging in it. Also, when it comes to moving to a small-scale mining site, it might mean a choice between leaving familiar surroundings with some infrastructure, some agricultural activity and a stable domestic situation for a place with no guarantee of work, of income or even of a return home when mining ceases.

Widespread illiteracy among women in developing countries is disadvantageous in many aspects of their work as miners, particularly in dealing with bureaucratic requirements. Some small-scale mining associations have started scratching the surface of these and other problems by holding workshops and seminars dealing with practical, financial and administrative barriers for women miners in several southern African countries, but with limited success. Perhaps the newly emerging women’s mining associations will enable progress to be made. External assistance will undoubtedly accelerate the process.

## **Overcoming constraints**

In view of the large number of women involved in small-scale mining and the problems they encounter over and above those faced by men working in the sector, it is important to identify and focus on removing gender-based constraints if their participation is to be on the same basis as men. It is necessary here to highlight the difference between gender — social differences between men and women that are learnt, changeable over time and vary within and between cultures — and sex — biologically determined differences that are universal. A greater awareness of the current and potential contribution women can make is necessary. This can only be achieved by having more and better information and data, which should be collected with the participation



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of all concerned. Good information will be the foundation for developing courses of action to benefit women miners. Action will need to include programmes — devised with the participation of miners, government agencies, NGOs and lending institutions — on: managerial training; obtaining financial assistance; establishing credit; increasing women's empowerment; and providing infrastructure for improving women's and children's health. The involvement of women at all stages will be essential if their skills and self-confidence are to be expanded. Women should be encouraged and assisted by governmental small-scale mining units, and where possible by mining trade unions, to organize themselves into appropriate supportive groups. The impact of programmes to assist women in small-scale mining should be monitored and the results reported and analysed and the programme adjusted accordingly. Setting up cooperatives is not necessarily an easy answer; people who are used to working individually can have problems adapting to the discipline of a cooperative. Solutions must be carefully thought out.

On the basis of the analysis of the information collected and subsequent discussions with those concerned, NGOs, public bodies and the private sector should quickly determine what their role should be and play it. Key areas for assistance include: helping to organize support groups; providing training in safe and environmentally sound mining techniques, in administration and in management; delivering technical services and support; educating women at different levels so that they have the chance to be upwardly mobile in small-scale mining; sensitizing women and the community to small-scale mining; improving women's domestic situation, for example by improving food processing and preparation activities; and delivering services such as health care, education, child care and first-aid, which will ease women's entry into small-scale mining and enable them to increase their participation. Development assistance projects should include elements that ensure women have the opportunity to improve their technical and commercial knowledge and expertise in all aspects of small-scale mining. If necessary, special programmes should be developed initially with the aim of ensuring that women are quickly and fully included in small-scale mining programmes. Unfortunately, most programmes to date have assumed that either women are not interested in small-scale mining or, if they are, they have equal opportunities — which clearly they do not.

In view of women's key family role, improving occupational health, community health and education facilities will have a powerful, direct and immediate impact on them, freeing them to branch out into new activities. Safety and health at mines must be encouraged too, and enforced. Old pits should be closed and isolated and stagnant water removed. Children's shelters should be provided. There should be active collaboration between small-scale mining authorities and district health officials, especially with respect to reducing the incidence of sexually transmitted and other infectious diseases. The age groups most affected by HIV include those most involved in small-scale mining.

The various schemes that provide credit to micro-enterprises could be adapted and extended to include small-scale mining activities, taking into account the inherent uncertainties of lending for mining. The success of these schemes in assisting women to set up and run small commercial operations is well documented, and the women concerned have an impressive record of paying back their loans. The possibility of setting up small-scale loan agencies based on successful schemes in other sectors, and providing assistance in selecting and evaluating mining leases should be evaluated. Resources to underwrite such activities could, for example, be earmarked from the proceeds of official buying agencies, eventually becoming micro "revolving funds" as production and official sales are stimulated, generating increased revenues.

Women gold panners and mineral processing workers, who are often the most disadvantaged in the small-scale mining sector, should be assisted on a priority basis through the provision of more and better health care, education and help in acquiring the right to land ownership to improve their economic standing. In the longer term the establishment of the conditions necessary for sustainable local, regional and national development will work towards the reduction of poverty.

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There are likely to be lessons learnt from successful projects in other sectors that have enabled groups of women to succeed in areas where they were previously disadvantaged. The ILO, for example, has had several successful projects in primary sectors that were targeted at women, including one to assist women fuelwood carriers in Ethiopia and another to help women in the plantations sector in the United Republic of Tanzania. The ILO is also heavily involved in assisting in the establishment and running of cooperatives and small businesses and, more recently, in aspects of micro-finance and in promoting more and better jobs for women.<sup>10</sup>

Awareness-raising, training, confidence and image building and the setting up of support groups are all elements in the process of providing the means for women to break through the barriers that confine most of them to a menial role in small-scale mining. When these are combined with the removal of legal and financial obstacles and socio-cultural taboos, women will be in a much better position to take advantage of the opportunities that small-scale mining can provide, leading to their greater economic fulfilment.<sup>11</sup>

<sup>10</sup> More information on these programmes and on relevant publications can be found on the ILO's website <<http://www.ilo.org>> .

<sup>11</sup> This chapter has also drawn on the following: Mamadou Barry (ed.): *Regularizing informal mining: A summary of the proceedings of the International Round Table on Artisanal Mining*, Washington, DC, May 1995, IEN Occasional Paper No. 6, Apr. 1996 (World Bank); Béatrice Labonne: "Artisanal mining: An economic stepping stone for women", in *Natural Resources Forum* (London, Elsevier, 1996), Vol. 20, No. 2, pp. 117-122; United Nations: *Developments in small-scale mining*, Committee on Natural Resources, Third Session, 6-17 May 1996 (New York, doc. E/C.7/1996/9).

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## 4. Child labour in small-scale mines

Boys and girls work in small-scale mining in many developing countries. Even when the mining is legal, their work is not. Children working in small-scale mining are not only exposed to immediate risk but they are also jeopardizing their long-term development — both physical and socio-economic. The means to eliminate child labour in mining, especially extreme forms, without delay are being developed and implemented by a number of agencies and organizations, notably the ILO through its International Programme on the Elimination of Child Labour (IPEC).

In the 81 replies to the Office's questionnaire on small-scale mining, child labour was only cited four times out of 241 (2 per cent) as one of the three most important issues for the sector (figure 1.2). That is not to say that hundreds of thousands of children do not work in small-scale mines, some of them in intolerable conditions. The few countries that provided data on child labour acknowledged 10,000-250,000 children working full time or part time in small-scale mines. This low priority given to child labour as an issue is more indicative of the respondents' perception of the need to address the other major problems cited than of not considering child labour per se as important. Fixing up access to credit, improving productivity, providing training, focusing on safety and health will lead to improvements in small-scale mining that, in turn, will have a positive impact on child labour. Only when small-scale mining is on a sound and sustainable economic footing will the issue of child labour become more important in the eyes of those concerned. This does not mean that child labour should be ignored until other issues are dealt with. Quite the reverse. Every effort should be made to eliminate it. But it is part of a wider problem that must also be tackled. If child labour in small-scale mining is approached in isolation, its long-term elimination is unlikely.

Working conditions and health and safety risks affecting children in small-scale mining differ widely according to whether work is underground or on the surface, the type of mineral being mined, and the type of processing that is carried out and children's involvement in it. Clearly those at greatest risk should be the primary focus of programmes to stop their participation and prevent it recurring.

The hazards faced by children are the same as for adult miners (inundation, cave-in, asphyxiation, overexertion, malnutrition, TB, malaria, diarrhoea, trips and falls, lack of hygiene, dust, noise, vibration, mercury and other chemicals) but the risks to immature bodies are much more severe.

At well-established mining sites with experienced adult miners the risks are likely to be lower than in a gold rush situation where thousands of people arrive and work in a haphazard way with no knowledge of or regard for basic safety precautions. Small children need smaller tunnels than adults, so quicker progress is possible when following a vein of ore in competition with others nearby.

Children as young as 6 or 7 can be seen in many countries breaking rocks with hammers, washing ore, sieving it and transporting it. Children as young as 9 have been observed working underground, setting explosives and fetching and carrying for adult workers. At age 12 or so their presence underground is more widespread in a number of countries and they start to do work that is the same as adults — filling sacks with ore, transporting them on their backs or loading them into carts. Few children go to school, even if schooling is available. Since many mining sites are seen as temporary, there is little incentive for the local authorities to provide schooling. Where children do go to school, they often work after school, at the weekends and in the holidays. This is not confined to mining of course. If they were not mining they would be working in the fields. Some children work to augment the family income — of their own volition or urged to do so by their parents; others are orphans or have left home and are working to survive. The problem is that many children do not get paid, so they are just working for enough food to live. Any cash generally comes from hand-outs following a discovery, or from the proceeds of scavenging.

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More rigorous mine inspections are easier to carry out than stopping child labour. The benefits to small-scale miners of mine sites adhering to basic occupational health and safety regulations and work practices would flow to children too, even allowing for the fact that their labour is illegal.

Considerable care is needed if programmes for removing children from hazardous work are to succeed. The local situation must be carefully studied and the children concerned, and their parents if they have any, consulted. Experience has shown that child labour is not an issue that can be tackled in isolation. Merely removing children from the workplace without providing the means for them to go to school and ensuring a compensatory contribution to the family income will eventually result in them drifting back to the work they left or, perhaps, to worse occupations. The objectives of the programmes that are being undertaken under the umbrella of IPEC are to:

- prevent children being put to work in small-scale mines;
- withdraw children from dangerous activities;
- improve children's working conditions as a first stage towards eliminating child labour;
- gain a better idea of the living and working conditions of children involved in small-scale mining;
- make children, parents, employers, private and public institutions and the public more aware of the dangers of putting children to work in small-scale mines;
- provide working children and their families with viable alternatives.

## **Children in small-scale mining in different countries**

The following examples from different developing countries are a representative cross-section of child labour in small-scale mining: how it is organized; what the children do; and the risks and hazards that affect them.

### **Guinea<sup>1</sup>**

Boys of 14 to 16 years of age work in diamond mines in Guinea. They approach the mine owner seeking work, often at the behest of their poverty-stricken parents. If he thinks they are suitable they are engaged in a temporary capacity, working at whatever tasks they are given, with no account being taken of their age, and under threat of instant dismissal if they are not up to expectations. They therefore tend to work extremely hard in order to satisfy their boss, and to have the possibility of earning more. Common tasks are digging gravel in trenches, using buckets to remove water from the workplace and helping to deviate streams and rivers using sandbags. Working in such physically extreme conditions is bad for the development of young bodies, but here they are encouraged to work harder by being told that young people are more likely to find diamonds, which is the only way they will receive any payment. Even then they do not receive an equal share because of their young age. They complain of rheumatism, malaria, injuries, and insect and snake bites. If they get sick, they are likely to be dismissed in order not to cost their employer money for medical treatment. They are, however, well fed, as this is a means of ensuring that they can continue to work at maximum effort. New young workers are at the beck and call of older workers. Work is sometimes undertaken at night if it is too hot during the day. When diamonds are found, the proprietor takes 50 per cent of the proceeds and the rest (minus the cost of food) is divided among the workers. There is great scope for fraud in the valuation of the diamonds found, which are judged solely on weight with no account taken of quality.

<sup>1</sup> Drawn from T.C. Kpoghomou: *La main d'oeuvre infantile dans les mines de Friguiabe-Gare: Un exemple de "l'exploitation du travail des enfants" en Guinée*, mimeo. (unpublished, 1996).

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## Madagascar

An IPEC survey of 307 child workers (12 per cent of the total) in small-scale mines and quarries in Madagascar,<sup>2</sup> 202 of whom were boys, showed the following profile of child mineworkers in this country. Fifty-three per cent were aged 12 or under (11 per cent aged 7-9); one-third were at school and three-quarters lived at home with both parents. Half had three to five siblings and one-quarter had six to nine. Half of the families were in a precarious economic situation with difficult living conditions. Travelling time between home and school or work was up to one hour for 80 per cent of the sample.

Half of them considered their work to be hard, monotonous and carried out under strict time constraints. Three-quarters said there were serious safety or health risks associated with their work. Sixty per cent carried loads of 5-10 kg, with 44 per cent making frequent trips and a quarter mentioning the danger of accidents. One-quarter carried loads exceeding 10 kg. Two-thirds worked in tiring or very tiring positions, with one-quarter working in a dusty atmosphere or in confined spaces. As the work is carried out above ground, few were troubled by noise, vibration, ventilation or the risk of fire.

There was virtually no personal protection, sanitation, preventive medicine or social protection. Twenty per cent received no first aid and 70 per cent had no or insufficient housing.

Working time was six to ten hours a day for 60 per cent of those surveyed, and 10 per cent worked more than ten hours a day. Three-quarters received less than the statutory minimum wage, 10 per cent earned more and 10 per cent were paid in kind. As far as the work environment was concerned, two-thirds said they were in a stable situation with permanent employment. Eighty per cent worked with their families, 12 per cent independently and 8 per cent received a wage. One-third had the opportunity to learn a few skills, the rest had none.

## Burkina Faso

A similar survey of 500 children working in small-scale mines in Burkina Faso showed both similarities and differences with the situation in Madagascar.<sup>3</sup> The children were older (41 per cent aged 12 or under), none was at school and only 25 per cent lived with both their parents. One-third had ten or more siblings; 95 per cent travelled for up to one hour to work. Family living conditions were very difficult for 96 per cent, with 66 per cent living in extreme poverty.

Eighty per cent considered their work to be very hard; one quarter said it was monotonous; 15 per cent worked under strict time constraints; 96 per cent considered that there were very serious risks associated with their work. Seventeen per cent carried loads of 5-10 kg, and the same proportion loads of over 10 kg. Two-thirds made frequent long trips; 83 per cent worked in extremely tiring positions; all worked in a dusty atmosphere; and one-quarter were affected by severe noise or vibration.

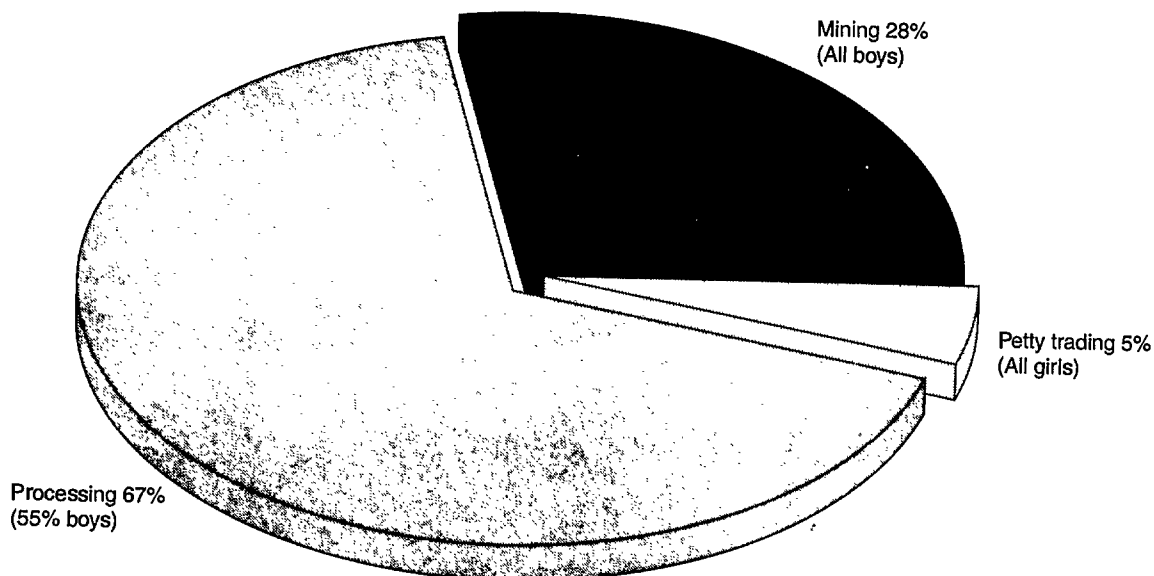
The situation as far as the children's well-being and health protection were concerned was similar to that in Madagascar, except that 96 per cent of those in Burkina Faso had insufficient housing. Working time in Burkina Faso was longer — 98 per cent of the children worked more than ten hours a day — possibly reflecting the age profile and total lack of school attendance. Almost three-quarters worked with their family and two-thirds received no pay; 15 per cent were paid in kind; and 19 per cent received up to the statutory minimum wage. Two-thirds of the children felt they were in an unstable employment situation; 80 per cent had no formal skills.

<sup>2</sup> Findings of an unpublished ILO/IPEC survey forming part of a plan to develop a national programme of action on child labour, 1998.

<sup>3</sup> Findings of an unpublished ILO/IPEC survey of child workers in small-scale gold mining in Burkina Faso, 1998.

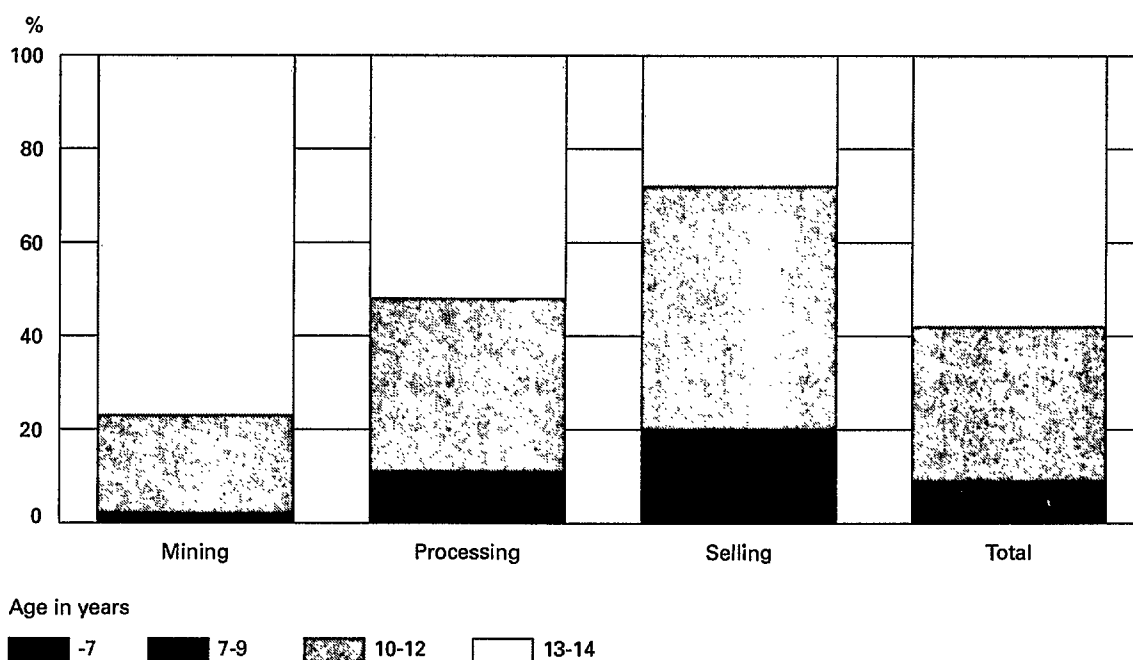
This survey distinguished between children working in mining, mineral processing and petty trading. Figures 4.1-4.5 show the differences between these types of work as far as age, family situation, education and remuneration are concerned.

**Figure 4.1. Children's work in small-scale mines, Burkina Faso, 1998**



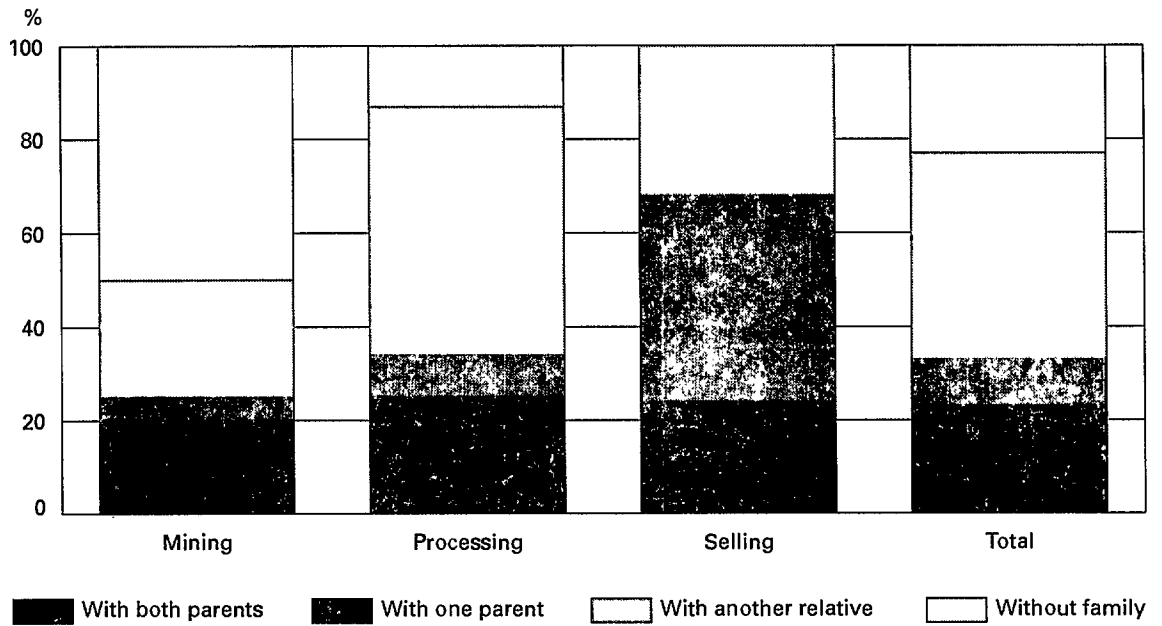
Source: IPEC.

