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Artisanal and Small-scale Mining in India

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Table of Contents

Explanatory Key Words 5

Status of SSM at a Glance 6

1 Some Preliminary Considerations 7

1.1 What is Artisanal Mining and Small-Scale Mining? 7
1.2 History of Mining and Development of Mining Culture 7
1.3 Small-Scale Mining and National Mineral Policy 8
1.4 Difficulties in Obtaining Information and Data on Small-Scale Mining 8
1.5 Position of Artisanal Mines and Small-scale Mining 9
1.6 Background of NISM – Its Activities and Familiarities with Small-scale Mining in India 10
1.7 General Attitude of Some Technical People, Officials and Politicians Toward Small-scale Mining 11
1.8 Appreciation of Traditional Culture and Ethos of Small-scale Mining in the Local Milieu -- Need for Sympathetic Visionaries 11

2 Current Legal Status of Artisanal and Small-scale Mining 12

2.1 Official Definitions 16
2.2 Legal Codes and Regulations 17
2.3 Official Policy Statements 19
2.4 Changes Occurring During Past 10 years 20

3 Actual Status, Role and Importance of Artisanal and Small-scale Mining 21

3.1 Official Statistics on Formal Miners 21
3.2 Statistics on Mineral Production or Revenues 25
3.3 Participation in Informal Mining 31
3.4 Employment 32
3.5 Relative Importance of Economic Formations 34
3.6 Organising Production and Processing Activities 36
3.7 Net Income to the Miners 37
3.8 Employment of Women and Children 38
3.9 Multiplier Effect 38
3.10 Negative Impacts on Environment 39
3.11 General Observations 40

4 Range of Practices in Mining, Processing and Environmental control 43

4.1 Mining 43
4.2 Processing 44
4.3 Environmental Control 44

5 Support Activities 46

5.1 Financing or Credit Schemes 46
5.2 Producer Associations 46
5.3 Formal Technical Assistance Projects – Training Programme 47
5.4 General Observations 50

6 Bibliography (related to Small-Scale Mining during past 10 years) 50

6.1 Legal Codes and Regulations, and Legal Reviews 50
6.2 Policy Statements 52
6.3 Mining and Processing Practices 52

6.4 Environmental Impacts, Their Management and Control 52
6.5 Financing and Marketing Scheme 53
6.6 Technical Assistance Projects & Programme 53
6.7 Organisational Issues 53
6.8 Gender & Child Labour Issues 54
6.9 Technology Research 54
6.10 Environmental & Community Health 54
6.11 Occupational Health & Safety 54
6.12 Miscellaneous – Books, Journals and Proceedings 54

7 How Safe Is Small-Scale Mining? 55

8 Role of SSM in Value-Added Foreign Trade 58

9 Interactions Between Small-Scale Miners And Medium And Large Exploration And Mining Companies 60

10 Record Of Some Examples – Vignettes or Short Stories 61

11 Resource People 62

12 Gender Issues -- Changing Socio-Economic Profile Of Women Working In Small/Medium Mines – Results of Pilot Survey in Selected Areas in Eastern India 66

12.1 Preamble 67
12.2 Work structure 67
12.3 Economy 68
12.4 As regards earning status and pattern of attendance 68
12.5 Income Structure 69
12.6 Age Distribution vis-a-vis Attendance of Women Workers 69
12.7 Effect of Mining on Socio-Cultural Life Style 69
12.8 On Changing Role of Women 70
12.9 On Social Structure 70
12.10 On Socio-religious Customs & Traits 70
12.11 On Material Culture 71
12.12 Effect of Mining on Health and Occupational Risk 71
12.13 Conclusion 72
12.14 Gender Issues in Mining 73