**Figure 4.2. Age profile of children working in small-scale mines, Burkina Faso, 1998**



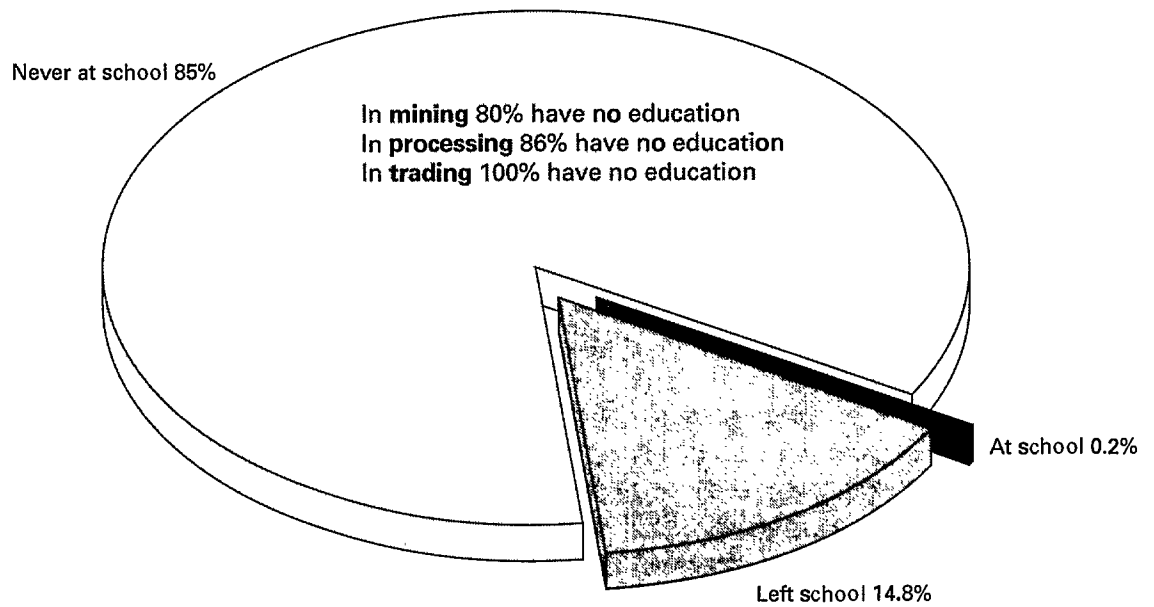
Source: IPEC.

**Figure 4.3. Family situation of children working in small-scale mines, Burkina Faso, 1998**



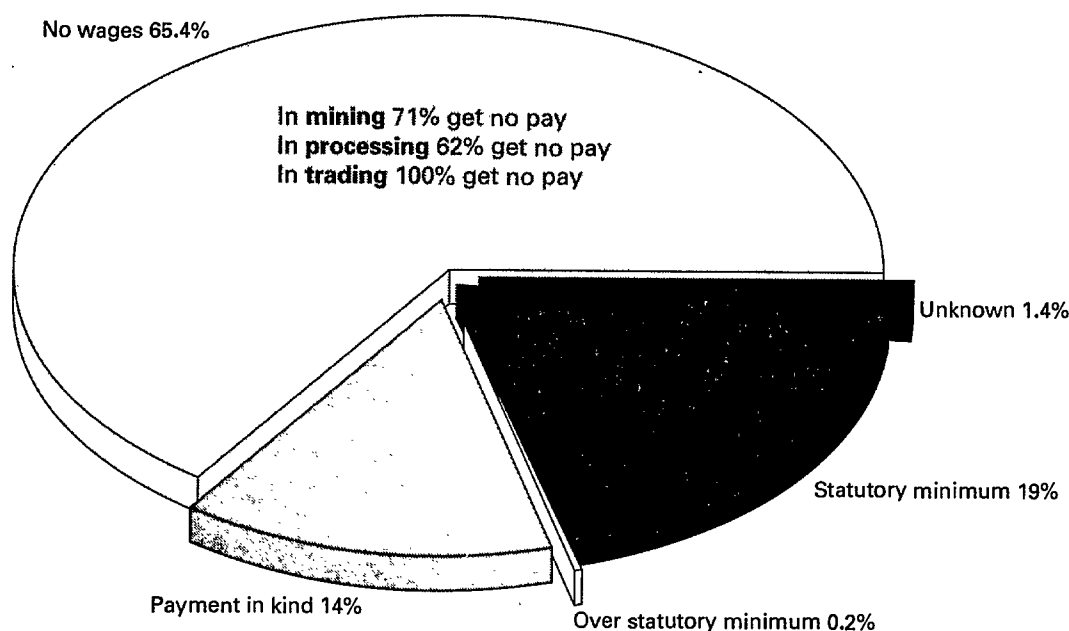
Source: IPEC.

**Figure 4.4. Education level of children working in small-scale mines, Burkina Faso, 1998**



Source: IPEC.

**Figure 4.5. Earnings of children working in small-scale mines, Burkina Faso, 1998**



Source: IPEC.

#### Niger<sup>4</sup>

Young people under the age of 18 make up 53 per cent of the population in Niger and the informal sector accounts for 71 per cent of GDP. The high level of poverty (73 per cent) is the main reason that people turn to small-scale mining, despite the high level of risk and the low rate of economic return.

Mining in Niger is carried out on an artisanal to a semi-industrial scale. Artisanal mines produce mainly gold, gypsum, trona and construction materials; it is basically subsistence mining, producing barely enough to survive. When profits are made, it is usually merchants who make them, not the miners.

Full-time employment in small-scale mining in Niger is about 15,000, 2,500 of whom are under 18 years old. Part-time employment, however, is about 132,000, including about 67,000 children. When small-scale quarries are included, the total small-scale mining workforce amounts to about 442,000, of whom 250,000 are estimated to be children under 18.

The production of trona (hydrated sodium carbonate), which is used in cattle feed, is primarily carried out by the descendants of slaves. But extensive poverty has driven "free" families into this activity too. About 10,000 children are estimated to be involved in the production of trona in the region. The site at Birni N'Gaouré comprises 120 families of 600 workers, including 360 children under 18. They are involved in the exploitation, transport and treatment of the mineral, as well as in transporting fuel wood. Using hoes or scrapers they scratch the surface of the ground to loosen the mineral-bearing sand, putting 5-10 kg at a time into baskets. This task is undertaken by women and children as young as 8. They also carry the baskets, sometimes up to 3 km, to their homes where the material is put into larger baskets.

<sup>4</sup> Drawn from Soumaïla Alfa: *Rapport sur le travail des enfant dans les petites exploitations minières du Niger*, unpublished case study to be included in a forthcoming Sectoral Activities Department Working Paper on child labour in small-scale mines.



Water is added, dissolving the trona as it percolates through the mineral and the basket and the trona-rich solution is collected. This liquor is heated for about half a day to produce a concentrate which crystallizes on cooling. The trona paste is moulded on a stalk in 20 kg lumps, which are dried in the open for about two weeks and then transported for sale by the men.

Wood is the only source of energy for heating the trona liquor. Because of the extent of desertification it often has to be collected up to 10 km-away. This task is reserved for men and children over ten years old. The site produces about 100 tonnes of trona a season, generating about \$20 per family. Table 4.1 shows the different tasks undertaken by different age groups; 31 per cent of all workers are children under 14.

**Table 4.1. Activities of trona miners, Niger, 1998**

Activities	Age				Total (percentage)
	6-9	10-13	14-17	Adults	
Scraping mineral	10	16	8	7	41 (20)
Transporting mineral	10	15	10	17	52 (25)
Transporting wood	2	5	25	15	47 (23)
Heating trona	2	4	15	15	36 (17)
Selling trona	-	-	5	25	30 (14)
Total (percentage)	24 (12)	40 (19)	63 (30)	79 (38)	206 (100)

Workers in trona production are not covered by specific regulations; mines inspectors have not been seen in the region for ten years; there is no individual or community protective equipment; and medical examinations and social security are non-existent. Accidents and illness are generally treated at home using traditional methods — health clinics are too far away and must be paid for. Although no accidents or injuries were reported in 1997, a more recent survey indicates that about 10 per cent of the working children have an accident each year. Respiratory ailments are the main illness associated with small-scale mining.

Nothing is being done to prevent or regulate child labour in trona production, which is directly linked to the extreme poverty of those involved and to their social status as the descendants of slaves. The absence of national means to alleviate the plight of impoverished miners points to it remaining unchanged unless outside help can be mobilized.

The mining of salt for animal and human consumption is similar to trona production. In Tounouga 200 families each with about 15 members produce about 480 tonnes of salt a year, realizing about \$32 per family — considerably less per capita than for trona production despite the higher value of the salt. Of the 3,000 people involved at this site, 1,620 are children under 18 who work in all stages of the production process. They are not paid and show signs of fatigue, malnutrition, respiratory problems and skin lesions. As above, the cost of medical treatment and a distrust of modern medicine means that most ailments are treated at home.

As well as being physically demanding for children, salt and trona production are completely uneconomic. If it were possible to organize the production, transport and marketing so that it was more efficient and more income was generated, the slow climb out of poverty would benefit children who now have no alternative to working and no future but this type of work.

Gypsum is produced at Madaoua by 600 workers, 360 of whom are children — mostly boys. Twenty-three per cent of the workers are children aged 6-13 who are involved in collecting, cleaning and transporting the gypsum to the collection point. Most of the adult workers, however, are women. Nodules of gypsum are collected from the surface and at a depth of up to 2 metres, cleaned by hand and transported by donkey to where they are loaded on trucks for carriage to a cement works, the sole buyer. The returns on this activity are such that it takes at least five years for a worker to pay off a \$30 loan to buy a donkey, which is quite likely to die after two

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or three years of hard work. Here too, the use of inappropriate hand tools, the long hours in the sun and the many kilometres travelled each day on foot take their toll on young workers.

There are 40-50 small-scale gold mining sites in Niger, with a total of about 30,000 workers, including about 5,100 children. Artisanal gold mining increased rapidly in the mid-1980s when the price of uranium (Niger's principal export) and employment started to fall. Artisanal gold mining is normally combined with agriculture. After the rainy season tens of thousands of workers flock to the gold mining sites, although some work all year despite the sites being officially closed because of the dangers of flooding. Working conditions are worse than in the types of mining described above and prostitution and drug use are far more prevalent, presumably because more money is available.

Mining is carried out on the surface, in trenches and underground — all by hand. The maximum authorized depth of trenches is 10 metres, but many exceed 20 metres, greatly increasing the risk of collapse. Underground shafts up to 50 metres deep (the maximum allowed is 30 metres) lead to horizontal or inclined tunnels about 1.5 metres in diameter and up to 30 metres long which follow the gold veins. Restricting the depth to 30 metres is irrelevant if the tunnels are not supported and the strata is weak. Each shaft has 10-25 workers. Surface mining takes place in trenches that are up to 100 metres long and 20 metres wide, and some reach depths of 30 metres without benches being cut to help stabilize the walls. It is in one of these that 27 people died in 1998 when the walls collapsed in the rainy season.

The type of processing depends on the type of ore mined. Alluvial ore is panned with water or winnowed dry, rather like corn, and the grains of gold collected. Quartz that contains gold is crushed then ground to separate the particles, and then sieved and winnowed or panned to retrieve the gold. The powdered gold that is obtained is sold to intermediaries who sell what they buy to a refinery in Niamey.

Depending on their age and sex, children take part in most of the mining and processing operations. Despite the fact that people under 18 are not allowed to work underground, some boys of 16-17 work as miners in the tunnels and boys as young as 14 haul sacks of mineral weighing 5-10 kg to the surface. Standing on the wooden rungs of a rope ladder, with safety ropes fastened to the earth wall of the shaft by pitons, they pass the sacks upwards from one to the other. A 50 metre shaft could have up to 20 boys on this ladder. Access to the floor of the trenches and the removal of minerals is on the same principle as in the underground shafts. Prostitution by girls as young as 12 and drug-taking by boys and girls are common at some gold mining sites. Boys aged 15-17 sell water to miners. Using a cart pulled by a donkey they make two 20 km round trips a day to collect and sell water, realizing about \$4 for each trip. Often, however, like many traders in small-scale mining, they are paid only if and when gold is found and sold. Table 4.2 shows the activities of children at two gold mining sites based on a sample of 50 from each site; 28 per cent of the children are under 14 years old.

This gold mining is carried out with no inspection or supervision. The last attempts to improve safety were in the mid-1980s. There are no safety regulations to be enforced apart from the requirement to stop work during the wet season, and the recommendations of safety teams and mining engineers who have visited the sites from time to time. As with the rest of the informal sector, gold miners are not covered by social security, nor is there any preventive medicine. The nearest medical centre is 60 km away and the nearest hospital 200 km. Accidents and illness are treated at home. If transport is available, serious cases are taken to hospital.

**Table 4.2. Mining and processing activities of children in gold mining in Niger, 1998**

Activity*	Age			Number (percentage)
	6-9	10-13	14-17	
Digging (shafts, tunnels, trenches)	-	-	1	1 (1)
Transport of mineral	-	-	25	25 (20)
Breaking rocks	-	-	5	5 (4)
Grinding rocks	0	2	4	6 (5)
Sieving	5	10	7	22 (17.5)
Panning (water)	-	-	9	9 (7)
Winnowing	-	3	8	11 (9)
Selling gold	-	-	2	2 (1.5)
Selling water	2	-	10	12 (10)
Selling food	3	8	6	17 (13.5)
Prostitution	-	2	8	10 (8)
Selling/using drugs	-	-	5	5 (4)
Total (percentage)	10 (8)	25 (20)	90 (72)	125 (100)

\* Some undertake more than one activity.

## Peru<sup>5</sup>

Mollehuaca, in the Nasca-Ocoña zone in the south of Peru, is one of five areas where traditional gold mining takes place. This zone has been much affected by traditional gold mining; more than 40 mining communities have been formed over the last 20 years comprising at least 15,000 people, about 7,000 of whom produce some 4.9 tonnes of gold a year, worth almost \$50 million. Mollehuaca is on the banks or the bed itself of a narrowing dry gully. Apart from expansion physically being impossible, the town is contaminated by mercury.

The actions of terrorist groups in 1991 drove the formal mining companies from the area. A subsequent influx of people — friends and relatives of the remaining population — made way for migrants from elsewhere in Peru. In 1996 an earthquake destroyed 85 per cent of the homes in Mollehuaca. More recently, floods caused by the El Niño phenomenon have seriously affected the population, sweeping away buildings and damaging water supplies. These natural disasters accentuated the poverty of the inhabitants who were advised to relocate but were not given the resources to do so.

Almost 97 per cent of the homes have no running water, sewerage, garbage collection or electricity. Water comes from wells and must be boiled. Seventy per cent of people use candles for lighting; the rest buy electricity produced by portable generators for three to five hours a day. Mollehuaca has no permanent health services but the community has set up a medical post which is staffed twice a week by personnel from the medical post in the district's capital 6 km away. In an emergency people must go there on foot. A pre-school and a primary school were set up on the initiative of the community and they have 152 pupils. The incidence of pregnancy among girls is increasing and there is a high rate of illiteracy among women.

In 1998 Mollehuaca had a population of 1,154 in 387 households organized in ten committees; 13 of the households were headed by a woman. The entire population is directly or

<sup>5</sup> Drawn from Zoila Martinez-Castilla: *Trabajo infantil en el centro minero artesanal de Mollehuaca*, unpublished case study to be included in a forthcoming Sectoral Activities Department Working Paper on child labour in small-scale mining.

indirectly involved in mining activities. Child labour is part of community life, whether in mining activities or in trade or services, to augment the family income, or for the children themselves. There were 428 children under 14 (281 girls), 104 of whom, between 6 and 17, worked in mining (table 4.3). Most children work for their parents, without pay, as part of their family responsibilities. This "need to work" is culturally instilled by the parents in order to help pay for their clothes and school needs. Some of the older children (aged 15-17) live alone, working full time with no family or social protection. If they work independently for a mine owner or the proprietor of a stone mill, they receive similar compensation to that of adults. In the former case they receive a can of mineral per day, in the latter a daily wage.

**Table 4.3. Working children according to age/occupation, Mollehuaca, 1998**

Occupation (local names)	Boys			Girls			Percentage
	6-10	11-14	15-17	6-10	11-14	15-17	
<i>Vetero</i>	2	5	9	0	4	0	19
<i>Pallaquero</i>	0	0	0	4	6	7	16
<i>Quimbalatero</i>	7	9	8	3	8	9	42
<i>Deslamador</i>	0	1	5	0	3	1	10
<i>Ranchero</i>	1	2	0	2	2	0	7
<i>Burrero</i>	1	1	3	1	0	0	6
Total	11	18	25	10	23	17	104
Percentage	11	17	24	10	22	16	100

Of 451 adults in active employment, 355 are miners, 6 per cent work stone mills, 5 per cent are manual workers and 1 per cent are mill workers. A further 125 people work at or near their homes, 14 per cent of them in stone mills. Of the 148 working children 13 are from single-parent families where the head of the family is the mother; 17 children aged 15-17 live alone or with non-relatives, having left school and gone to Mollehuaca to find work and survive; 118 children live with both parents. The number of offspring varies; in 90 per cent of the families there are one to three children and four to ten in the remaining 10 per cent. Independent working children usually eat at boarding houses and those who live with their families eat at home. The staple diet is based on carbohydrates (bread, noodles and potatoes) and is low in vitamins, proteins and minerals.

Boys over 16 do not go to school. Children aged 6-15 attend primary school in Mollehuaca or secondary school in the nearby village of Relave. They work with their families after school and during the weekends and vacations, forgoing any recreation time. The children do the same work as adults plus additional tasks that are exclusive to children, such as taking food to the miners.

Children working underground are exposed to very harsh conditions. They work 12-hour shifts underground for one or two weeks at a time, eating and sleeping at the mine entrance. They use adult-sized chisels, sledgehammers and picks that require considerable strength and are ergonomically unsound for their size. Most children work stone mills (*quimbaletes*) which also require tremendous effort. One or two children spend up to 15 hours a day balancing on a piece of wood atop a big boulder, rocking it continuously like a seesaw to grind the ore. The main problem, however, stems from contact with the mercury they mix with the ore and water, a mix which they are in contact with during the whole shift, without using any kind of protection. The child is also exposed to mercury when he removes the amalgam from the mill, and more so if he is present when the amalgam is burnt to recover the gold, liberating mercury vapour.

*Rancheros*, who take food to the miners, are generally the younger children. The hilly 6-10 km round trip on foot, carrying food and water, takes up to seven hours. Children working as

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*burreros* drive donkeys to the mine entrance, load the minerals onto them and drive the loaded donkeys down again. They also feed and care for these animals.

The scant vegetation and the water courses in the area are subject to contamination by mercury which, together with the dust are risks to everyone's health. As there are no market-gardens in the semi-desert Mollehuaca gully, all groceries, fruit and vegetables are brought in from the nearest coastal towns. The cost of living is therefore very high and nutrition is poor.

The most frequent ailments are respiratory (61 per cent) and diarrhoea (19 per cent). The majority of the population are aware of the hazards of mine work for their health, adding that accidents and contamination are the worst threats. The maximum allowable mercury concentration at the place of use is 0.01 mg/m<sup>3</sup> of air. Measurements at eight stone mill sites recorded mercury levels ranging from 0.013-108 mg/m<sup>3</sup>, with an average of 0.077 mg/m<sup>3</sup> — eight times the allowable limit. Atmospheric levels of mercury away from the mills is also higher at several locations than the allowed limit for industrial areas — 10-16 times higher in a few cases.

Elevated levels of mercury were found in the blood of 62 per cent and in the hair of 39 per cent of a sample group of 102 people, 54 per cent of whom were children aged 7-17; 17 per cent of the group were anaemic. There are neither preventive medical services nor occupational health specialists in Mollehuaca. Monitoring of mercury has to be carried out by specialists in laboratories in Lima.

Children working in mining and processing in Mollehuaca are aware of the need for personal protection but the measures they take are inadequate, putting them in a highly risky situation. Notwithstanding their awareness of the risks, children accept them as part and parcel of mining. They use baize to cover their noses, material or knitted hats as protection from the sun and rags as elbow and knee protectors. When equipment was provided as part of a sensitization project in 1996, the masks, gloves and boots were only used for a short time. Masks in particular were said to be uncomfortable and the children wearing them were mocked by others.

The living and working environment in which the children grow up also has an impact on their intellectual capacity. Of 36 children aged 7-12 years of age who were evaluated, 66 per cent had an intellectual capacity below the average for their age. In children aged 13-17, the proportion was 77 per cent. The younger children showed no problems with their short-term memory, whereas 13 per cent of the older group exhibited some deficiency. Slight to moderate difficulties in hand-eye coordination were found in children aged 7-12. One-sixth of this group showed a level of maturity below that expected.

The General Mining Law in Peru does not include traditional mining where child labour is concentrated and therefore does not regulate it. The fact that mine supervision in Peru is carried out for the Ministry of Energy and Mines by licensed auditors, and that small-scale mining is dealt with by means of questionnaires rather than by site visits, means that there is no visual check on whether children are working in the mining centres. As far as labour inspection is concerned — and it is labour legislation that sets the minimum working age (a minimum age of 15 for working in mines, provided parental permission is granted) — the zones where traditional mining work is performed are seldom visited by labour inspectors.

A survey by the labour inspectorate in 1996 identified only 54 children among the 1,614 people working for 228 small mining enterprises in Madre de Dios. Only three of these children were under 15 years of age. These figures are at odds with others that have been gathered more recently. More serious as far as the labour inspectorate was concerned was the fact that 80 per cent of the sites surveyed did not respect workers' rights, including minimum rates of pay, hygiene facilities and the right to paid holidays. Although fines were levied, fewer than half were paid.<sup>6</sup>

<sup>6</sup> *El Comercio*, 23 Sep. 1997 (Lima), p. A9.

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## Philippines<sup>7</sup>

Some 3.7 million of the 22.3 million children aged 5-7 in the Philippines have been identified as working children. Over half are estimated to be working in a hazardous environment. Although the extent of child labour in small-scale mines is not known, the hazards are, ranging from working in make-shift tunnels to carrying heavy loads and to exposure to toxic chemicals. Mining ranks first on the list of the recently updated guideline on hazardous work and activities that the Philippines Labour Code proscribes for persons below 18 years of age.

Small-scale mining is the prime source of livelihood at Sibutad in the south of the Philippines, which has a population of about 12,000, 8 per cent of whom are children aged 10-14. Often parents and their children work together in different stages of mining and processing gold-bearing ore, using predominantly primitive and unsafe mining methods (hand-dug tunnels that follow the gold vein), inadequate equipment and poor handling and processing practices.

There are currently only six tunnels operating at the site, compared with over 100 in 1986-89. In the meantime a large mining company has acquired much land, leaving little scope for the small-scale miners. Each tunnel has about 15 underground miners (*abanteros*), plus those who install timber supports and those who carry the ore to the surface (*atraseros*). Although children are not allowed to work underground, up to 15 per cent of those working do. Children commonly carry ore (25-30 kg sacks) on their backs from the mine mouth to the processing site 500-600 metres away. Sometimes they have hand carts on which several sacks can be loaded.

The mining community has no health services, apart from periodic visits from a midwife. The nearest hospital is 7 km away. There is an elementary school at the site; the secondary school is 7 km away. Of 114 child workers at the site, half were at school and seven were females. Their ages ranged from 7 to 18 years, with 34 per cent aged 7-14. Seven worked underground; 74 were general labourers; 26 worked at washing ore and gold panning; and seven ground up ore before it was fed into a mechanical grinder. Gold is extracted by amalgamation with mercury and the subsequent burning off of the mercury.

A survey of a small number of child workers, all of whom were male and most of whom were at school, shows that a typical child worker at this site lives at home, is one of six siblings, some of whom also work at mining, is aged about 14, has been working for about 4 and a half years and has finished elementary school. He works about three hours a day after school and all day at the weekends, travelling for about 35 minutes to and from work; 85 per cent of them work all the year. They generally eat at work, bringing food (bread, rice, fish) from home (table 4.4).

Two-thirds of child workers carry ore in sacks from the mine to the processing area (average weight: 28 kg per sack); one-fifth are involved in ore processing and hence potentially come into contact with mercury; a few carry water (20 kg containers) for sale to the underground miners. Some workers do more than one task. Most are paid piece rates (about \$0.20 per load), others earn a wage of about \$4 per week. Some can earn up to \$50 per month — about two-thirds the wage of an underground worker. Child labourers usually work on their own or with their parents. They are not wage-earners; they are paid by the task by the landowners, gold buyers or adult miners who buy water from them. Most of their earnings are put towards the family budget or are spent on food. Small amounts are kept for personal use or expenditure at school.

<sup>7</sup> Drawn from Dulce P. Estrella-Gust: *A case-study of children in small-scale mining (Sibutad, Zamboanga del Norte, Philippines), July to August 1998*, unpublished case-study to be included in a forthcoming Sectoral Activities Department Working Paper on child labour in small-scale mines.

**Table 4.4. Activities of child workers in small-scale gold mines, Sibutad, 1998**

Age	10-12: 21%	13-15: 57%	16-18: 14%	≥19: 7%
Education	Elementary: 37%	Elementary graduate: 43%	Secondary: 10%	≥High school: 10%
Work	After school: 8%	Weekend: 3%	Both: 89%	
Hours/day	3	8	5	
Days/week	5	2	4	
Activity*	Underground: 9%	Processing: 22%	Carrying: 65%	Other: 4%
Status	Self employed: 71%	Assist parents: 29%	Employed: -	
Payment	Piece work: 53%	Daily wage: 16%	Weekly wage: 26%	Other: 5%
Earnings	\$15-\$50 per month			
How spent	Food: 36%	Given to parents: 50%	Personal: 7%	Schooling: 7%
Health hazards	Heavy loads: 23%	Mercury: 20%	Heat: 2%	Cold: 2%

\* Some do more than one job.

A group of 12 mothers and four fathers, after initially denying that their children worked in mining, admitted to researchers that they did. The youngest worker was 8 years old; the average age was 10. Nine of the parents had two or three children working in small-scale mining. Some of the 23 working children of these parents worked underground. One-third of the child workers' fathers did not have a job. Most of the mothers were involved in mineral processing in addition to their family duties. Unsurprisingly, most of the children had decided to work to support their family or to earn money for themselves (figure 4.6). The parents were aware of the hazards and risks associated with small-scale mining but they saw no alternative — their families needed the money and there was no alternative employment available. At least the families stayed together.

The major hazards for the child workers were the effects of carrying heavy loads and contamination by mercury. A survey of children's health at the site showed that about 80 per cent of the sample had suffered from respiratory ailments, and two-thirds from musculo-skeletal disorders. They reported having had various symptoms in the previous six months (mid-1998), particularly joint and muscle pains (figure 4.7). On physical examination, almost all of the children exhibited skin, ear, nose and throat and neck abnormalities; 60 per cent had a restricted lung function. Mercury and lead levels in their blood and urine, however, were within normal limits, as was their mental and neurological status.

Figure 4.6. Reasons for working in small-scale mines, Philippines, 1998

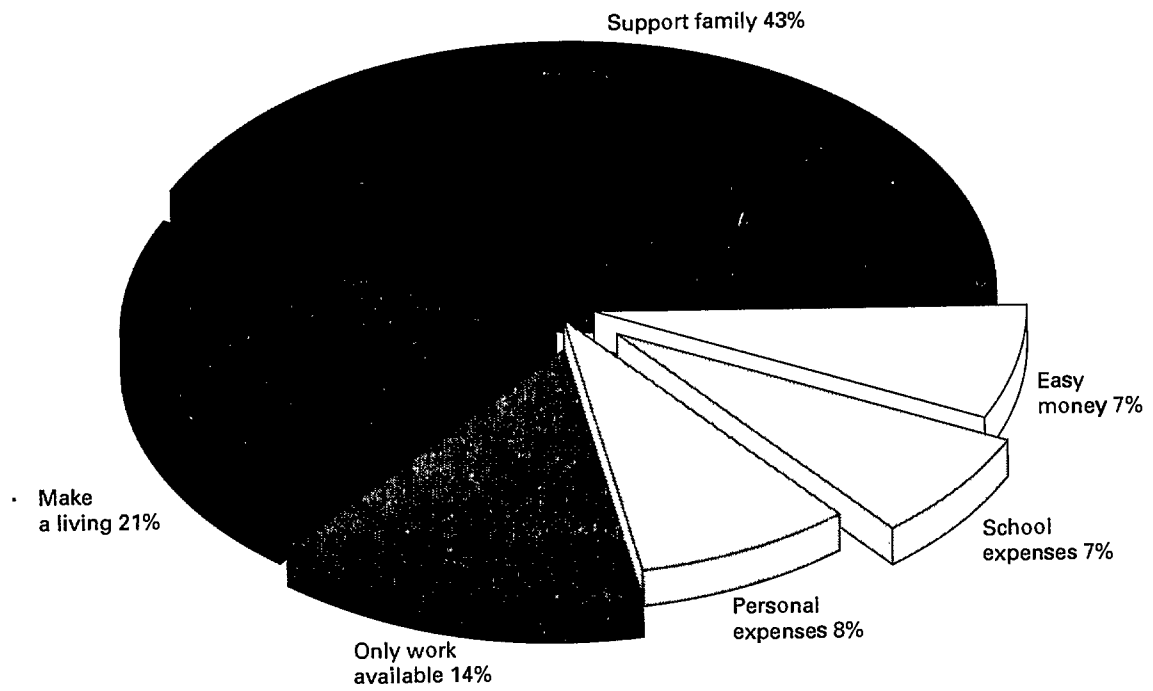
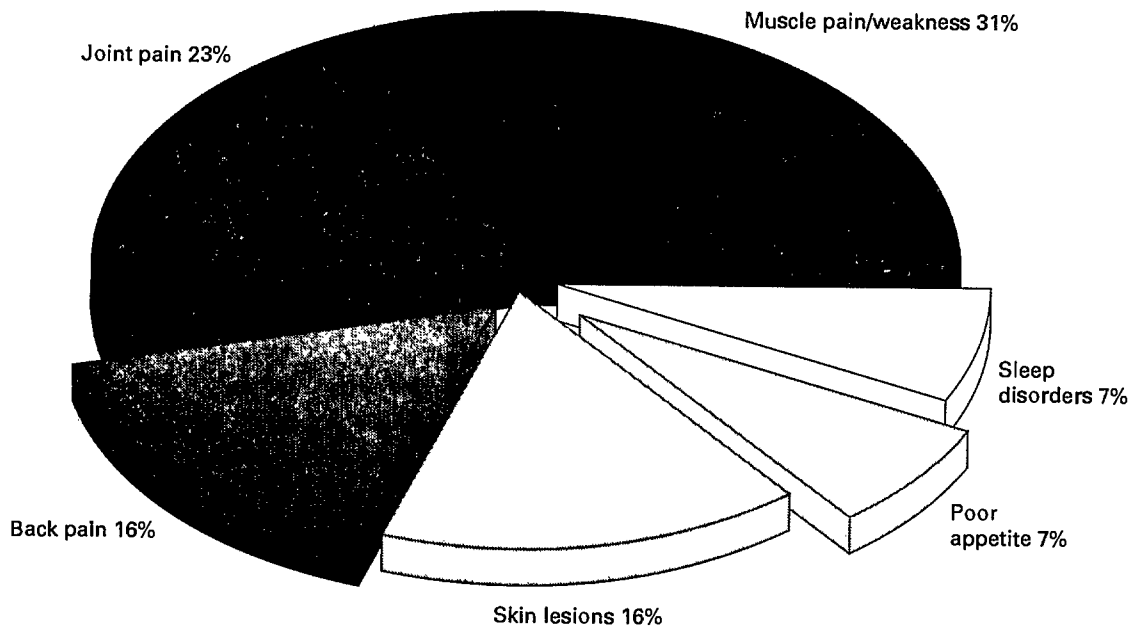


Figure 4.7. Symptoms frequently reported, Philippines, 1998





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## Viet Nam

There have been several reports that in Viet Nam children are part of a gold rush to the site of a former large mine in the north of the country, over 700 working children in one case. Reports of children being abducted and forced to work in the gold mines for as little as \$10 per month were subsequently denied.<sup>8</sup> In 1997 there were two reports of children being used as cheap labour in gold mines. In one case over 80 children, some as young as 13, were expected to carry at least 270 baskets each holding 15 kg of ore each day (4 tonnes). A raid by Vietnamese authorities on an illegal gold mine near the border with Laos found 15 teenage boys working under similar conditions.<sup>9</sup>

## United Republic of Tanzania<sup>10</sup>

In Mererani, near Arusha, there are about 3,000 children aged 12-15 who do not go to school. Most of them, who are migrants, have been removed from the mine sites because of the harsh work environment and/or following greater public awareness of child labour. They survive by doing odd jobs and informal sector activities in the Mererani township; some 200 are reportedly working as domestic servants or as sex workers. There are still about 150 boys aged 12-15 working at the mine site as “snake boys” and sieving debris searching for small gemstones. The tasks of the snake boys are to fetch and carry underground, place dynamite charges in confined spaces, fetch water from nearby streams and run errands for the adult miners. Because of their size and agility snake boys can make four round trips in the time an adult would make one. These children receive no payment, except sometimes when tanzanite is found. They get one or two meals a day and often sleep in the open or even in the mines. There is no set work pattern, all work intermittently from dawn to dusk. There are neither specific rest periods nor holidays. Allegations of sexual abuse by older mineworkers are common.<sup>11</sup> One of the outcomes of an accident here in 1998 was a decision to ban the employment of children under 16 in the mines (box 2.1).

Sanitary conditions at the mine sites are deplorable, with no separate eating areas (empty paint containers are used as cooking utensils), no toilets or latrines, no clean fresh water; workers drink water from a nearby stream without boiling it. Heaps of mine waste — much of it graphite that contains silica — are everywhere, being dispersed by the wind.

The major hazards of work at Mererani are heat, noise, vibration and the lack of ventilation underground. Complaints of tiredness, headaches and other stress-related symptoms are common. When pneumatic drills are used, the effects of vibration and dust (neither water nor masks are used to suppress or guard against dust) are more marked on young people, but do not appear until years later. Carrying heavy loads in awkward, crouching, positions is a precursor to lower-back problems later in life. The complete lack of medical and health facilities (other than some private dispensaries manned by medical assistants) means that there is no screening and no indication of the effect of these working conditions on any of the workers. Those who are not paid clearly cannot buy medicine, although some employers may contribute if they feel it is in their interest to have the worker return to work rather than find a replacement. Common medical complaints among child workers include septic wounds, malaria, gastroenteritis, general weakness and aches and pains.

<sup>8</sup> *Mining Journal* (London), 5 Apr. 1996, p. 252.

<sup>9</sup> *ibid.*, 15 Aug. 1997, p. 139.

<sup>10</sup> Drawn in part from B.O. Alli: *The situation assessment of child labour at the tanzanite mines, Simanjiro in Asmshe region, Tanzania*, unpublished ILO mission report, Apr. 1997.

<sup>11</sup> *The Guardian* (United Republic of Tanzania), 29 Nov. 1997.

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The eagerness to be the first to reach newly blasted areas and, hopefully, find tanzanite means that little time elapses between underground blasting and workers (especially the snake boys) re-entering the mine, if indeed they left it. Some hide in the mine to ensure they will be first at the work face after blasting (evidence of there being no record of who is working). Non-fatal asphyxiation due to lack of oxygen is a common occurrence. With no pay and no choice of work snake boys and other child workers face a bleak future — hoping to be taken onto the payroll as they get older, hoping to find some gemstones through scavenging, hoping for a paid job in town, or anywhere — but with few prospects.

Despite being given one or two meals a day, the nature of the diet — maize porridge, boiled leafy vegetables and beans — is insufficient to maintain proper health and normal growth, let alone when arduous work is carried out. The local school is inadequate for the number of school-age children, with some classes being conducted in the open. The situation has worsened since many former child workers have been withdrawn from mining. Being unable to go to school, they are returning to the mines or, if luckier, they find work in shops or houses. Others end up on the street. Consequently, merely removing children from work will not necessarily resolve their problems, rather replace one set with another. Also, the high proportion of migrants in this area brings repatriation into the equation.

## Stopping child labour: What is being done?

There is increasing public awareness of the problem of child labour, generally as well as specifically in small-scale mining, and a broad consensus of the need to do something about it. In practice, however, it is a complex issue, with economic, political and social implications at the international, national and local levels. Thus, even its extreme forms — which include some aspects of child labour in mining — progress towards its abolition has been rather slow. There are three broad courses of action to combat child labour: legal, direct intervention, and the use of market-based initiatives.<sup>12</sup>

Many countries have a statutory minimum age for work, and some have a minimum for mining or hazardous work that includes mining. But these laws are widely flouted in many developing countries. Because mining is largely a non-urban activity, and sometimes transient, it is difficult for inspectors to monitor and control child labour in small-scale mining. There are also international standards. The ILO's Minimum Age Convention, 1973 (No. 138), for example, applies to all sectors of economic activity. It sets a minimum age of 18 for "hazardous" work and it applies equally to all countries, so that a country's level of development is no excuse for children to be employed in hazardous jobs. As of December 1998 this Convention had been ratified by 69 of the ILO's 174 member States. In 1998 the International Labour Conference held the first of two discussions on a new Convention on child labour that is designed to supplement Convention No. 138. The objective is to adopt a Convention that forbids *all* the extreme forms of child labour, fill in the gaps in current international legal instruments and set clear priorities for national and international action. In the preliminary discussions in 1998, it was agreed that the worst forms of child labour would include any type of work or activity which, by its nature or the circumstances in which it is carried out, could jeopardize the health, safety or morals of children — who are defined as all persons under the age of 18. The draft text that will be further considered in 1999 calls on each ratifying member State to establish "appropriate mechanisms" for monitoring the provisions of the proposed Convention, as well as designing and carrying out programmes of action to eliminate the worst forms of child labour. In addition, the draft calls for each ratifying member State to "take all necessary measures to ensure its effective implementation and enforcement, including the provision and application of penal and other

<sup>12</sup> For a more detailed discussion on these three approaches and the work of IPEC, see M. Lansky: *Child labour: How the challenge is being met* (Geneva, ILO/IPEC, 1997).

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sanctions.” Finally, the draft urges members to take into account the importance of education in eliminating child labour, and adopt “effective and time-bound measures” to assist in the removal of children from the worst forms of work and provide “rehabilitation and social integration”. The new Convention, if adopted in 1999 by the International Labour Conference, will normally come into force one year after the second ratification by an ILO member State.<sup>13</sup>

Direct intervention has been an important means of containing specific cases of child labour. The ILO launched the International Programme on the Elimination of Child Labour (IPEC) in 1992. The programme is funded by 17 industrialized countries and the European Commission. About \$100 million has been paid or pledged up to 2001. The programme is operating in over 50 developing countries, implementing over 1,000 country-level action programmes. The increasing focus on hazardous forms of child labour has meant that small-scale mining is now part of IPEC’s activities in Africa, Asia and Latin America, starting with the gathering of sound data on the extent and nature of child labour in mining (see the sections on Madagascar and Burkina Faso above), sensitizing all concerned on child labour, supporting the withdrawal of children from mining in Nepal, Peru, the Philippines and the United Republic of Tanzania (for more details see Chapter 7). The very nature of small-scale mining makes it difficult to classify the work undertaken by children according to its hazardous nature. There is often a continuum of situations ranging from mildly or potentially hazardous to life-threatening in the short or long term. Because small-scale mining is often at the periphery of the economy, it is not easy to find the people or organizations to deal with the problems. The fact that more money is being directed by the ILO and other organizations at addressing the problem of child labour in small-scale mines does not necessarily mean that all those who are queueing up to spend it on the children’s behalf are adequately experienced, knowledgeable or competent. Consultants can be as prone to “gold rushes” as miners. Developing a package of measures that will bring about real and lasting change to the people concerned takes time, information, dedication and resources. If corners are cut, trust will be lost and the programmes will fail.

Market-based initiatives to combat child labour include a variety of product labelling schemes and/or corporate codes of conduct designed to inform consumers that the goods they are buying are not made or processed by children. Because minerals, except gold, silver and gemstones, are primary inputs to manufacturing processes, it is by no means certain that an approach that works for carpets, clothes or coffee would be relevant for minerals — more so when most of them are consumed locally. Even for precious metals and gemstones, how could it be verified? The many stages in the buying and selling of gold, for example, before it is refined and transformed into jewellery, or used industrially, makes it virtually impossible to say *how* it was mined. The same is true for gemstones which are sold in batches before being made into jewellery. Careful thought will need to be given to proposals to put codes of practice in place in factories that are one or more steps removed from the production of the primary inputs. It may be better for mining to focus on more direct means of eliminating child labour from small-scale mines rather than targeting the conscience of the final consumer. To this end, multifaceted responses and interdisciplinary strategies with long-term impact are needed, both at the national and the international levels (box 4.1).

<sup>13</sup> ILO: *Record of Proceedings* (Geneva, 1998), Vol. I, p. 19/70.

## Box 4.1

### Measures to combat child labour in small-scale mining

#### Awareness-raising/mobilization

Awareness-raising and mobilization of the society are important tools for the prevention and elimination of child labour. Highlighting the consequences of child labour in small-scale mines is the first step in the right direction. It has been acknowledged that if society as a whole recognizes that child labour is a problem, the stage has been set to stigmatize and then eradicate the most abusive and hazardous forms of child labour. This can be achieved, inter alia, through awareness campaigns, seminars and workshops, dissemination of information through the media, training of professionals working in the field of child labour, informal visits with parents and working children, training of teachers and educators, and development of municipal plans of action.

#### Education

The single most effective way to stem the flow of school-age children into abusive forms of employment or work is to extend and improve schooling so that it will attract and retain them. Quality education is a vital part of the solution. At the very least, schools must be available, accessible, and hold full-time sessions or at least occupy a large part of the day. Furthermore, they must be affordable and of acceptable quality and socio-economic relevance. It is crucial to follow up and provide additional support to children who have been withdrawn from work and put into formal schools. These children need psychological assistance and counselling to enable them to adapt to the school environment and remedial academic teaching and coaching to ensure that their educational gaps are filled. In addition, teachers need to be taught to work with (former) working children and to use innovative training techniques.

#### Rehabilitation through the provision of support services

A child's withdrawal from work should be accompanied by a whole range of supportive measures. This is especially important if the children have been stunted in their development. In addition to education, training, health services and nutrition, vocational training, recreational activities and intensive counselling are needed.

#### Promotion of income-generating opportunities for families

Many children are forced to work in order to supplement the family income. In many instances, therefore, removing children from either full-time or part-time work must be combined with alternative income-earning opportunities for the parents and/or children.

#### Improvement of legislation and enforcement

In many countries there is legislation dealing with child labour in hazardous activities, but it is often not strictly enforced. Thus, law enforcement needs to be reinforced through the training of law enforcement personnel, including labour inspectors. Where legislation does not exist, laws on the subject should be adopted and implemented.

## 5. Legislation: A path to sustainable small-scale mining?

Much small-scale mining takes place illegally — over 50 per cent in many countries (table 1.1) — but the nature of lawbreaking and the reasons for it vary. Sometimes there is no land available for small-scale mining — it has all been allocated to large companies for prospecting or exploration. Sometimes the regulations are so complex that small-scale miners are dissuaded from attempting to adhere to them. Moreover, the widespread lack of institutional capacity to implement small-scale mining regulations means that the chances of being caught and sanctioned are slim. Sometimes the regulations serve to stifle small-scale mining, trapping it in suboptimal operations rather than promoting it as a sustainable, profitable entrepreneurial activity that can provide significant employment in rural areas. So the only way forward is down an illegal path. Whatever the reasons, illegal small-scale mining is accompanied by considerable economic losses, and there is no possibility of using official means to improve working conditions and occupational health and safety so long the activity itself remains illegal.

A significant proportion of the respondents to the Office's questionnaire cited one or more legal issues as important constraints on small-scale mining (figure 1.2). These included: obtaining permits for exploration and development; taxation; selling arrangements; and access to finance. Clearly, the legal and regulatory framework has an impact on most issues that affect small-scale mining. Thus, for small-scale mining to overcome the social, labour and other constraints it faces, this framework needs to be both sound and appropriate. Moreover, it needs to be backed by the infrastructure that will ensure that its provisions are implemented and, more importantly, that illegal mining is identified and encouraged to operate within and be protected by the law, enhancing its prospects of being safe, efficient, productive and, above all, sustainable.

In the last five years several international meetings on different aspects of small-scale mining have highlighted the need for the development and implementation of appropriate legislation as a precursor to the transition of small-scale mining from a marginal to a mainstream economic activity (box 5.1 and annex).

### Box 5.1 Calls for legislation for small-scale mining

- Governments and their agencies should endeavour to provide a simple, clear, understandable and stable set of laws and regulations on small- and medium-scale mining (United Nations Interregional Seminar on Guidelines for the Development of Small/Medium-scale Mining, Harare, February 1993).
- Governments must move towards legalizing artisanal mining and streamlining registration and licensing procedures and giving legal recognition to security of tenure and the right to transfer and mortgage mining titles (World Bank International Round Table on Artisanal Mining, Washington, DC, May 1995).
- Where applicable, governments should include a treatment of small-scale mining in their mining codes (Global Conference on Small and Medium-scale Mining, Calcutta, 1996).
- The acquisition of a full, transferable mining title to the discoverer of a [gold] deposit should be a simple, quick and transparent process (Expert Group Meeting on UNIDO High Impact Programme "Introducing New Technologies for the Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining", Vienna, July 1997).

The increasing recognition in a number of countries of the need both to foster and to control small-scale mining in order to bring it into the formal mining sector is slowly being turned into legislation that will enable this goal to be met. Previously, most developing countries were intent on attracting foreign investment in mining, making sure that nothing, especially small-scale mining, would jeopardize potential interest in the nation's mineral resources. Twenty-four countries that replied to the questionnaire reported having specific laws and regulations that

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covered small-scale mining. Some of these were recently enacted small-scale mining acts, others were sections in broader mining legislation. Elsewhere, the national mining law applies to all mines regardless of size. Some aspects of small-scale mining, notably labour and social concerns such as occupational safety and health, employment and working conditions, and environment, tend to be covered by other, broader legislation, often that dealing with small businesses. This coverage, however, is more implicit in that it does not exclude small-scale mining rather than explicitly including it.

Responses to a question about the major legislative problems facing small-scale mining were fairly evenly divided between problems relating to titles, security of tenure, obtaining licences to prospect and mine, their short duration, and problems with the plethora of regulations that were often inappropriate for small-scale mining because they tended to favour large mines, making it difficult to adhere to them. Sometimes, different regulations were in conflict (e.g. land use) and reporting requirements were unclear, complex or onerous. A smaller number of replies cited difficulties with tax, finance and environmental aspects of laws and regulations.

## Improving the regulatory environment

When asked what should be done to improve the regulatory environment, the responses from 32 developing countries focused on five major areas:

- specific legislation is needed for small-scale mining, developed in consultation with all concerned;
- legislation should include simple, transparent processes for the granting and transfer of permits and for ensuring security of tenure;
- legislation should cover occupational safety and health and environmental matters;
- control over all aspects of small-scale mining should be vested in a single, well-resourced agency, with a widespread network of offices that would act to facilitate small-scale mining as well as regulating it;
- tax concessions or forgoing royalties for a limited time and foreign investment should be used as appropriate to encourage the development and expansion of small-scale mining.

If the answers to the question of what is required of small-scale mining legislation and its implementation are obvious, what are the problems in developing policies and laws that would enable small-scale mining to operate in a legal way and make a tangible, recognized contribution to economic development? Legal small-scale mines would be better able to attract investment or gain access to credit. Even small amounts of investment would make much small-scale mining more efficient and more profitable and therefore lessen the need for vulnerable workers, particularly women and children, to be involved. Employment would be more stable as mining becomes established rather than transient. Moreover, legal trading in minerals and competitive prices will deter smuggling, to the benefit of all.

The definition of a small-scale mine is often a stumbling block when framing legislation. If too prescriptive a definition is used, it might only apply to a small-section of this activity. For example, limiting the depth to which small-scale mines can work automatically precludes the legal exploitation of deeper resources — at a time when more oversight is likely to be necessary because of the increased risk of working at greater depth. Some small-scale mining regulations do not permit the use of explosives, since it was never envisaged that mining would be carried out in hard rock and the resulting illegal and unsafe use of explosives is a major cause of accidents and disease.

There is a need to decide at the outset whether the objective of legislation is to control or confine small-scale mining — to limit its impact — particularly with respect to large mining operations, or whether it is to enable small-scale mining to flourish as a viable entrepreneurial economic activity. Restrictive provisions, both technical and administrative (such as short-term permits, and lack of security of tenure), constrain development, trapping small-scale mining in

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a suboptimal state, or they encourage illegal mining. Engulfing small-scale mining with many regulations and short-term, non-negotiable permits makes expansion difficult, credit virtually impossible to obtain, and consideration of environmental impact most unlikely. There is a danger that, in working to attract large, foreign mining investment, governments framing small-scale mining legislation will focus on how best to confine small-scale mining rather than encourage it. But the inevitable institutionalization of illegal mining and tension between large and small operations will also have a severe long-term negative impact if large mining companies are deterred from investing because of the extent of illegal small-scale mining. Governments must therefore find the right balance. Hence the need for wide consultation of all concerned when framing small-scale mining legislation.

Much small-scale mining legislation is intended primarily to help nationals of the country concerned get into mining and restricts this activity to them. In some cases land for small-scale mining by local citizens is reserved. Problems arise when local credit is not available to finance continuing operations or an expansion. When illegal investment from overseas entrepreneurs is sought, it can put the local operator at the risk of being closed down; moreover, because the investment is illegal, its terms are likely to be less favourable for the miner than if local credit had been legally obtained. Once again, the need to consider all the implications of developing the small-scale mining sector must be taken into account when legislation is being drafted.

The formalization of purchasing arrangements that ensure that small-scale miners get close to the world price for their products means that, for the most part, shady deals with middlemen are not necessary — although, for various reasons, particularly to ensure regular cash flow from small amounts of production and because of remoteness, intermediaries are sometimes used (but this is the miner's choice, not of necessity). The proportion of mineral production accounted for by small-scale mining is evidence of its importance to the national exchequer in many developing countries and of the losses that can occur if sales are not transparent and at the going rate and if exports are not legal. For example, in Ghana, which has a well-established mechanism for buying gold and diamonds, the third largest source of gold production and by far the largest source of diamond production are from small-scale mines. The impact of small-scale mining is similar in other countries too. Over 30 per cent of high-value minerals for export are produced in the small-scale mines of Niger, Peru, United Republic of Tanzania, Zimbabwe.

The fact that in many developing countries training and expertise have been focused more on technical mining issues than on regulatory functions has meant that it can be difficult to develop new, appropriate legislation without outside help. However, there is often a suspicion among small-scale miners that much of the outside help comes from those more attuned to the needs of large mining companies than to those of small-scale mining. But the more recent involvement of development agencies in framing or revising mining legislation should mean that the needs of small-scale mining are taken more into account if the agreements reached at international meetings are taken seriously (box 5.1)

## **Whose responsibility?**

Different aspects of small-scale mining (including occupational health, safety, employment, environment, community health, education, migration, labour, finance) are often the responsibility of separate government agencies, but in practice it usually falls to overstretched, inadequately funded and poorly staffed mines inspectorates to oversee small-scale mining operations. In fact, there was widespread agreement among respondents to the Office's questionnaire that if small-scale mining was to be regulated properly it should be the responsibility of mines inspectorates, which needed the means to do it. Their duties should include the monitoring and control of mining operations and the provision of advice and training to small-scale mine owners and workers (at mines and in workshops at suitable locations). Notwithstanding the broad roles assigned to the inspectorates, many are unable to do more than collate returns from the small-scale mines that lodge them and verify production and royalty

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payments. Sometimes they can make sporadic visits to nearby small-scale mining sites, but often the lack of vehicles or fuel precludes inspectors from leaving their offices to make mine visits. This limited activity is not surprising in the light of the general lack of resources in many mines inspectorates in developing countries, made worse when much small-scale mining is outside the law anyway and will stay there until the inspectorate is in a position to make a difference. More, better paid, independent inspectors with better training, more offices in mining regions and more equipment were all high on the list of needs if regular visits to small-scale mines are to be feasible and their statutory duties discharged. Outside assistance may well be necessary to break the cycle. Recently, one of the first results of World Bank assistance to mines inspectorates in different countries has been the purchase of vehicles. Inspectors in the countries concerned now have much-needed mobility and the opportunity to make contact with legal and illegal mining operations, monitoring the former and attempting to bring the latter within the law. Whatever legislation is enacted, however, it will not be valid unless it is complied with and is seen to be complied with. For this to be ensured, many mines inspectorates will need to be expanded and decentralized if efforts to legalize small-scale mining are to pay off in terms of increased production, productivity, investment, employment and income.

Some legislation provides incentives for small-scale mining, including tax concessions or exemptions from royalty payments and the provision of grants for prospecting. Some mines inspectorates are able to provide advice and training to small-scale miners. Penalties for violations of the law exist too, such as fines and the cancellation of permits or licences; but these are often inadequate and, in any case, are rarely implemented. A large gold mine in Ghana had over 4,000 illegal miners on its property, but the number of arrests and convictions was only 20-30 a year until matters came to a head and they were all forcibly removed. In one region of Peru over 80 per cent of small-scale mines were flouting the law; only 40 per cent of the fines levied were paid.

## Different needs in different countries

Some national mining legislation contains sections on small-scale mining. Where it is not specifically mentioned, this is largely because the mining law is based on that of former colonial powers where small-scale mining was not carried out as an identifiable activity. In these cases, therefore, small and large mines are lumped together under the law despite the fact that most provisions designed for the bigger mines are largely irrelevant as far as small-scale mining is concerned.

A few countries have enacted specific small-scale mining legislation. Even in these countries, however, the need to revise small-scale mining regulations is already apparent in the light of the increase in small-scale mining activity and the different forms it is taking. Several countries that are revising their general mining legislation are incorporating small-scale mining provisions in the new laws. In some cases the drafting of these revisions is being assisted by the United Nations or the World Bank which, among others, have stressed the need for small-scale mining to be put on a legal footing in order to bring it into the formal mining sector and limit its negative impact.

The provisions in existing small-scale mining legislation in different countries illustrate the concerns that governments are trying to address:<sup>1</sup>

- curbing the illegal mining and trading of valuable minerals (mainly gold and gemstones), capturing the benefits for the country and controlling the distribution of them;
- encouraging the rational development of small mineral deposits;
- generating more stable employment opportunities in rural areas;

<sup>1</sup> This section is based in part on E. Bugnosen et al.: *A preliminary assessment of small-scale mining legislation and regulatory frameworks* (Rugby, ITDG, 1998).



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- rationalizing existing small-scale mining activities;
  - mitigating the severe environmental effects of uncontrolled small-scale mining (such as erosion and silting of rivers and streams);
  - encouraging the entry of nationals into small-scale mining;
  - protecting the rights of indigenous people on their ancestral land.

Much small-scale mining legislation recognizes the difference between the exploitation of minerals for commercial sale and for “own use”, the latter mainly concerning non-metallic minerals and building materials, with permits being freely awarded. When such mines become commercial, however, or when small-scale mines are no longer “small”, it is not always straightforward to manage the transition in the legislation. When should a small-scale mine be required to take out a different licence on different conditions? What is involved? Will it make life more difficult and artificially constrain development, or lead to production being concealed from the authorities? In some countries the government can stop small-scale mining when it considers it has passed a certain threshold, or if it feels that the deposit is more suited to large-scale exploitation. So, while legislation can assist small-scale mining, there is also the possibility that it could stifle its development beyond a certain stage.

Environmental concerns about small-scale mining have been addressed in a variety of ways in new legislation. Some laws include the preparation and approval of plans to limit the environmental impact of small-scale mining, including provisions for post-mining rehabilitation, but not in as rigorous a manner as for large mines. Some legislation focuses on specific, existing environmental problems, such as the use of mercury, deforestation or river siltation. The posting of environmental bonds when a licence is obtained or the earmarking of a proportion of the revenue from sales are used in some countries to ensure that some rehabilitation will take place. These provisions have had a positive effect in Bolivia and Ecuador, for example, where small-scale gold miners have learnt that they can be better off financially by entering into a verifiable commitment to meet certain environmental requirements and by operating accordingly than by posting a bond or risking fines for non-compliance.

Occupational health and safety are not generally included in small-scale mining legislation (although the Philippines introduced Small-scale Mine Safety Rules and Regulations in 1997); they are normally part of overall health and safety regulations. The lack of specific provisions for safety and health in mines was behind the adoption of the Safety and Health in Mines Convention, 1975 (No. 176). As countries with significant small-scale mining operations ratify the Convention and include these mines in its coverage, specific safety and health provisions will be required.<sup>2</sup> As legislation is reviewed, the Convention and its accompanying Recommendation provide useful guidance for those drafting new regulations.

Where legislation has enabled monitoring and control of small-scale mining to be decentralized to local authorities or to local mining inspectorates, it has been effective in targeting local issues, such as environmental degradation, occupational health and illegal migration in border areas. In cases where the local authorities have been able to collect royalties, they have a clear incentive to control and foster small-scale mining. But there are also examples of inappropriate aspects of legislation, such as focusing on cooperatives as the sole legal entity. This is fine where the cooperative movement is already strong, but can be counterproductive where there is no history of cooperatives in mining that has largely been an individually organized activity.

The development of small-scale mining legislation can be difficult in regions where large areas of land are already subject to exploration or prospecting permits issued to large mining companies and more so when they are issued on areas that were formerly worked by small-scale

<sup>2</sup> Article 2 of Convention No. 176 permits the exclusion of certain categories of mines from its application or from certain of its provisions, but plans for progressively covering all mines must be made.

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miners. In the Philippines a regulation to enable the “dual use” of prospective land by allowing gold panning and processing on existing mining claims has been introduced, but its effectiveness remains to be seen. Other mechanisms for enabling small-scale miners to gain access to prospective areas already subject to permits include “tributing” (where small-scale miners pay a rent, often a proportion of the proceeds of sales), operating agreements between large and small miners, and contract mining. Such arrangements are either initiated by the parties themselves (as has occurred in Gambia, Ghana and Venezuela) or with the involvement of the government (as in Papua New Guinea where standard tributing contracts exist). In Mongolia licence holders are encouraged to contract out to small-scale miners parts of a deposit that are not viable for large mining — buying the mined ore or taking a proportion of its agreed value in return for processing it. Many mining laws require the eventual returning to the government of unused land, but often it can be reserved for many years. Increasingly, however, mining companies are recognizing the benefits of surrendering less prospective parcels of land for possible reallocation to small-scale miners. Such action demonstrates their community responsibility and lessens the chances of illegal mining on their property (see Chapter 6).

For the most part small-scale mining legislation focuses on permits, taxes, marketing and, sometimes, environmental management. While small-scale mining legislation rarely addresses labour and social issues directly, the very fact of improving the framework under which small-scale mining operates, increasing monitoring and control, and providing technical and legal advice to small-scale miners, will lead to greater prosperity and so to better working and living conditions for those involved.

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## 6. Large-scale and small-scale mining: Cooperation or confrontation?

Established mining companies are wary of the activities of small-scale miners for many reasons, often with some justification, particularly when they encroach on mine property. The actions of illegal miners not only affect a mining company's day-to-day operations, they have implications for the community, national mineral development, and thus for the national economy. Companies can face considerable difficulties if they choose to become directly involved in removing small-scale miners from their concessions. Such action can make them vulnerable to accusations of human rights violations, attract the hostility of miners (even their own workers) and prompt direct protest action. As a result, many mining companies find that diplomacy works better than physical security measures. For example, it is better for a company to try to find employment for some of the small-scale mineworkers, or take small-scale mining under its wing, than to shut them out and hope the problem will go away.

There is a school of thought that questions whether the benefits of small-scale mining are less than the costs arising from occupational and community health and environment problems, and the risk of dissuading large mines from starting operations. But small-scale miners often hold the moral high ground, especially if dispossessed of their former livelihood in favour of a large mine, and it ill behoves large mining companies to trample over them. Fortunately there are some striking examples of how careful cooperation between large and small mines, with or without the government as an intermediary, can enhance the activities of the latter and the credibility of the former, provided they work together.

Areas in which larger mines could be of assistance to small-scale mining include:

- providing affordable assaying services;
- sharing geological and other technical information with small-scale miners;
- providing practical training and technical advice;
- helping to set up or sponsor small-scale central processing plants;
- buying services, tools and equipment from the local community;
- assisting with the procurement and storage of explosives;
- providing custom milling services and workshop facilities;
- buying and treating tailings (directly, not through intermediaries);
- releasing land that is suboptimal for large-scale mining;
- providing emergency assistance and mine rescue.

It is important to bear in mind that large mines have often been the training ground (through employment) for small-scale gold miners.

The need for new mining investment in developing countries has often led to a relaxation of mining legislation to create incentives for foreign mining companies. In some cases this has meant discrimination towards small-scale mines, particularly as regards the length of leases and the conditions of their renewal. For example, incoming mining companies often want to include land used by small-scale miners in their exploration leases. Small-scale mining leases are often issued for relatively short periods (two or three years) and when they expire they are often reassigned to larger companies rather than renewed. Understandably, this is a cause of considerable resentment — towards the mining company rather than the government. If the company is in a hurry, it will generally be encouraged to negotiate directly with the small-scale mining leaseholder — buying the lease or promising to employ those concerned in exploration or in future mining activities. In some cases inhabitants (often small-scale miners) are resettled once a new mining lease has been awarded. So they not only lose their land but their homes too. Many return to mining, but now it is illegal. Also, where previously they might have been able to use some machinery it now has to be all manual, further affecting productivity and income.

The recognition of small-scale miners' traditional role and acquired rights is prompting some large mining companies to divest themselves more quickly than is legally required of properties that they judge to be not prospective, notably in several African countries. In so far as such disposals are willing and not merely expedient, the companies have accepted that they have a role to play in assisting the small-scale mining sector — and this is an efficient “arm’s length” way of doing so. But how much further does the responsibility of a large mining company towards small-scale mining go? Releasing mineral rights is one thing; providing material support and assuming some kind of overall responsibility is another.

In developing successful partnerships with small-scale miners and their community it is important that the company communicates its needs in a non-threatening way, at the same time learning the community’s wants and trying to incorporate them into the company’s strategy for development and operation. Critical issues for the company and the community include:

<b>Company</b>	<b>Community</b>
Avoid confrontation with small-scale miners	Maintain access to viable mining areas
Keep small-scale miners out of main working areas	Improve quality of life
Achieve stable, long-term relationship with community	Have opportunities for stable employment
Avoid uncontrolled influx of people	Acquired rights as miners respected
	Economic impact of mine in the community maximized

There are several approaches to developing a relationship between large and small mines, from cooperation to confrontation (see box 6.1).

<b>Box 6.1</b>		
<b>Different approaches to the relationship between large and small mines</b>		
<b>Approach</b>	<b>Action taken</b>	<b>Outcome</b>
Institutional cooperation	<ul style="list-style-type: none"> <li>• Government develops positive policies in conjunction with company and small-scale miners</li> <li>• Company and small-scale miners develop positive relationship</li> </ul>	<p><b>PEACE</b></p> <ul style="list-style-type: none"> <li>• Complementary company and institutional efforts</li> <li>• Development of area around the mine</li> </ul>
Informal cooperation	<ul style="list-style-type: none"> <li>• Company wants to develop positive relationship with small-scale miners</li> <li>• Government provides no support; ignores small-scale miners and/or tries to reduce their numbers</li> </ul>	<p><b>UNSTABLE PEACE</b></p> <ul style="list-style-type: none"> <li>• Company in conflict with government policy by allowing small-scale miners to work</li> <li>• Possible conflict with other mining companies</li> </ul>
Informal war	<ul style="list-style-type: none"> <li>• Government has positive policy towards small-scale mining</li> <li>• Company decides to evict miners from property</li> </ul>	<p><b>CONFLICT</b></p> <ul style="list-style-type: none"> <li>• Small-scale miners react against company</li> <li>• Development but no integration with community</li> <li>• Significant security risks</li> </ul>
Institutional war	<ul style="list-style-type: none"> <li>• Government decides to stamp out small-scale mining</li> <li>• Company decides to evict miners from property</li> </ul>	<p><b>CONFLICT</b></p>

Source: P. Morris: *Managing relationships between Placer Dome, Inc. and artisanal miners at the Las Cristinas project in Venezuela*, paper prepared for the World Bank International Round Table on Artisanal Mining, Washington, DC, May 1995.

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When mines, especially state-owned mines, have closed the situation is clearly different from that which may prevail where small-scale miners are working on or adjacent to active mining operations. In Bolivia and Ecuador, for example, tin and gold miners are active in former mines, treating the tailings or working in now closed mines. Cooperatives of small-scale tin miners in Bolivia pay COMIBOL a small percentage of the value of production for the right to treat waste dumps or to work in the company's former mines. Groups of gold miners in Ecuador have entered old, long-closed gold mines, revisiting and extending the old workings or removing and processing waste material stored underground with the knowledge of the Government but without title or leases. But a new, large mine in one area has gone to extraordinary lengths to keep small-scale miners from encroaching on its lease (where they used to work); it is completely surrounded by a high wall with watch towers and armed guards.

The following examples of interaction between large and medium mines and small-scale mining illustrate some of the issues and a range of approaches to deal with them.

## **Interaction between large and small-scale mines**

### **Bolivia**

In Bolivia an exploration company has entered into an agreement with a society of small-scale miners in San Simón whereby:

- the company agreed to suspend all legal action against the small-scale miners;
- the small-scale miners agreed to legalize, with the company's help, their society;
- the small-scale miners agreed not to jeopardize the exploration activity;
- the small-scale miners agreed not to increase the membership of their society;
- the small-scale miners agreed not to sign any agreements with third parties;
- the company granted the small-scale miners rights to mine and undertake subsequent processing under certain conditions (defined areas, maximum daily production, no heavy equipment);
- the company agreed to pay the small-scale miners 1.5 per cent of the net smelter returns in the event that large-scale mining took place;
- the company agreed to absorb the manpower of the society in the event of large-scale mining;
- the company agreed to assist in the provision of materials for the construction of a school and medical post;
- the company agreed to help the society to acquire another mining concession.

In mid-1998 the company had met its part of the agreement; the society only partially. Nonetheless, good relations between the two prevail. The society has more problems with illegal miners from Brazil with whom several confrontations have taken place, some with fatal consequences.<sup>1</sup>

### **South Africa**

When a group of managers at a South African coal company (Ingwe) sought to set up their own small-scale coal mine, they had problems in identifying suitable reserves and in attracting finance. They eventually obtained from Ingwe a lease over a small area that was unsuited to underground mining. Ingwe also provided limited bridging finance (which is being repaid by a toll on production), technical assistance and managerial input, mining layout plans and environmental management capacity. The small company (Kuyasa) pays a royalty to Ingwe,

<sup>1</sup> Hentschel et al., op. cit.

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which has agreed to buy all its production. Finance remains a problem. The 10 million tonne coal deposit was not accepted as collateral and finance was only offered at very high rates of interest or involved unacceptable equity sharing arrangements. However, the mining contractor agreed to wait for payment until the product was sold and also posted an environmental rehabilitation bond on the company's behalf. This experience shows that even a small-scale mining company with experienced, well-qualified and determined people can have difficulty obtaining finance. It highlights both the need for innovative and flexible financing arrangements for small-scale mining and the benefits of links between large and small mines.<sup>2</sup>

Also in South Africa, small-scale miners in Kimberly are seeking access to dumps of sub-standard ore or processing waste at large mines. Improvements in processing technology, however, have meant that some old tailings dumps are at least as rich in metal content as the ore that is currently being mined and processed. Many mines, therefore, particularly those that are coming to the end of their life, include these dumps as part of their strategic reserves. When some dumps have been made available to small-scale miners, the mine has been accused of keeping the best for themselves, depriving small-scale miners of higher grade material to which they feel they should have access.<sup>3</sup> So "giving away" mineable material is not straightforward. Small-scale miners need to have the results of assays so that they know what is being offered and can make an informed decision about what to do and how best to exploit the material.

Since tailings dumps are inevitably on mine property, the question of responsibility for the safety and health of the small-scale miners arises. In most legislation the mine management is responsible for all those working on mine property. So unless some means of supervision and appropriate work practices can be established, few mine managers would want to be involved. There are also often problems of theft from current operations, especially when gold and diamonds are being mined.

## Namibia

In Namibia a group of small-scale miners has been assisted in establishing legal, safe, economically viable tin mining following the cessation of mining by a company which for many years bought tin concentrates from small-scale miners at Uis. With careful planning, technical and organizational assistance and with full cooperation between the project and the community, a group of informal sector miners has been transformed into a relatively well-organized mining unit, even though profitability is low.<sup>4</sup>

## Zimbabwe

Prior to the establishment of the Shamva Mining Centre (SMC)<sup>5</sup> in 1989, small-scale mines in the area used the services of the nearby larger, formal mines for milling their ore for a fee. The owner of one such mine also provided some technical assistance to the small-scale miners in the area, and allowed them to use his magazine for storing their explosives. The SMC provides

<sup>2</sup> "Kuyasa: SA's first black-owned mining firm", in *African Mining*, Sep.-Oct. 1998, p. 75.

<sup>3</sup> M.H. Solomon: "Small and mid-scale mining in South Africa: Beyond the rhetoric", in *Raw Materials Report* (Stockholm, Raw Materials Group), Vol. 12, No. 3, 1997, pp. 23-30.

<sup>4</sup> For more information on the project at Uis in Namibia see the following articles in *Raw Material Report*, op. cit.: H. Gustafsson: "Small-scale mining in Uis: A balance between men and mechanization", pp. 25-19; E. Hawala: "Uis tin project: Setting the stage", pp. 20-21; M. Ericsson: "Uis small-scale mining: Conclusion", p. 22.

<sup>5</sup> For more information about the Shamva Mining Centre, see Intermediate Technology Development Group (ITDG): *Report on the Shamva Mining Centre Project* (Harare, 1994); E. Bugnosen: *Approaches to providing appropriate technology to small-scale miners*, paper prepared for the World Bank International Round Table on Artisanal Mining, Washington, DC, May 1995.

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such extension services, as well as custom milling facilities. The most important of these for many small miners is the availability for hire of a pneumatic drill to drill the holes for blasting. The manual alternative requires two or three days' work to drill a 50 cm hole. The Centre also provides training for small-scale mineworkers and mine owners in various aspects of mining and processing. Unfortunately, opportunities for collaboration between large and small mines beyond the level of that provided by the SMC are limited. The major mine in the area is over 1,500 metres deep. It treats about 30,000 tonnes of ore a month using cyanide leaching to extract the gold. This mine is several orders of magnitude larger than the small-scale mines, operating at levels of technical sophistication and mechanization that are of little relevance to the problems facing the latter. Nevertheless, it does make its assay services available to small-scale mines for a modest fee. There are 80 large and medium mines in Zimbabwe that have a "proto team" — a team of miners trained in the use of self-contained breathing apparatus and first aid, who are available on call to recover persons from hazardous mining situations. In the past these teams have been used to rescue small-scale miners trapped by falls of ground, often with accompanying injuries. But they are specifically prohibited from putting their own lives in danger in order to recover bodies.

## Ghana<sup>6</sup>

A gold mine in western Ghana, a former state-owned mine purchased from the Government by Gold Fields (Ghana), had severe problems with over 5,000 illegal small-scale miners on what had become its property. When the mine was government-owned, little heed was paid to them since their surface and near-surface mining did not interfere with the deep underground mine. Before they were finally evicted by force in 1997, after three years of effort by other means, there were over 4,000 illegal miners on the property working in 113 mine shafts up to 90 metres deep in areas earmarked for a new surface mine. These miners were not only working in their "own" shafts; they were also stealing from the company's ore stockpiles (sometimes in the presence of company personnel who were prevented from operating their machinery for fear of causing injury), extracting material from the tailings dam, working in abandoned underground shafts, and rushing underground in the existing mine immediately after blasting (before the company's miners were allowed back in accordance with safe practice) to steal newly blasted ore from operational shafts. There was also considerable theft of production equipment and tools. Threats and bribes were used against the mine's personnel to gain access to the underground workings. When tension escalated, as happened here and at another mine in Ghana, personal attacks occurred, weapons were produced and equipment was vandalized.

Local law-enforcement officers acting to get rid of the illegal workers from the Gold Fields (Ghana) mine have managed few arrests and convictions (20-50 a year), compared with the number involved (over 4,000). The company points to the use of stimulants and alcohol, recourse to prostitution, the bidding up of retail prices, and the diversion of resources from other productive activities as the major adverse social and economic effects of illegal mining, plus severe environmental effects from abandoned sites, polluted streams and deforestation. Legal small-scale mining also has a similar impact, but the Government seems unable to act.

The company is concerned that illegal mining not only deprives it of immediate revenue, but it can also result in much larger quantities of ore becoming uneconomic since the illegal miners have taken the "cream". Moreover, the rate of gold recovery by these miners is very low (less than 50 per cent of the gold in the ore) so the loss to the large mining sector and the country as a whole is compounded. If the small-scale mining were on a legal footing, confined to dedicated areas, for example, there might be some scope for the large company to buy the tailings of the small miners, as is done elsewhere, paying a proportion of the value of the gold they

<sup>6</sup> The following is drawn in part from Gold Fields (Ghana) Ltd.: *Addressing the galamsey problem: The view from Gold Fields (Ghana) Ltd., Tarkwa*, internal report, 27 May 1996.

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contained. The company is also concerned about the uncertainty that can be caused by illegal small-scale mining. It can affect the pace of mine development, delaying subsequent cash flow and affecting profitability. There is clearly a need, therefore, for large mining companies to focus from the start on the issue of small-scale mining on or near their leases and develop strategies to address it, taking into account local practice and government control, if any.

Gold Fields (Ghana), based on its own experience, has proposed a three-pronged approach to dealing with illegal small-scale mining: strengthening small-scale mining; encouraging economic development; and ensuring the enforcement of regulations. This strategy that requires a concerted government effort and the cooperation of large mines small-scale miners and local authorities. Firstly, the framework for legal small-scale mining sector should be structured so that there is no incentive for people to turn to illegal mining. Collaboration between large mining corporations, representatives of small-scale miners, including illegal miners, and government mining authorities should be established with a view to studying the issuing of mining licences, the nature of the regulatory framework, taxes and royalties, access to finance, other disincentives to legal mining that need to be overcome, and the need for and nature of technical and institutional support. Gold Fields (Ghana) believes that mineral reserves that are suboptimal for a large mine should be identified and set aside for small-scale mining (although the problem of access to "sub-standard" resources mentioned in the context of tailings dumps above would need to be addressed). The second strand of action is to expand employment opportunities in the region through the promotion of economic development, since illegal small-scale mining is a subsistence activity driven by poverty. Some of the taxes and royalties from large-scale mining could well be directed to improving local economic development and economic diversification, for example by promoting the development of industries to supply mining needs, including services, rather than importing them. Mining companies, for their part, could be more active in promoting local fabrication and purchase. Finally, there is a need to ensure that all the laws that protect legitimate mining operations are enforced by the appropriate authorities instead of the companies needing to employ their own extensive security services, which often increases tension between them and the community. The necessity for high walls and armed guards because of the absence of an effective police presence is a major source of unease, especially if large mines are perceived to be "taking the law into their own hands".

There are clearly benefits in working in a non-conflictive way towards a "win-win" solution that will assure uninterrupted large-scale mining side by side with viable, safe and legal small-scale mining, as the following example shows.

## Venezuela<sup>7</sup>

Placer Dome has put in place a number of initiatives as part of a programme of institutional cooperation with small-scale miners at its Las Cristinas mine in Venezuela:

- implementation of a programme to improve public services (health, education, water, sanitation) through self-help initiatives with the local community;
- assessment of the viability of providing technical assistance to small-scale miners to allow them to operate in a profitable and environmentally acceptable manner;
- maximization of direct local employment opportunities through the provision of training in basic skills and helping to raise the general education level in the towns;
- supporting local mining associations to encourage self-control over the number of small-scale miners on the property;
- commencement of a small business development strategy;

<sup>7</sup> The following is drawn from Morris, op. cit.; and J. Davidson: "Building partnerships with artisanal miners on Las Cristinas: The Mínera Las Cristinas experience in southern Venezuela", an updated version of a paper in *Mining Environmental Management*, Mar. 1998, prepared for the ILO.



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- maximization of local purchases to the extent possible;
  - opening discussions with relevant government agencies to encourage them to formalize their policies towards small-scale mining, support company strategy and accept their responsibility for the supply of community services.

Minera Las Cristinas (a joint venture between Placer Dome Venezuela and Corporación Venezolana de Guyana (CVG)) is constructing a 40,000 tonnes per day (tpd) surface gold and copper mine in Venezuela at a cost of about \$600 million. When it is operational the mine will have a permanent workforce of about 800. A 126 hectare part of the concession has been set aside for a 40 tpd small-scale gold mining project that is being implemented jointly by the company and a local NGO (Asociación Civil de Mineros Artesanales "Los Rojas"). The project will employ about 150 people directly. Since 1994 the company has invested over \$1 million in cash and kind in support of the "Los Rojas" Association and many local people have committed themselves to the success of the project, which is an integral part of the larger project and is included in all cost estimates and in the environmental and social impact statements and permit applications. Why?

Small-scale mining at Las Cristinas has a long history. Over 10,000 people were involved in mining gold in the 1980s, using hydraulic jets, gravel pumps, large sluices, trucks and loaders. Gold panners followed along behind or worked independently. Much mercury was used and spilled and almost half the 4,000 hectares were seriously affected by hydraulic mining. Following the consolidation of land holdings by CVG, which meant taking highly prospective areas from small-scale miners (as a means to try to control illegal mining), the exploration and development rights were sold by auction in 1990. When exploration started 4,000 people lived and worked on the concession. Nearly 3,000 of them were resettled by CVG on two adjacent sites and were provided with land, basic building materials and water. All the buildings on the concession were razed to the ground and all small-scale mining stopped before Minera Las Cristinas took formal possession in 1992.

Although people had been resettled, they now had no land on which they could legally mine and no alternative opportunities for work. Nor was any attempt made to organize mining or other employment. Consequently, illegal mining soon started on Las Cristinas and on an adjacent site. It was the sole means of livelihood for all the resettled people. The lack of investment in basic infrastructure at the new settlement meant that living conditions remained primitive long after the move (electricity was not connected until 1997 and water and sanitation are still major problems). Not surprisingly, the problems of the relocation plus a number of other factors led to a strong distrust of the company by the small-scale miners. These factors include:

- low levels of education and skills;
- lack of employment opportunities;
- lack of property and tenancy rights;
- insufficient or inadequate housing;
- lack of basic public services (health, water, sanitation, electricity, education, recreation) and consequent public health problems (malaria, parasites, sexually transmitted diseases);
- lack of access to mineral resources.

The resulting increase in tension between the small-scale miners and the company spilled over into a variety of public protests.

The company realized that it had to assess the risks of illegal small-scale mining to its operations and see what could be done to minimize them. The fact that the security of the project and the economic well-being of the community were linked meant that it had to do something to establish good and lasting company-community relations. An independent assessment of the local mining and community situation identified the local concerns and viewpoints and helped reduce tension between the company and the community. It also became clear that the Government was unable to deal effectively with illegal small-scale mining. The company's recognition of the

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community's right to expect a more secure livelihood following its resettlement led to exploratory discussions on reaching a formal accommodation between them. These converged around the idea of setting up a small-scale mining operation on a part of the concession.

The Los Rojas area, which was suggested by both community leaders and company managers, was a fortuitous choice. Already part of the concession, Los Rojas was a long-standing small-scale mining site — an area of known prospectivity which the local miners had long experience with and faith in and which, most importantly, was still perceived by them as desirable. Half of the miners still working illegally on the property could be found there. It was also of marginal interest to the company in the medium term. Los Rojas had the advantage of lying on the easternmost edge of the Las Cristinas project area, away from the target mining areas but close to the two resettlement communities. The company agreed that work at Los Rojas could continue and that it would tolerate *bateeros* (gold panners) on the main property provided they did not interfere with exploration activity. These agreements, together with the use of unarmed security guards led to a reduction in tension, if not in the number of small-scale miners working on the property.

The project's long-term objective was to establish a legal, secure work opportunity for miners from the local community that would be less chaotic, if possible more productive, safer and more environmentally responsible than historic artisanal operations in the area had been. The concept was gradually to replace traditional forms of mining with a system involving mechanized overburden removal but the selective removal of the gold-bearing material by hand. The processing objective was to develop and install milling options that would forgo the use of mercury without affecting the level of gold recovery and income.

From the company's perspective, such a project, even if only partially successful, would achieve an underlying goal — creating new possibilities for openness and stability in the relationship between it and the community. The company foresaw another potential benefit — an organized, semi-industrial, small-scale mining operation that could become an important source of trained semi-skilled local labour for the large mine and the processing plant. From the community's viewpoint, the project had the potential to address a continuing community concern — security of livelihood — and improve the quality of life of the miners, their families and the local communities in general.

By the end of 1995 the company had committed resources and personnel to the project, including the hiring of a full-time project director. For their part, a group of artisanal miners and community leaders formed an ad-hoc committee to promote local participation in the project. The new challenge became to develop and implement a project that would clearly benefit both parties.

The Small-scale Mining Project (*Proyecto Pequeña Minería*) of Minera Las Cristinas was inaugurated in early 1996. By the end of that year the following progress had been made:

- organization, registration and initial membership of a village-based artisanal miners' association;
- creation of a company technical support group based at Las Cristinas;
- establishment of a *provedurta* (food store) owned and operated by the Association in one of the resettlement villages;
- negotiation of a memorandum of understanding between the Association and the company;
- initial infrastructure development;
- definition of needs for securing the legal status of the project;
- setting project area boundaries, implementing near-surface exploration programme and reserve assessment, additional metallurgical test work and evaluation of existing local and regional milling options;
- completion of independent socio-economic impact assessment and forest inventory;
- introduction of organized security and safety inspections in the project area, new operating standards and work practices under the supervision of the Association.

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The year 1997 saw:

- the commissioning of the meeting and administration centre;
- the excavation of three supervised calicatas; completion of near-surface drilling in the principal mining zone;
- purchase of *proveeduría* building and expansion of services;
- organization and expansion of the group of collaborating members working on security and safety, road and facilities maintenance, the *proveeduría*, and project administration;
- opening of field infirmary with a full-time paramedic, equipment and supplies; initiation of medical checks and treatment of working miners;
- expansion of company technical support group, with project geologist, laboratory/mill foremen and exploration technicians;
- completion of preliminary training needs assessment;
- study trip to Bolivia with Association and technical support group representatives;
- updating of Association membership lists; registration of non-members working in the mining area;
- completion of application for environmental authorization; approval to proceed with construction of the mine, mill and environmental control facilities;
- completion of metallurgical testing and preliminary mill design; installation of provisional non-mercury mill.

During 1998, despite major reductions in activity, staff and overall expenditure by Minera Las Cristinas, the project continued to advance in the following ways:

- first-stage processing of all run-of-mine ore within Los Rojas;
- set-up of a final processing and collection centre off the property;
- design and construction of mill tailings impoundment and sediment control structures;
- final upgraded gravity mill design, purchase of new equipment, layout and preparation of site, installation of new plant;
- initiation of reforestation project;
- election by Association members of a new Board of Directors;
- approved interim agreement between the Association and company regarding the development of the Los Rojas area, and the rights and obligations of the two parties.

Even after three years of substantial progress many challenges remain, including:

- balancing the needs and interests of the parties involved;
- building confidence and overcoming suspicion;
- developing local technical and organizational capacity through education and field experience;
- expanding the participation of the Association membership in the project implementation process;
- fostering government-agency support, both domestic and international;
- introducing appropriate technical and organizational innovations to mining and milling practice.

For Placer Dome and the small-scale miners the Los Rojas project is more than just an effort at managed mineral resource sharing; it is a community-based social and economic development project, built on the concepts of co-management and joint decision-making. Apart from the normal challenges of operating a small mine in an efficient and profitable way, the project's greatest remaining challenge will be to smooth the transition from ad hoc, wasteful and environmentally reckless artisanal mining to work practices that are an organized, productive, safe and equitable. In three years there have been significant positive changes — in work

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practices, in business organization, in environmental awareness and, most importantly, in the way both large and small miners have come to understand and view each other and themselves.

There are some clear and useful lessons to be learnt from the foregoing experiences which, when adjusted for local conditions, could form the basis of broader company-community development in other regions using small-scale mining as the fulcrum.

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## 7. Assisting small-scale mining: Benefits from coordination<sup>1</sup>

Many projects to assist small-scale mining have failed or have not led to lasting improvements because they have treated small-scale mining as a subset of large, formal mining. For the most part, emphasis has been on finding technical solutions to mining and processing problems, with scant heed being paid to the underlying economic, labour and social issues. Another factor in their relatively short-lived success has been the low priority given by governments to small-scale mining. So once a project has been left to stand on its own, it has often gently wound down due to a lack of continued government support or supervision. Fortunately, the relatively recent recognition that much small-scale mining is closely related to poverty has led to a reorientation of assistance programmes to ensure that the underlying aspects are included when assistance is provided, giving a greater chance of sustained improvements being achieved.

### What is being done?

IGOs, NGOs and some large mining companies are assisting small-scale mining, either directly or by supporting national bodies such as ministries of mines and their offshoots. But there is little coordination between them, which can reduce their effectiveness or lead to a duplication of effort. Information provided by different agencies and from answers to the questionnaire shows there are several countries where two or more IGOs, let alone bilateral donors or NGOs, have small-scale mining projects. Moreover, piecemeal solutions are seldom able to be sustained in the longer term because of the close interaction between the different issues affecting small-scale mining. Fortunately, the necessity of an integrated approach is now widely recognized. While a comprehensive programme of assistance is likely to be costly and less easy to organize than individual action, it would have several advantages for the agencies concerned and for the recipients. The nature of IGO operations means that there will be several conceptual and practical difficulties to be overcome if genuine partnership is to be achieved. But these are by no means insurmountable and there is already a recognition that, in days of shrinking budgets, joint funding and a broad approach to achieving integrated solutions to the problems of small-scale mining will be attractive to donors and recipients alike (see annex).

### World Bank

The World Bank has taken up suggestions for greater coordination on small-scale mining made at several international meetings, most recently in 1997 (annex). The Bank is proposing the establishment of a consultative group for artisanal and small-scale mining development.<sup>2</sup> In view of the differences in administrative requirements of different IGOs, donors and governments, all assistance to small-scale mining would be coordinated by this group, which would be responsible for developing policy guidelines, providing advice, collecting and disseminating information on best mining, processing and environmental practices (including labour and social matters), and raising and disbursing funds for the implementation of assistance projects. Funding for the activities of the group would come from bilateral and multilateral donor agencies, international NGOs, mining companies and governments. The group would support successful projects submitted in international competition and successful bids for projects designed or commissioned by members of the group and would disseminate the results or replicate successful projects in

<sup>1</sup> Much of the information in this section has been provided to the ILO by the organizations concerned.

<sup>2</sup> World Bank, Industry and Mining Unit: *Proposal for a global consultative for artisanal and small-scale mining development*, letter to ILO and others, Aug. 1998.

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other countries. In carrying out these activities it is envisaged that the small-scale mining sector would be materially assisted in becoming legal, regulated and economically viable. There would be a reduction in the adverse social, cultural and environmental impact of small-scale mining, together with a reduction in tension between small and large mines. Such a broad approach would have considerable benefits for small-scale miners, small-scale mining communities, national, state and local governments, and large mining companies — the ultimate “win-win” situation.

The World Bank’s approach to poverty reduction — strengthening the income-earning capacity of labour-intensive activities while improving productivity and environmental sustainability — is well suited to small-scale mining and, if properly carried out, can have a positive effect on poverty alleviation by increasing rural employment and income. At the same time, successful small-scale mining can reduce environmental, social and cultural damage that is often associated with unregulated illegal mining. The Bank’s ultimate goal is to establish a vibrant endogenous mineral development sector that will strengthen national and local economies, both of which are prerequisites for sustainable development.

The general thrust of the World Bank’s lending in the mining sector is to provide policy advice to governments and to support the private sector. Recent technical assistance has concentrated on legal and regulatory reform, institution building, the establishment of competitive fiscal regimes, the privatization of state-owned enterprises, and the provision of adequate geological databases. The Bank’s objectives that affect small-scale mining are: the promotion of partnerships among mining stakeholders; ensuring environmentally, socially and culturally acceptable mining development; regularizing small-scale mining; and being a repository of best practice for the mining sector. As part of its overall mining programme, the Bank is currently financing projects in Burkina Faso, Ecuador, Ghana, Guinea, Mali and the United Republic of Tanzania that emphasize the links between legal, regulatory, technical, financial, environmental and social issues in small-scale mining.

In *Burkina Faso* the small-scale mining component of a mining capacity-building project supports programmes to: study the socio-economic, geology and environmental issues that are specific to small-scale mining, with a view to determining a strategy for providing extension services; establish a pilot training centre for small-scale miners (replicating it if successful); support the delivery of technical and geological advice and extension services by the relevant government agency; assess mechanisms to evaluate the financing of small-scale mining; promote the identification, development and dissemination of small-scale mining equipment through private sector delivery mechanisms; and implement, in coordination with the mining ministry, an environmental sensitization and awareness campaign in small-scale mining communities.

A project of mining and environment technical assistance in *Ecuador* consists of a policy management component to help restructure and strengthen mining institutions, and a policy implementation component to assist the Government in relation to the mining sector. This latter component includes development assistance to small-scale miners, consisting of technical assistance to enable the mining directorate to demonstrate the use of simple, more effective and environmentally neutral mining, concentration, and ore-recovery techniques and equipment to improve production and minimize the release of toxic substances into the environment. In addition, an environmental sub-component will assist the environment directorate to mitigate the impact of mining on the environment and on the health of mining communities.

In *Ghana* a mining sector development and environment project has two components related to small-scale mining. One deals with strengthening mining sector institutions through the provision of support to the Minerals Commission to improve its organizational structure, review existing monitoring and enforcement practices, develop guidelines and standards for implementing sectoral and environmental regulations, and establish a minerals and environmental information system. This component will also provide support to the mines ministry to enable it to carry out its inspection, monitoring and enforcement responsibilities, and to assist small-scale miners in the application of the new technologies developed under this project. The second component consists of assistance to small-scale mining enterprises through pilot testing of

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identified modules of equipment for improving both productivity and yields from small-scale mining and the dissemination of successfully tested models to determine their applicability to Ghana's conditions and their acceptability by small-scale miners. This component will also focus on making better geological information available to small-scale miners. A policy sub-component will address ways to improve the framework for small-scale mining operations, including reviewing laws and regulations, and improving marketing arrangements. An environmental sub-component focuses on the reclamation and rehabilitation of areas degraded through past small-scale mining activities as a pilot exercise to determine best practices and cost-effective methods for future reclamation programmes.

A mining sector investment promotion project in *Guinea* comprises legal, data, institutional and restructuring components. Small-scale mining issues are addressed under the institutional component which deals with the organizational and managerial aspects of granting mining rights, controlling environmental safety and health aspects, and economic, social and regional development issues of small-scale mining, the commercialization of laboratory and applied geology services, the promotional role of the Government, and the role of the State in administering its interests as a shareholder in mining enterprises.

In *Mali* the mineral policy reform component of a mining capacity-building project consists of several studies, audits and advisory services to help the Government design and implement a new policy and strategy for the mining sector, including small-scale mining. The studies will cover the legislative, economic, fiscal, institutional, small-scale and environmental aspects of the mining sector. Implementation of the strategy will involve restructuring the institutional framework of the sector, revising the legislation and procedures, and closing and/or selling public enterprises and their holdings in mining to private investors. Strategy implementation will also involve strengthening the Ministry of Mines, Hydraulics and Energy through the long-term provision of an expert, and training government officials in mining finance and economics, negotiating techniques, metallurgy, mine management, operation, and technology.

Small-scale mining is one of three strands of a mineral sector development project in the *United Republic of Tanzania*. It will finance the collection of data, strategy formulation, information dissemination and the demonstration of simple and environmentally sensitive technologies, plus training and capacity-building support. It will also include assistance for improving small-scale mining with collaboration from UNIDO to pilot test small-scale mining equipment for improving productivity and reducing or eliminating the use of mercury in gold production. Successfully tested models will be disseminated to determine their applicability to Tanzania's conditions and acceptability by small-scale miners.

## United Nations

The Department of Economic and Social Affairs of the United Nations has a long involvement in various aspects of small-scale mining, including drafting environmental regulations and pursuing activities that enhance the contribution of small-scale mining to economic and social development at the community level, while making it a more formal activity, and promoting closer links with international financing institutions and multinational mining companies. In 1993 the Department organized the interregional seminar in Zimbabwe that led to the Harare Guidelines (see annex). Recent specific programmes have focused on Africa.

As part of a project to promote mining investment in Burkina Faso, the United Nations held an international investment forum in 1995 combined with field trips to small-scale mines and presentations on small-scale mining operations (methods, production, socio-economic and environmental impact) and on foreign direct investment in minerals development, including in small-scale mining. A new project is being developed that aims to integrate the development of artisanal mining into a multi-sectoral programme of poverty alleviation in rural areas. The feasibility of strengthening small-scale mining through ensuring the existence of enabling legislation, access to credit, technical know-how and marketing policies will be assessed in the

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light of the existing situation. A task force composed of government officials, private sector and NGO representatives, elected officials, community representatives and United Nations specialists will be set up to implement the project; it will include participants from the mining sector. In the Central African Republic, a project to assist the small-scale mining sector included two missions in 1995 that made recommendations with regard to production circuits, the creation of pilot centres, modification of existing processes, reduction of fraud, a socio-economic study, training, follow-up and control of operations, and the provision of institutional assistance. In *Chad* several international promotion days for the mineral sector were organized in 1995. Study tours oriented towards small-scale mining for project personnel in African countries with a geology similar to that of Chad were held. In *Mali* sites have been identified for the promotion of small-scale gold and industrial minerals mining, taking into account environmental issues, women's involvement and the need for access to credit. A pilot processing plant will be set up at each site. If successful, other plants will be installed in other regions. Environmental management will be strengthened and an environment manual for small-scale mining in the region will be prepared. Micro-credit schemes will be established in several rural mining regions. In *Mozambique* a project that finished in 1994 had some success in assisting the Ministry of Mines to promote small-scale mining in the country, and in reorienting the curriculum of the Geology and Mining Institute towards more practical training. But a lack of technical staff precluded the promotion of new, safer and environmentally sound production techniques. A new proposal being studied by the Government and UNDP involves the establishment of enabling conditions for small-scale mining, alleviating technical and financial constraints faced by small-scale miners and establishing community-based socio-economic development with an emphasis on the full participation of potentially marginal groups. New legislation to curtail the illegal production of gold and precious stones is about to be introduced. The new measures will consist of identifying and demarcating areas where local residents can carry out small-scale mining activities and sell the product.<sup>3</sup> They will underpin the objectives of the new project being proposed. In *Togo* following an inventory of the country's mineral potential, an analysis of the economic impact of minerals exploitation has been carried out and the market for products from small-scale mining operations assessed. Recommendations were made for the establishment of a small-scale mining centre and a programme of support for small-scale mining, including setting up viable production units.

The regional Commissions of the United Nations are also involved in assisting small-scale mining. The Economic Commission for Africa (ECA) has published several reviews on the status of small-scale mining in Africa and on strategies for its development and has contributed to regional and international fora on small-scale mining. It has provided advisory services to *Equatorial Guinea* and neighbouring countries and to some countries of the Liptako-Gourma (Burkina Faso, Côte d'Ivoire, Guinea) on the reinforcement of the institutional and legal frameworks in order to stimulate gold production from small-scale mines. ECA is currently seeking funding for two small-scale mining projects — on women in small-scale mining in Africa and for the organization of a forum for small-scale mining entrepreneurs.

The Economic Commission for Asia and the Pacific (ESCAP) has been actively involved in providing advice and training related to small-scale mining throughout the 1990s. A particular focus has been on the mining of non-metallic minerals in the least developed countries of the region. Regional seminars on environmental issues in mining have been organized with UNCTAD and held in Indonesia and Viet Nam. Each covered small-scale mining operations and environmental management. The 53rd Session of the Commission (April 1997) discussed, inter alia, mining and host communities, the integration of mining and socio-economic development, and small-scale mining, it recommended strategies for closer relationships between mining and the community and between small and large mines. The social impact of mining was covered at the Fourth Session of the Committee on Sustainable Development in October 1997.

<sup>3</sup> *Mining Journal* (London), 9 Oct. 1998, p. 276.



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The United Nations Conference on Trade and Development (UNCTAD) has recently started a programme to enhance the capacity of the public and private sectors in developing countries to address sustainable development issues arising in the context of mineral resource exploitation. The programme, which is specifically intended to facilitate consultation between companies, various levels of government and local communities, uses a framework consisting of a geographical information system (GIS) and an economic model. The GIS, which is essentially an electronic map of the area under study, is designed to illustrate socio-economic change over time, both past and projected. The economic model describes the exploitation of mineral resources and its interaction with the rest of the economy, including environmental consequences. Outputs from the model are integrated into the GIS, which is used to facilitate discussions among the various stakeholders with a view to arriving at a common understanding of the opportunities and constraints of the development process. A first pilot project is under way in Namaqualand in the Northern Cape Province of *South Africa*. It is intended to undertake similar projects in several other countries. A major information and communications project is the establishment of an Internet site, "Mineral Resources Forum",<sup>4</sup> as a framework for international cooperation on mineral resources and related sustainable development issues. This site aims to draw on the expertise of specialist organizations and individuals and to encourage interaction between the different interests working on mineral resource issues, including small-scale mining. The site is managed as a consortium of principal partners that will gradually be constituted in 1998-99. The principal partner for the environmental part of the site is UNEP Industry and Environment.

Among the specialized agencies of the United Nations, UNEP, UNIDO, and ILO have specific programmes addressing small-scale mining issues within their mandate.

## United Nations Environment Programme

Small-scale mining is included in the UNEP Industry and Environment (UNEP IE) programme on mining and the environment. UNEP IE highlights the specific areas involved in a variety of publication (journals, monographs, series), information systems (Mineral Resources Forum on the Internet in conjunction with UNCTAD) and conference presentations. The Office has joined with UNIDO (see below) to examine the role of training — for small-scale miners, mining associations and government ministries — in improving mineral processing practices and in selecting technologies to improve environmental and social performance. Specific activities that have addressed small-scale mining issues include a training workshop in *Guyana*, the preparation of a training manual, and the support of a training needs assessment and pilot training workshops in the *United Republic of Tanzania* (each in conjunction with UNIDO).

## United Nations Industrial Development Organization

UNIDO is developing programmes on environmentally sustainable development of small-scale mining and metal extraction, specifically the elimination of the use of mercury in gold production. Following the holding of an Expert Group Meeting on UNIDO High Impact Programme "Introducing New Technologies for the Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining" in 1997, UNIDO is preparing project proposals on the removal of barriers to the introduction of cleaner small-scale mining technologies.

Following the identification of "hot spot" areas (e.g. rivers and waterbodies) of mercury pollution in countries in Africa, Latin America and Asia that have very active small-scale gold mining and the subsequent analysis of the extent of mercury use, the existing legal framework of the mining sector and the barriers to the introduction of cleaner technologies, the project will demonstrate and support the development of alternatives to mercury amalgamation. At the same time, the project will improve the productivity and income of the miners through more efficient

<sup>4</sup> <<http://www.natural-resources.org/minerals>> .

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recovery and provide advice to governments on the regulation of small-scale mining and the establishment of institutional structures to assist sustainable small-scale gold mining. Moreover, as the adoption of new technologies can be hindered by legal, informational, institutional, financial, political and cultural barriers, the project will address them and propose solutions to overcome them. Additionally, as many women are involved in small-scale mining activities, the project will include activities specifically aimed at different aspects of women's involvement in order to increase their level of participation. A project in the *United Republic of Tanzania* is promoting the introduction of more efficient gold recovery and concentration methods that minimize the use of mercury and stop it polluting water courses near Lake Victoria. A workshop to improve awareness in the participating countries of the dangers of mercury pollution and the legislation required for preventing further environmental degradation was held in Indonesia in 1995. Clean technology for gold mining and processing, in particular for small-scale mining operations, was explained. The workshop provided a forum for an exchange of experience in mining legislation, waste disposal and environment management, as well as exploring avenues for future cooperation in training and the supply of equipment. Funding is being sought for a project in *Viet Nam* that will assist the Government to improve the environmental performance of small-scale tin mining and processing that is carried out by family groups at a barely economically viable level. In the *Philippines* UNIDO has commenced a programme to reduce mercury emissions in Davao de Norte. Apart from the introduction of new methods of recycling mercury, the nine-month project also covers the upgrading of the laboratories of the Department of Environment and Natural Resources that monitor the concentration of mercury, cyanide and heavy metals. Two studies will be carried out: one to measure the extent of mercury pollution in rivers and crop plantations; and another on the establishment of a small-scale mineral processing centre that will operate under controlled and sustainable conditions. About 50 people from different areas of small-scale mining will be trained in the environmental management of small-scale mining operations. The project will be used as a model for future activity to reduce mercury emissions during gold production.<sup>5</sup>

## International Labour Organization

Until recently, activities to assist small-scale mining that have been undertaken by the ILO focused on improving occupational health and safety and working conditions in small-scale coal mines, notably in *China* and *Pakistan* through the provision of training to improve the capacity of mines inspectors and rescue teams as well as upgrading the knowledge of mineworkers. A training centre for small and medium-sized coal mines was established in the early 1990s in Changsha (Hunan Province). Since then, a pilot mine safety training programme for village and township mines has been developed and is being implemented following a survey of mines to determine the training needs in the light of the nature of their operation and the education and skill levels of the mineworkers. Details of risks and accidents at these mines (see Chapter 2) show the widespread lack of awareness of safety and health matters. A national task force developed a draft training programme which has been reviewed; and the task force members have been trained and pilot training sessions run and assessed. In Pakistan, in view of the high number of accidents in small-scale coal mines, the feasibility of further assisting those involved — workers and inspectorates — to improve occupational health and safety and emergency preparedness is being examined.

In the light of the pervasiveness of silicosis, including in small-scale mining and processing, the ILO/WHO Programme on the Global Elimination of Silicosis is designed to offer countries a framework for a broad international collaboration and to contribute to its elimination as an occupational health problem. The short-term objective of the programme is to promote

<sup>5</sup> "UN funds Mindanao mercury emission reduction project", in *Business World* (Manila), 12 June 1998; and <<http://www.proquest.umi.com>>, 22 Sep. 1998.

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national programmes to reduce the incidence of silicosis. The long-term goal is to establish international cooperation on the global elimination of silicosis as an occupational health problem in 30 years.<sup>6</sup>

More recently, following the establishment of IPEC (see Chapter 4), programmes to prevent child labour in small-scale mining are being developed in a number of countries. In the *United Republic of Tanzania* in 1994-95 IPEC supported an action programme implemented by the Tanzania Chapter of the African Network for the Prevention and Protection against Child Abuse and Neglect (ANPPCAN), an NGO, aimed at the sensitization of teachers, parents and community leaders in 36 villages surrounding gold mine sites in the Mbeya Mwanza and Arusha regions. Hazardous child labour persists in different mining sites across the United Republic of Tanzania. The gold and diamond sites in Tunduru, Chunya, Geita and Kahama districts have been identified by researchers and study visit teams as having a high incidence of child labour. Children as young as 10 years old work under dangerous conditions. They are invariably underpaid and subjected to different forms of abuse. Consequently, since 1998, IPEC has been supporting the Tanzania Federation of Free Trade Unions in the implementation of a project aimed at:

- the withdrawal of 500 children from mining work in five districts of the United Republic of Tanzania and their reintegration with their families and/or in school;
- the establishment of community level committees on child labour at the mining sites;
- the sensitization on child labour of employers, union and community leaders in the five districts;
- the negotiation of collective agreements with mining employers to prevent and eliminate child labour at these sites.

In *Nepal* in 1996-97, CPC-Nepal, an NGO, implemented with IPEC's support an action programme on the prevention and elimination of child labour in quartz mines in Taplejung district in the north-east of Nepal. Children of poor villagers, some as young as 11 years old, are often employed in the mines of this mining district. The programme aimed to prevent children working in mines and withdraw those who are and provide them and their families with alternatives. Land was provided by a mining company on which a school was built for the working children. Day care was also provided to pre-school children. Health and nutritional services were provided to the mining community where the target children lived. Parents of working children received functional education as part of awareness-raising on child labour and assistance was given to mothers of the target children to undertake income-generating activities through the use of a revolving fund.

In 1996-97 IPEC supported PRRM, an NGO in the *Philippines*, in the implementation of an action programme aimed at obtaining comprehensive baseline information on child labour in small-scale mining in the province of Camarines Norte and identifying working children in the small-scale mining communities. This action programme also sought to lobby and gain support of provincial, municipal and local officials in the elimination of child labour in these mining communities.

In *Peru*, many children work in mines under precarious conditions (see Chapter 4). The mines are often located in remote regions that lack basic necessities such as electricity, potable water and adequate infrastructure for sanitation. Children as young as six years old work long hours in the gold mines, without protection against injuries and accidents. Since 1998 direct assistance projects are being implemented with IPEC support in Santa Filomena and Mollehuaca. These projects will benefit approximately 1,000 children aged 6-18 and their families. The

<sup>6</sup> I. Fedotov: "Global elimination of silicosis: The ILO/WHO International Programme", in *Asian-Pacific Newsletter on Occupational Health and Safety* (Helsinki, Finnish Institute of Occupational Health), Sep. 1997, pp. 34-35.

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objective is to withdraw children from hazardous work and rehabilitate them through education, skills training and other support services. Activities will be carried out to sensitize the mining communities and mobilize them to take action against child labour. Parents of working children will also be trained so they can seek and engage in alternative income generating alternatives.

The outcome of the present tripartite meeting should provide the ILO with further guidance on how it can best assist in improving labour and social deficiencies in small-scale mining.

## European Commission

The European Commission is funding a four-year project in *Bolivia* to promote small-scale mining, partly to contain migration and partly as an alternative to coca production as part of a much larger coca-reduction programme. The project, which started in 1998, focuses on poor communities in the Potosí, Oruro, La Paz region whose already parlous situation was made worse by the mining crisis and the closure of the COMIBOL mines that underpinned employment. As a result, people have either left the region or turned to precarious small-scale mining or to coca production. The project is designed to improve the productivity and revenues of small-scale mining, improve working conditions, reduce its environmental impact and improve community services, particularly health, hygiene and education, so as to make small-scale mining a viable alternative to coca growing. Training for young people, the promotion of alternative income-generating activities and micro-finance schemes, and increasing the capacity of the local authorities to plan and manage their affairs will be important long-term parts of the project. These will be significant in view of the finite life of the mineral reserves in the region. Support for small-scale mining includes the rehabilitation and maintenance of some of the heavy processing machinery at former COMIBOL mines, transferring ownership to the cooperatives or the local authorities. Minimum safety standards will be developed and introduced and containment ponds constructed to enable the recycling of water used in mineral processing. Improvements to the region's infrastructure will focus on health (including rehabilitating a hospital and making potable water more widely available), education (including rehabilitating a school, so as to improve literacy and employment-related skills), and assisting the municipalities to improve their planning, analysis, human resources and financial management capacities. As many of the project's staff as possible will be drawn from the area.

## What assistance does the small-scale mining community want?

Answers to the questionnaire elicited a wide range of activities that could usefully be sponsored by or undertaken by development agencies and/or NGOs in conjunction with local organizations to assist small-scale mining. They fell into three broad areas: making more resources available; providing training; and providing technical assistance. Resources are sought for: the purchase of appropriate equipment and tools, including small-scale processing plants and environmental monitoring equipment; the support of projects to improve local infrastructure; enabling better access to credit; exploration activities; determining the economic viability of mineral deposits; and the preparation of mining plans. Training centres for miners and mine inspectors that focus on safety and health, environmental issues and improved mining techniques should be established. Mines inspectors should be trained as trainers so that they can provide extension services to small-scale miners. Mobile training facilities that would enable training to be brought to the workplace and thus reach many more people should be established and funded. There is also a need for management training for owners and entrepreneurs. Seminars, workshops and study tours are all seen as important facets of training. Training materials and equipment should be appropriate for both the type of mining being carried out and the educational level of the trainees. Visual, practical training materials, rather than oral or written, should be developed and used. Technical assistance is sought in a variety of areas, including: improving

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the social protection of mineworkers; reviewing, updating and harmonizing mining laws and regulations, with a particular focus on health, safety and the environment; marketing; legal procedures; setting up cooperatives; encouraging the local manufacture of tools and equipment for small-scale mining; increasing awareness of environmental issues; consolidating responsibility for small-scale mining in a single agency; and studying how to limit any adverse impact of small-scale mining on local communities, especially indigenous people.

Notwithstanding the unscientific nature of the questionnaire, there are clearly some gaps to be filled as far as providing assistance to small-scale mining is concerned. Better coordination and consultation at all levels will undoubtedly pay dividends in delivering assistance that is wanted, where it is needed and in an efficient and effective way.

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## 8. Summary and points for discussion

### Setting the scene for small-scale mining

Like most economic activities, small-scale mining has positive and negative aspects. It is closely linked to economic development, particularly in the rural sector in many developing countries; it helps to stem rural-urban migration, maintaining the link between people and the land; it makes a major contribution to foreign exchange earnings; it enables the exploitation of what otherwise might be uneconomic resources; and it has been a precursor to large-scale mining. Moreover, it provides employment for about 13 million people and affects the livelihood of 80-100 million. On the other hand, the potential of small-scale mining is far from fully realized because of the many inadequacies of the process itself and of the regulations and practices that attempt to control it. Much of the potential benefit is lost because there is no legal and fiscal framework, and because of inefficient production, processing and marketing arrangements. Uncontrolled small-scale mining can have a major adverse impact on the environment, and work in small-scale mines is often dangerous, unhealthy, precarious and poorly paid. These factors tend to reinforce one another, creating a vicious circle from which it is only possible to break out of by having in place the policies that will put small-scale mining on a stable footing and, most importantly, the programmes, the will and the resources to implement them. The social and economic complexity of small-scale mining and the fact there is no model on which to develop a sound theory or programme and a hitherto ad hoc approach to assisting it mean that change has been small and slow.

When the earlier employment figure of 6 million was estimated, the paucity of reliable data on most aspects of small-scale mining (employment, output, revenue, occupational health and safety, working conditions, environmental impact) was highlighted. Since then more information has become available. Unfortunately, however, it has shown that the number of people in precarious employment is far higher than was originally estimated, that health, environmental impact and community hygiene at mine sites leave much to be desired, that earnings are generally very low and that working conditions are often difficult, dangerous and unhealthy. The extent of the use of child labour is also better documented in some countries, leading to concerted efforts to prevent it.

Irrespective of legal definitions of small-scale mining and requirements for its registration, which often merely serve to satisfy bureaucratic requirements, the situations on (and in) the ground are varied and complex. The failure of much of the existing legislation and institutional arrangements to differentiate between and accommodate the different types of small-scale mining has been a major factor in preventing the effective delivery of assistance to small-scale mining, leading to its continued isolation and marginalization in many countries.

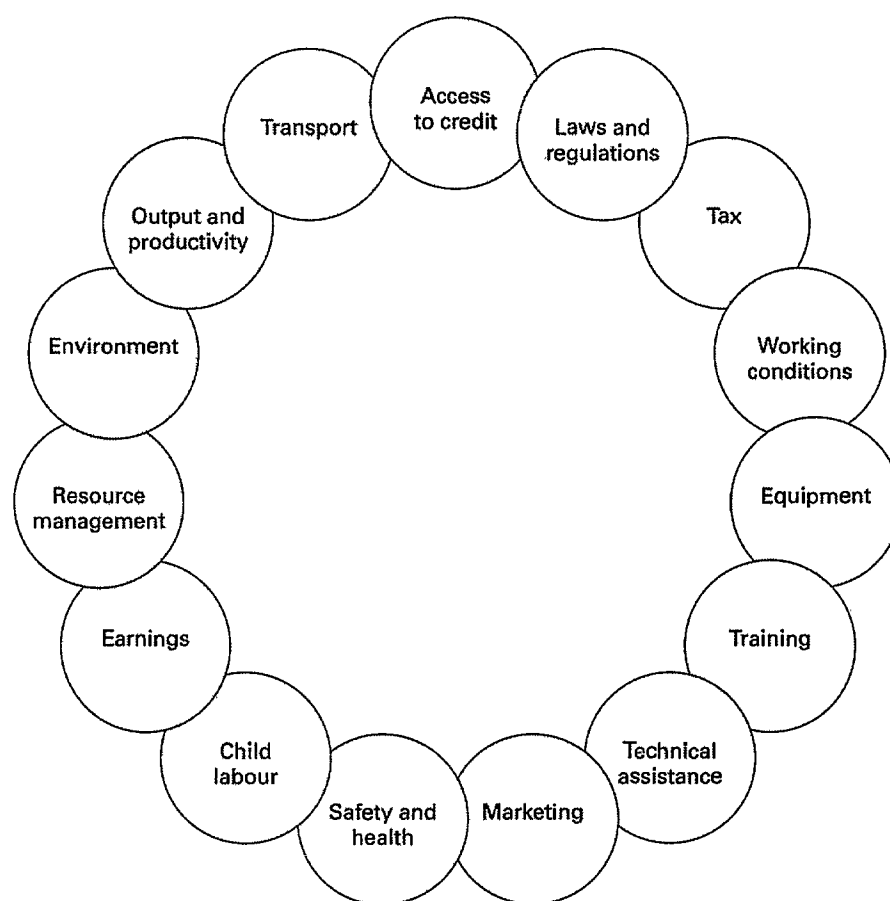
Small-scale mining can and should be encouraged by creating the operating environment that encourages the use of best practices for mining and for occupational health and safety and environmental protection. Together with institutional arrangements that provide for the effective implementation of regulations by strong, informed government institutions, this will enable small-scale mining to thrive.

The task for the new millennium is to bring small-scale mining into the mainstream. The steps that need to be taken in this regard include ensuring that title and property rights over minerals are straightforward to acquire and transfer; that access to finance for small-scale mining is on equal terms with other sectors; that labour and social issues are addressed and the working and living conditions of small-scale miners and their communities are improved; that the environmental impact of small-scale mining is minimized; and that small-scale miners have the necessary technical and business skills to ensure the safe and efficient operation of their mines. Success will assure the existence of small-scale mining as a socially and economically beneficial

activity that enriches the entrepreneurs and workers involved, together with the regions and the countries in which it takes place.

Each of the broad issues that affect small-scale mining overlaps another to some extent (figure 8.1). This report focused on labour and social aspects, drawing attention to the simultaneous need for a sound legal framework, adequate and sustainable finances, and greater coordination among the agencies and organizations that seek to assist small-scale mining.

**Figure 8.1. Small-scale mining: Overlapping issues**



## **Occupational health and safety in small-scale mining**

Occupational health and safety are important issues for small-scale miners and their communities. If real progress is to be made in dealing with accidents and diseases affecting small-scale miners, a factor will be to ensure that sufficient reliable data are available so that analysis will point quickly to the most appropriate courses of action for surveillance and treatment. For this to be possible, two things are important: a simple form for reporting accidents and disease, and the removal of any stigma that is attached to their reporting. Occupational health and safety regulations may need to be revised to ensure that the special requirements of small-scale mines are covered. Also, mines inspectorates will need to be strengthened if they are to oversee occupational health and safety and provide the extension services that are essential if small-scale miners are to be convinced that they can be more open about occupational health and safety to their ultimate advantage.

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One of the problems in addressing occupational health and safety in small-scale mines in developing countries is that the external assistance that is vital to stimulate improvement is for the most part developed from experience gained in large mines in industrialized countries. Such concepts of safety might have little meaning or relevance in a small-scale mine in a developing country, despite best intentions. Safety training must therefore be carefully tailored to accord with the linguistic, ethnic and cultural characteristics of the workforce, as well as with the industrial realities of the country or region.

While the principles of hazard management and accident prevention, especially the human factors, that are widely used in large mines are broadly relevant in small-scale mining in developing countries, their application generally is not. Small-scale mines do not have the financial or human resources to improve the design of tools and equipment (if they have any), support a continuing safety programme, or support safety training. Both mineworkers and owners/concession-holders must be helped to realize that accident prevention and improved occupational health are worth obtaining and keeping. If a mine owner/concession-holder can be convinced that supporting training to improve occupational safety and health is in his or her best interest, the chances of an effective programme being achieved are enhanced. Fortunately, there are several examples of the self-interest of small-scale miners being used to good effect to improve occupational health and safety. The discussion and duplication of successful projects can provide a fast track to improvements.

In view of the individual and competitive nature of much small-scale mining, the long hours and the arduous work, there seems to be little chance of setting up safety committees and designating "safety resource specialists" from among the workforce — a typical approach in large-scale mines. The impetus is likely to have to be external — from government, a large mine nearby, mining trade unions, NGOs or IGOs — and involve all at each site and, preferably, the local community.

Safety and health training programmes that rely on graphic or oral communication will have a greater and more lasting impact than the use of written aids. Moreover, organizations that are physically close to, sympathetic to and trusted by the small-scale mining community will be able to make the greatest contribution to education and training in safety and health. Finding and nurturing existing skills will normally pay greater dividends than relying extensively on external expertise. While overseas visits, fellowships and training can be useful in demonstrating what can be achieved with, from the trainee's perspective, unlimited resources, there is a danger that the gap between reality and the ideal is so great that disillusioned trainees or their down-to-earth colleagues will find it hard to put theory into practice at home. It may be more useful to bring external expertise, innovation and know-how to the sites concerned so that it can be adapted in situ and quickly applied, rather than being demonstrated from afar in videos, classrooms and visits to well-endowed mines and training centres.

Improving occupational safety and health requires resources. Clearly, the cost of diseases that are associated with small-scale miners and their communities is significant. It is short-sighted to look solely at the cash benefits arising from small-scale mining that, hopefully, flow into the coffers of government and local merchants without addressing the social costs that they entail. Some means needs to be found to capture and plough back into public services, such as improving health and safety, a part of the revenues from small-scale mining. Whether this is achieved by earmarking a portion of the margin on sales retained by buying agencies, by increased licence fees or by some other means will depend on national circumstances.

Education, training, demonstration and surveillance are the key elements of any programme to improve occupational safety and health in small-scale mining. But this is well known. What is required are the will and resources to undertake a sustained programme that will provide sufficient incentive for those concerned to want it to continue. Attempting to improve health and safety without appealing to the self-interest of those most directly involved is likely to prove fruitless. For this they must be fully involved from the start, and have a sense of being full partners. In other words, the fundamental question "What's in it for me?" must be clearly



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addressed and a credible answer provided. Even so, a long-term approach is necessary if tangible results are to be obtained and sustained.

## **Women in small-scale mining**

Small-scale mining has a powerful impact on women, but not always for the best. Though they provide up to 50 per cent of the workforce in small-scale mining, they do not get 50 per cent of the rewards. Even though small-scale mining is being increasingly included in legislation, much of women's involvement is in artisanal (the smallest-scale) mining that is still largely informal. Often they are not paid. Their contribution is therefore often stalled at the bottom of the hierarchy where they provide unskilled labour or goods and services to miners and the community. They are constrained by family responsibilities, cultural barriers and technical, legal and financial hurdles. Where women have overcome these constraints they have generally been very successful.

If the women who want to are able to play a full role in small-scale mining, they will make a significant contribution to economic development. To enable their participation, the technical, financial and socio-economic constraints must be removed, the working environment and living conditions at small-scale mining sites and adjacent communities improved, taking into account women's family responsibilities and the needs of their children, and the legal, regulatory and institutional framework that affects small-scale mining become at least neutral if not favourable to women.

The barriers to women's participation in small-scale mining are not necessarily all gender-based but, because of their lack of education and the constraints of family responsibilities, women are more likely to be adversely affected by bureaucratic procedures, illiteracy and a lack of access to credit in their own right. Even when they have obtained a permit, women entrepreneurs have found their lack of technical skills, particularly among those with no background in mining, and their lack of assertive or supervisory skills to be a problem in dealing with male employees, co-owners or co-workers. Many of these shortcomings have a cultural bias and will require considerable changes in attitudes before they can be overcome.

Socio-cultural impediments, such as gender, are deep-rooted and difficult to overcome, particularly when women try to become mine owners and permit holders. There has been progress in some countries in enabling women to have access to property and credit in their own right. Loan schemes that do not require collateral other than evidence of a mining lease will be important in developing both female and male entrepreneurship.

Women's lack of schooling, their higher rate of illiteracy than men and their general lack of knowledge of mining constitute formidable barriers to their entry into small-scale mining, other than as low-paid labour. Moreover, their lack of education means they are prevented from taking advantage of the increasing amount of technical assistance that is being directed towards small-scale mining. Such assistance may well need to be better oriented towards women's needs.

Properly conducted, small-scale mining (e.g. gold panning) can be a worthwhile occupation for rural women, provided their children can be cared for — at home or close to the workplace. Lack of child-care facilities either hampers their effective participation or puts their children at considerable risk. With improved working conditions and a sound and appropriate legal framework, gold panning could become a major source of employment for some of the poorest families in some countries.

The transition from informal, illegal artisanal mining to better run, legal small-scale mining should be as painless as possible. This will entail the forgiveness of past transgressions, minimizing bureaucracy and the creation of a climate of cooperation. As the transition occurs, women will benefit. In the meantime, however, it may be necessary to ensure that assistance to small-scale mines pays special attention to the needs of women who wish to improve their input and gains from small-scale mining.

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Greater support from government, and from larger mining organizations, trade unions and development assistance agencies, is likely to be a cost-effective means to improve small-scale mining generally and, with careful targeting, the position of women in particular. When designing the best means to assist women in small-scale mining, a gender analysis that identifies and understands the roles and needs of men and women at the level at which the assistance is targeted should be undertaken. It is important to identify the division of labour between men and women, who has access to and control over resources and benefits, and the needs of both men and women involved in small-scale mining. Women-specific programmes may be needed in the first instance to overcome existing imbalances between men and women in some aspects of small-scale mining.

As has been stressed elsewhere in this report, small-scale mining issues need to be addressed in a manner which is appropriate to the physical location and social infrastructure of those concerned. A broad-brush approach will not do. This is particularly true for gender issues. As governments become more attuned to the need to address them it will be easier for women to participate more and more effectively in small-scale at every level.

## **Child labour in small-scale mining**

The main causes of child labour in small-scale mining are: poverty; lack of opportunities or incentives to go to school; no prospects for regular employment; the lack of a coordinated policy to stop child labour; the lack of law enforcement; a reluctance to invest in small-scale mining to improve its performance; and a reluctance or inability to make the social investments necessary to stop child labour.

Most children work to support their family or to earn money for themselves. Although their parents are aware of the hazards and risks associated with small-scale mining, they see no alternative; their families need the money and there is no other employment available. At least the families stay together.

The more remote and more informal a small-scale mining activity, the more likely children are to be involved. Remoteness means that child care or schooling no longer offer an alternative to children working. It also removes the likelihood of there being other, less dangerous employment for them and the possibility of regular inspection to ensure that labour codes are being adhered to. The more informal the operation, the less the regard for regulations that limit the involvement of children in paid or unpaid work.

The difficulty of obtaining reliable data is compounded by the remoteness of many mine sites, the opposition of some employers to any "prying" into their practices regarding young workers, and the reluctance of the workers themselves to jeopardize their position by being outspoken.

With no pay and no choice of other work child mineworkers face a bleak future — hoping to be taken on a payroll as they get bigger, scavenging in the hope of finding some minerals to sell, hoping for a paid job in town, or anywhere — but with few prospects.

A "typical" child worker in small-scale mining is a boy aged 10-15, mainly working above ground, in a family group, digging, crushing or grinding ore, or transporting it in sacks weighing 10-25 kg over distances up to 600 metres. He uses adult-size tools (bar, pick, hammer, shovel) and is most unlikely to use any proper protective equipment.<sup>1</sup> He receives no direct pay, rather he contributes to the expanded earnings of his family. If he goes to school (unlikely if he is over 12 years old) he works two to three hours a day after school and all day at the weekends and during vacations. If he does not go to school he is more likely to work independently of his

<sup>1</sup> This is not surprising. As children are not expected to work in hazardous situations there should be no market for child-size implements or protective equipment. Manufacturers would find it difficult to countenance producing equipment for use by children in an illegal activity.

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family, doing whatever he is told to do with little or no concession to his age. If he is involved in the processing of gold-bearing ore, he is likely to show signs of mercury poisoning. He is likely to have respiratory problems, skin disorders and musculo-skeletal problems no matter what sort of mining he is involved in. The considerable number of girls who are involved in various aspects of small-scale mining have the added problem of being more likely to be targets for abuse, such as sexual exploitation.

The type of work that children undertake covers all the tasks in small-scale mining from cooking and cleaning to the extraction of ore underground and on the surface, its transport and separation and subsequent metal production. In some cases children are expected to do less than adult workers, but often they are required to do the same work, but for less pay, if any. In underground mines in several countries children are used to dig small tunnels and to mine in spaces that are too small for adults or, because of their small size and agility, to fetch and carry for adult miners.

Children's involvement in small-scale mining falls into two broad categories. Where single women or parents with very young children work in small-scale mining operations, the children often accompany them to the site as there is no alternative means of looking after them during the working day. At some sites the youngest children play, sometimes under the supervision of one of the women workers who take it in turn to mind them, or under the eye of an elder child. Depending on the effectiveness of any supervision, this often means that children play near to where their parents are working, leaving themselves open to many of the risks run by the workers, but without any knowledge of them. Older, school-age children may not have the opportunity to attend school and therefore work in mining, may prefer to assist their parents, or may have to assist them in order to maximize the family income. They are often not paid — their efforts being recognized in the larger payments received by one or both parents.

A worse form of child labour in small-scale mining occurs when children are employed separately from their parents, often going away from home to work. This type of employment becomes prevalent during gold rushes and when subsistence farming is no longer able to provide a living for young people in rural areas. Moreover, working in mines (and sometimes sleeping in them) is often the only opportunity to obtain what appears to be a high and regular wage. The reality for many child workers, however, is that once the cost of food, tools and sometimes medication has been deducted from their earnings they are left with nothing. Occasionally children are able to work on their own account — on Sundays for example, provided they meet the cost of all materials required. While this activity holds out the prospect of some real earnings, it does so at the expense of their health. But the alternative — informal employment in the services sector — is often considered to be worse.

Young workers engaged by concession holders to work in small-scale mines are attractive for a number of reasons. Firstly, as they are working illegally, any complaints regarding wages or working conditions would likely be ignored. Secondly, young workers are generally compliant and tend not to question the tasks assigned to them and the living and working conditions they are faced with. The fact that wages are often not received until after the end of a work contract is undoubtedly a constraint on rebellion. Lastly, for many rural young people there is no alternative wage employment outside the small-scale mining sector; subsistence farming is neither attractive nor sustainable.

The living and working environment in which the children grow up also has an impact on their intellectual capacity. The complete lack of medical and health facilities at or near many mining locations means that there is no screening and no indication of the effects of harsh working conditions on any of the workers. The precarious nature of small-scale mining makes it important to find alternative sources of income for the children at risk, especially those who show evidence of mercury poisoning and of an affected intellectual capacity, or withdraw them from work altogether.

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Reducing poverty and providing education opportunities are the keys to the elimination of child labour. If small-scale mining can be more profitable there will be less need for children to work to supplement the family income. By forming groups, possibly cooperatives in some areas, production and processing could be carried out more efficiently and marketing made more effective. Improvements in community and occupational health will also pay dividends for all who are working in mining, especially children.

The need for children to contribute to the family income is recognized and widespread. However, until the means are available to make it possible for children not to work, merely removing them from work will not necessarily resolve their problems. Rather it will replace one set with another. The family may descend further into poverty, forcing the children to leave home and find themselves in even worse straits. But the absence of national means to alleviate the plight of child miners and impoverished small-scale miners generally points to it remaining unchanged unless outside help can be mobilized. Action programmes must therefore be sufficiently broad to ensure that adequate infrastructure exists to accommodate the needs of children removed from these extreme forms of work.

## **Legislation for small-scale mining**

The isolation of much small-scale mining from the mainstream of economic development — the poverty aspect — leads to its legal isolation too, preventing it from becoming a recognized economic activity with wide benefits to the people concerned, their region and the country as a whole. The high proportion of national mineral production coming from small-scale mines in many countries and the extent of illegal mining, particularly of precious minerals, provide conclusive evidence of the extent of economic loss that is being endured so long as they remain illegal.

The legalization of small-scale mining is an important step in transforming it into a sustainable activity. The simple awarding of titles and licences and making them transferable, renewable and long-lasting are the bedrock of viable legal small-scale mining activity.

Small-scale mining is bedevilled with too many regulations that are mostly designed to constrain it and too few inspectors to ensure that they do. There is therefore little incentive for small-scale mines to conform, particularly if the risks of being caught and of sanctions being applied are minimal. If small-scale mining is to be encouraged to operate legally, legislation must be (at least) even-handed in allowing small-scale miners access to suitable land for prospecting and mining activities. It must be “user friendly” as far as the issuing of permits and the granting of licences are concerned — permits that provide clear security of tenure for a reasonable period so that small-scale mining can become established. Conflicting regulations need to be harmonized and needlessly restrictive provisions reviewed. If a single agency were responsible for overseeing small-scale mining and the miners themselves could do business at a “one-stop shop” the benefits of legal operation and protection under the law would start to outweigh the costs as far as small-scale miners are concerned.

The development of small-scale mining regulations and development assistance projects to strengthen mining inspectorates are slowly having an impact. But unless more is done quickly, mines inspectorates run the risk of continually being a few steps behind in bringing small-scale mining under the umbrella of the law.

## **Links between large and small-scale mines**

There is often a clash of interest between small-scale and large mines. In the eyes of many large mines, small-scale mining is synonymous with illegal mining. Small-scale miners often accuse large mining companies of tying up large tracts of land with speculative mineral rights, denying them their rightful access to mineral resources.

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There are many cultural, procedural and political challenges to companies opening their doors to small-scale mining. These include: avoiding an influx of small-scale miners and people looking for work in the large mine who might turn to small-scale mining; ensuring that sufficient resources exist to enable small-scale mining to continue for an agreed period (possibly for the life of the large mine); and getting government agencies to accept and meet their responsibilities towards the community.

While private companies are not expected to support informal sector activities, they generally have a role in communities in developing countries that goes beyond that of employer. Assisting small-scale mining could be a valuable part of this activity. Moreover, governments will find it difficult to tackle the problems of small-scale mining, including labour and social issues, without the technical, logistical and financial support of the mining industry. As far as the industry is concerned, however, it might well say that the taxes and royalties it pays are sufficient for the government to meet its obligations to small-scale mining and that it should act accordingly.

The continuing presence of unorganized, uncontrolled small-scale mining is considered by most mining companies to be a threat to the establishment of new large mining operations. Tension and conflict between alienated and displaced small-scale miners and large mining companies can be politically and financially damaging for foreign investors and national governments, particularly if it discourages new mining activity. There have been violent clashes in several countries as small-scale miners have sought to re-enter what they considered to be their rightful mining territory which had been assigned by the government to a large mining company. The potential for conflict over access to mineral resources is likely to increase as mining companies seek new prospective areas in developing countries and, understandably, focus first on sites in the vicinity of existing successful small-scale mining activity. Displacing thousands of miners and their families and starting a new mine employing a few hundred local workers might be good for the budget, but the government and the company ignore those displaced at their peril.

If large mining companies consider themselves as “guests” in the region where they establish new operations, behave accordingly and work within the existing cultural environment, the chances of harmonious relations between large and small mining operations are much greater than if the large mine is a heavily guarded enclave. But many small-scale miners are not interested in being “stifled” by an overbearing presence of a large mine “helping them out”. So care is needed in establishing and maintaining the right kind of relationship between them. Close collaboration between large and small mines will be good for mining, good for the company concerned and good for small-scale miners.

## **Coordinating assistance to small-scale mining**

An ad hoc approach to small-scale mining has constrained efforts to promote better organization and work practices, increase the productivity of small-scale mines and lessen the adverse labour and social effects. Erratic policy and decision-making has led to confusion among administrators and managers of both large and small mines and has sometimes caused conflict at mining locations — between large and small mines and between small-scale miners and regulators. A lack of coordination in the provision of external assistance has not helped. No wonder that bringing order to small-scale mining is a problem.

Even when small-scale mining can operate by itself — which it does most of the time — such operations might not be for the best for all concerned. Appropriate, integrated external influence or involvement can help small-scale mining realize its full potential — for the mine and its owners and workers, for the environment and for government coffers. Such involvement needs to be carefully developed and implemented — in consultation with all concerned.

Many projects to assist small-scale mining have failed or have not led to lasting improvements because they have treated small-scale mining as a subset of large, formal mining.

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Most of the emphasis has been on finding technical solutions to mining and processing problems, with scant heed being paid to the underlying economic, labour and social issues. Another factor in their relatively short-lived success has been the low priority given by a number of governments to this sector. So once a project has been left to stand on its own, it has often gently wound down due to a lack of continued government support or supervision. Notwithstanding the relatively recent reorientation of assistance programmes to ensure that the underlying poverty aspects of small-scale mining are included when assistance is provided, there are clearly some gaps to be filled if improvements are to be sustained. Better coordination and consultation at all levels will undoubtedly pay dividends in delivering assistance that is wanted, where it is needed, in an efficient and effective way.

## **Suggested points for discussion**

In the light of the foregoing treatment of the issues, the following points are offered as a basis for the Meeting's discussions.

### **General approach**

1. How can the labour and social issues affecting small-scale mining be better integrated with the regulatory, financial, technical and political issues that also affect the sector?
2. To what extent should employers' and workers' organizations contribute to or supplement the work of government agencies in addressing labour and social issues in small-scale mining? How might this be achieved?

### **Health and safety in small-scale mining**

3. How can more reliable data on the incidence and severity of accidents and disease in small-scale mining be collected and appropriate courses of action for prevention, surveillance and treatment developed?
4. How can governments and employers' and workers' organizations assist in training small-scale miners in occupational health and safety and in gaining access to the means to improve their occupational health and safety performance?

### **Women in small-scale mining**

5. How can the technical, financial and socio-economic constraints on women's participation in small-scale mining best be addressed, and by whom?
6. What specific assistance, if any, should be given to women in small-scale mining, and by whom?

### **Child labour in small-scale mining**

7. What steps should be taken by governments and employers' and workers' organizations to identify the extent of child labour in small-scale mining?
8. What role should they play in developing and implementing programmes for the immediate removal of children from hazardous work in small-scale mines and processing plants and the prevention of child labour in small-scale mining?

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## Legislation for small-scale mining

9. What should be done, and by whom, to encourage the development of legislation and regulations for small-scale mining that include labour and social issues, and to ensure that they are implemented and widely respected?

## Links between large and small mines

10. What role should employers' and workers' organizations play in developing and fostering closer relations between large and small-scale mines? What role should other organizations (including cooperatives and small-scale mining associations) and governments play?

## Assistance to small-scale mining

11. What role should be played by governments, the social partners and other organizations in assisting the small-scale mining sector to address labour and social issues?
12. How could assistance to small-scale mining be better coordinated so that it is more focused and the needs of small-scale miners are taken fully into account?

## Role of the ILO

13. In order of priority, what measures should the ILO take to assist its constituents in addressing labour and social issues in small-scale mining?

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## **Annex. Resolutions, guidelines and recommendations on small-scale mining, 1990-97**

### **Fifth Tripartite Technical Meeting for Mines other than Coal Mines, Geneva, 28 March-5 April 1990**

#### **Resolution concerning small-scale mining in the informal sector<sup>1</sup>**

The Fifth Tripartite Technical Meeting for Mines other than Coal Mines of the International Labour Organization,

Having met in Geneva from 28 March to 5 April 1990,

Noting that small-scale mining in the informal sector is an important phenomenon in many parts of the world and has special needs that require to be addressed,

Considering that such operations provide some work and income opportunities to many thousands of people,

Considering that because of a lack of resources, skills and knowledge many small-scale mining operations in the informal sector suffer from low productivity, inadequate incomes and poor safety and working conditions,

Concerned that in some cases the working methods of mines in the informal sector have resulted in serious damage to the environment,

Adopts this fifth day of April 1990 the following resolution:

The Fifth Tripartite Technical Meeting for Mines other than Coal Mines invites the Governing Body of the International Labour Office to call on member States of the ILO and on employers' and workers' organizations to:

- find ways to give informal sector mining operations greater access to training, technology, marketing and other infrastructures, and to financial and other resources necessary to make it possible for them to comply fully with existing safety, environmental and other regulations while becoming more efficient enterprises;
- facilitate tripartite approaches to develop and implement programmes to assist the informal sector mineworkers to adopt safe work practices and provide healthier working and living conditions, for example, by seconding selected workers from large mining operations for short periods of time to travel among the informal sector mining operations as advisers on safe work practices and healthy work procedures;
- encourage and foster the creation of facilities such as central processing and transport, including through co-operative initiatives, that would help informal sector mining operations to be more efficient and productive of incomes and employment;
- provide, where it is wanting, the social and economic infrastructure — including educational and transport facilities at the remote sites where informal sector mining operations are undertaken — that are necessary for the welfare of the persons involved and their families.

<sup>1</sup> ILO: *Note on the proceedings*, Fifth Tripartite Technical Meeting for Mines other than Coal Mines (Geneva, 1990), p. 89.



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## **United Nations Interregional Seminar on the Development of Small/Medium-scale Mining, Harare, 15-19 February 1993**

### **The Harare Guidelines on Small/Medium-scale Mining<sup>2</sup>**

Small and medium-scale mining makes an important contribution to national and regional rural development in developing countries. To realize 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 optimize its contribution to social and economic development.

#### *Legal*

Governments and their agencies should endeavour to provide a simple, clear, understandable and stable set of laws and regulations which assure:

- legal recognition as a basis for enabling the development of small and medium-scale mining;
- easy access to mineral rights;
- transferability of mineral rights;
- protection of the environment;
- recognition of landowners' and indigenous people's rights;
- safe working conditions;
- adequate protection of the rights of women and children.

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:

- technical management, environmental and marketing education;
- vocational training;
- facilities for marketing of products at fair prices;
- technical extension services;
- support for the development of cooperatives designed to provide services;
- promotion of independent interest groups.

#### *Financial*

Governments and their agencies should endeavour to provide appropriate progressive fiscal incentives that:

- treat small and medium-scale mineral producers like similar scale operators in other sectors;
- stimulate productive operations;
- are simple to administer and comprehend.

<sup>2</sup> United Nations: *Guidelines for the development of small/medium-scale mining: Selected papers* (New York, 1993), Annex 1.

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Governments and their agencies should endeavour to establish appropriate financial mechanisms adapted to the specific requirements of small and medium-scale mining, such as:

- easy access to available resources, including the removal of barriers for women's access;
- savings and loans cooperatives;
- special mining trust funds and the availability of risk capital;
- credit assistance which accepts mineral rights as collateral.

### *Commercial*

In providing support for marketing, governments and their agencies should endeavour to:

- facilitate marketing loans and their repayment;
- collect and disseminate marketing information;
- establish accredited marketing agencies;
- provide training in marketing and investment skills;
- ensure the funding of marketing institutions.

In supporting investment, governments and their agencies should endeavour to:

- establish a mineral development bank with access to foreign currency;
- promote the floating of bonds of small and medium-scale mining enterprises;
- provide tax incentives;
- provide physical infrastructure such as roads and telecommunications;
- promote mining projects through the provision of assistance to pre-feasibility and feasibility studies;
- establish a fully empowered investment centre for local and foreign investors;
- promote partnerships between small, medium, and large-scale mining companies.

To ensure an appropriate institutional framework, governments and their agencies should endeavour to:

- establish small-scale mining specialized units at the national, regional and international level;
- participate in South-South exchange of information in collaboration with technical cooperation for development programmes.

### *Technical*

Governments and their agencies have a responsibility to:

- identify and promote appropriate technology for small and medium-scale mines and to disseminate technical information;
- 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;
- provide training suitable for small and medium-scale miners;
- encourage the manufacture of equipment suitable for small and medium-scale mines;
- 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*

Governments and their agencies should take into account the Berlin Guidelines and have a responsibility to:

- make the small and medium-scale mining sector aware of its potential to cause environmental damage and its responsibility to minimize it;

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ensure effective local monitoring and control systems;  
encourage the development and use of environmentally friendly technologies.

### *Social*

Governments and their agencies should endeavour, to the best of their ability, to:  
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;  
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;  
ensure that medical, educational and other services supplied to the bulk of the population are also made available to small and medium-scale miners;  
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 undermined by their added domestic responsibilities;  
ensure that the rights of existing groups are not compromised by small and medium-scale mining sector activity.

### Guidelines for development assistance agencies working in the small/medium-scale mining sectors<sup>3</sup>

Agencies should incorporate support for the small and medium-scale mining sectors into their programmes, the objective being to encourage formal efficient and sustainable mining operations. Consequently, projects in these sectors should follow guidelines that take into account their special characteristics. These guidelines include:

encouraging the adoption of a system of mining title that allows mineral rights to be freely transferred and unencumbered;  
attention to environmental issues should be incorporated into all projects, using the Berlin Guidelines<sup>4</sup> as a basis;  
taking every effort to coordinate activities with other development assistance agencies and national authorities;  
the projects should ensure that the contribution of women be a consideration in any terms of reference, and that projects be designed to strengthen and support their position;  
local, national or regional training should be incorporated into all projects;  
assistance to the sectors should take into account the social and cultural norms of the area, country and region;  
international standards of health and safety should be observed in project design.

### NGO resolution<sup>5</sup>

Given that:  
small-scale mining in developing countries serves as a means of livelihood as well as income-generating activity for millions of people and enables local people to participate in mineral resources development;

<sup>3</sup> *ibid.*, Annex 2.

<sup>4</sup> *Mining and the environment: The Berlin Guidelines* (London, Mining Journal Books, 1992).

<sup>5</sup> United Nations, *op. cit.*, Annex 3.

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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.

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, multilateral 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.

## **World Bank International Round Table on Artisanal Mining, Washington, DC, 17-19 May 1995**

### **A comprehensive strategy towards artisanal mining: Agenda for action<sup>6</sup>**

An integrated solution to the problems of artisanal mining requires a partnership between the following key players: government, non-governmental organizations, artisanal miners' associations, international donor agencies, and international mining companies. The roles that each of these entities can play to contribute to the transformation process of artisanal mining into formal and sustainable mining is described below.

#### *Government*

The government, with the support of donor agencies if requested, is primarily responsible for improving the enabling conditions of artisanal mining. It should initiate broad macroeconomic and sectoral reforms which foster the orderly development of artisanal mining. In addition to simplifying registration procedures, the government should encourage small-scale and artisanal miners to formalize their activities by enhancing the advantages of legalization and by using incentives such as training and technical assistance. The small-scale mining unit can provide geologic information, assist in property valuation, support basic training in mining and ore processing, provide laboratory and assay services, establish testing programmes for equipment, and contribute to setting up small-scale mining centres. Finally, government agencies have a mandate to establish clear environmental objectives, set enforceable standards, monitor compliance, and provide environmental training and technical assistance to miners.

<sup>6</sup> *A comprehensive strategy towards artisanal mining*, Industry and Mining Division Draft Working Paper (Washington, DC, World Bank, Aug. 1995), pp. 5-6.

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### *NGOs and small-scale miners' associations*

NGOs and small-scale miners' associations can support the transformation effort by helping organize and train miners. As the experience of the CENDA Foundation in Ecuador shows, NGOs and miners' associations can reach a large number of miners in remote areas. They are also well suited to motivate, guide, organize, and deliver assistance to artisanal miners at the grassroots level. Accordingly, these entities can be used to implement project components and establish delivery mechanisms for technical assistance projects. They can play a key role in setting up rural credit schemes in village-based mining and in initiating environmental management programmes. More importantly, they can help sensitize miners about health, safety and environmental issues and promote the use of locally made, safe, and environmentally sound equipment.

### *Donor organizations*

Donor organizations can play a catalytic role in the transformation of artisanal mining. They can disseminate best experiences through the support of baseline studies, conferences and seminars which aim to find workable solutions to the issues and constraints of the subsector. In addition, they can finance policy reforms and targeted actions to address specific constraints in the subsector. Targeted actions will focus on funding the cost of technology transfer and strengthening the ability of micro-finance institutions, NGOs and miners' associations to address specific issues at the grassroots level. Some of these actions could be financed through donor-supported micro-finance programmes such as the newly created Consultative Group to Assist the Poor (CGAP) which provides loans and grants to institutions that deliver financial and related services to the poor on a sustainable basis.

### *International mining companies*

International mining companies have an interest in building a constructive relationship with the local community and the artisanal miners in their area of operation. In order to reduce social tensions, it is in their interest to establish a mutually beneficial relationship with indigenous miners at the early stage of mining development. Some gold-mining companies have successfully managed relationships with artisanal miners by making a conscious decision to concentrate on hard rock mining in order to leave shallow alluvials for indigenous miners. Other companies have contributed to the needs of the local community by setting up and supporting charitable foundations which provide social services in their area of operation. Other arrangements include the use of company facilities to demonstrate basic environmental and safety procedures, direct purchase of output from artisanal miners, and support of government and NGO initiatives toward the subsector.

## **Global Conference on Small/Medium-scale Mining, Calcutta, 2-4 December 1996**

### **Calcutta Consensus<sup>7</sup>**

The Global Conference on Small/Medium-scale Mining, held in Calcutta, India, on 2-4 December 1996, and subsequent related workshops, recognize that the Harare Guidelines of 1993 set out clear steps for the development and rationalization of small- and medium-scale mining. The Conference also noted that these principles must be implemented if there is to be a positive, long-term impact on the small and medium-scale mining industries of the developing countries.

<sup>7</sup> *Proceedings and recommendations*, Global Conference on Small/Medium Scale Mining, 2-8 Dec. 1996 (Calcutta, National Institute of Small Mines, 1996), p. 6.

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The Global Conference on Small/Medium-scale Mining reiterated that the commitment and effective partnership of all the players involved — governments, NGOs, donor agencies, large mining companies, and the small-scale miners themselves — are vital in addressing the key constraints faced by the small- and medium-scale mining sector.

The Conference concluded that, as a result of its discussions, the following considerations should be taken into account alongside the Harare Guidelines and the World Bank Round Table Recommendations:

#### *Legal*

Where applicable, governments should include a treatment of small- and medium-scale mining into their mining codes.

Where applicable, governments should ensure that affected communities and existing small-scale miners are consulted prior to granting exploration or mining rights to mining companies.

#### *Financial*

Governments and donor agencies should be encouraged to incorporate small- and medium-scale mining into their respective micro-enterprise financing programmes so that small-scale miners are better able to consider and administer their activities as long-term business ventures.

Banks and other financial and lending institutions should be encouraged to establish or develop lending programmes for small- and medium-scale mining ventures, and incorporate them into their regular programmes.

#### *Technical*

In order to facilitate access to finance, governments and NGOs could play a role to assist small-scale miners to identify and evaluate mineable reserves.

Governments and NGOs should encourage and support appropriate forms of organization, such as cluster mining, mining centres, cooperatives and partnerships, that could facilitate the delivery of technical assistance and information to small- and medium-scale miners.

#### *Socio-economic*

Governments should address the underlying poverty in small- and medium-scale mining areas.

Small- and medium-scale miners should be encouraged to invest in the socio-economic development of their immediate communities by providing fiscal incentives where possible.

Governments should enforce laws against child labour and, at the same time, provide appropriate social programmes for child development in small- and medium-scale mining communities.

Governments, banks and other lending institutions should remove any gender-related barriers that limit women's participation in small- and medium-scale mining.

#### *Environmental*

Governments should establish pragmatic environmental protection rules and regulations which specifically spell out the environmental obligations of the claim holders and the consequences of non-compliance.

Governments should initiate environmental awareness programmes and assist small- and medium-scale miners to adopt environmentally sound techniques;

Governments should ensure that adequate provision for the rehabilitation of small-scale mining sites is assured. For example, through the establishment of a trust fund using, inter alia, mineral royalties for the purpose.

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## **Expert Group Meeting on UNIDO High Impact Programme "Introducing New Technologies for the Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining", Vienna, 1-3 July 1997**

### **Recommendations of the participants<sup>8</sup>**

The UNIDO High Impact Programme "Introducing New Technologies for the Abatement of Global Mercury Pollution Deriving from Artisanal Gold Mining" is endorsed by the Expert Group Meeting.

In the context of issues identified at UNIDO's diagnostic missions and prevailing socio-economic realities in developing countries, the following additional solutions are recommended:

To communicate to governments that alternatives are available to address the complex problems related to artisanal gold mining. A process has been designed to effectuate these measures.

A training workshop for appropriate government officials is considered essential.

Emphasis should be on Africa, recognizing that, although most gold production is still manual with panning and sluicing, the transition to mechanized mining is underway. The challenge is to avoid the severe environmental damage experienced in Latin America.

Legislation should focus on institution building, illegality and the competitive aspects of gold marketing. The acquisition of a fully transferable mining title to the discoverer of a deposit should be a simple, quick and transparent process.

Regional small-scale miners' organizations are important building blocks in the abatement of mercury pollution. Country and site-specific organization and confidence building are important requirements. More study is required on the appropriate organizational formats.

Training of artisanal and small-scale miners is a cornerstone among the building blocks for the abatement of mercury pollution. Institution-building with training centres is advocated, starting with the experience of countries with good results, building on successes and learning from failures. Management of these centres shall be based on sound business practices as an alternative to a bureaucratic approach.

Equity funding and rotating funds are considered viable options for small-scale miners.

Innovative technologies identified for the abatement of mercury pollution include the "blow and tap" ("winnowing") technique for the migratory and manual artisanal miners and crushing, gravity concentration and/or cyanidation for the stabilized and mechanized miners.

There is a need for:

- R&D on mercury clean-up of tailings and recovery of gold and other valuable by-products;
- definition of research topics on mercury in the environment;
- R&D on how to best effectuate training of artisanal miners;
- R&D on measures to encourage artisanal and small-scale miners to develop responsible environmental practices; what role can women play?

Donor organizations shall coordinate their efforts and programmes in small-scale mining and endeavour to create synergies in their activities with a view to establishing formal collaborative relationships in due course. This will include the establishment of a network — informal or formal as appropriate — to exchange information and consult on small-scale mining activities of common interest. Programmes and projects need to be identified which

<sup>8</sup> UNIDO: *Final report* (Vienna, 1997).

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can be used as a testing ground for collaboration. Yearly meetings of donor agencies are proposed to coordinate programmes.

The guidelines formulated by the Expert Group will be used by governments to design their locally applicable road map. The challenge is to get the process started and to keep it moving forward.