13 Summary 74

14 Recommendations 79

15 Acknowledgement 79

16 References 80

17 Annexes 80

Explanatory Key Words

1.	Crore	=	10 Million
2.	INR	=	Rs.: Indian Rupee
3.	DGMS	=	Directorate General of Mines Safety working under the Ministry of Labour of the Govt of India
4.	IBM	=	Indian Bureau of Mines, working under the Ministry of Mines of the Govt of India
5.	M. Act	=	Indian Mines Act, 1952
6.	MMRD Act	=	Mines & Minerals (Regulation and Development) Act'1957
7.	Major Mineral	=	Any mineral other than "Minor Mineral" is major mineral – here the word major has been used purely as an adjective.
8.	MINOR MINERAL	=	"Minor minerals" is defined in clause (e) of the Section 3 of the Mines and Minerals (Regulations and Development) Act 1957 (MMRD Act'57). The current list of minor minerals is given below: "Building stones, gravel, ordinary clay, ordinary sand other than sand used for prescribed purposes (used for refractory, ceramics, metallurgical, optical and stowing in coal mines purposes, manufacture of silvicrete cement, sodium silicate, pottery and glass purposes), boulder, shingle, chalcedony pebbles (used for ball mills purposes only), limeshell, Kankar, and limestone used in kilns for manufacture of lime used as building material, murrum, brick earth, fuller's earth, bentonite, road-metal, rehmatti, slate and shale used for building material, stone used for household untensils, marble, quartzite and sandstone when used for purposes of building or for making road-metal and household utensil and saltpeter" (Source: Respective State Govts)

Status of SSM at a Glance

Number of SSM - 1997-98	
Out of 578 coal & lignite mines	– 26% or 150 are SSM
Out of 2618 metallic and non-metallic	– 95% or 2487 are SSM
Out of 5000 minor mineral mines	- 98 or 4900 are SSM
Out of 500 non-formal minor mineral mines	– 100% or 500 are SSM
Total 8696	**Total 8037**
Value of production of SSMs – 1997-98	
Out of total production of Coal & Lignite	– 6% or INR 11150 million
Out of total production of metallic and non-metallic minerals	– 25% or INR 16280 million
Out of total production of minor minerals	- 90% or INR 22560 million
Out of total production of non-formal minor minerals	– 100% or INR 250 million
Total INR 50,240 million	
Percentage production of SSM from different groups	
Form coal & lignite production	- 22.3%
From metallic and non-metallic production	- 32.56%
From formal minor minerals production	- 45.14%
From non-formal minor mineral production	- 0.5%
	100.0 %
Value of SSM production of non-fuel minerals including minor minerals	**- 42%**
Export of value-added products of small-scale mining in 1996-97 excluding processed diamond	**- 62% of all minerals**
SSM mines are not specifically more prone to accidents - fatal or serious	
Source : Based on IBM and DGMS statistical records for all types of mines and their productions -- suitably recalculated to SSM basis	

1 Some Preliminary Considerations

In writing this paper I would like to deal first with some background notes and preliminary considerations which would help in better appreciating and understanding the different aspects of Small-Scale Mining in India.

1.1 What is Artisanal Mining and Small-Scale Mining?

I am not clear how to differentiate between ***Artisanal Mining and Small-Scale Mining***. Probably it very much depends on individual perception. The artisanal miners, as many of us believe, normally work in small groups of family members and or of close relatives without employing any paid assistants. They may work in their own land or in public places or State owned land without any license or formal permission. They are thus mostly uncontrolled, illegal and unauthorised workers.

But in India Small-Scale Mining (SSM) is mostly organised mining carried on with acquired mining rights under some statutory control although unlicensed or informal activities are not uncommon on many occasions e.g. straying into unlicensed areas from existing mines and working in disputed territory.

Both Artisanal and SSM are highly labour intensive and no mining equipment, except simple tools, are used in Artisanal mining and in tiny SSMs. But in non-tiny SSMs the workers quite often use some mining equipment and machinery and some mines in the higher rung, are even partially mechanised for higher production and better productivity.

Artisanal mining is generally considered as unauthorised or illegal mining operation although not seriously prevented by the Government mainly because such activities provide at least some sustenance to the local people living below the poverty line and the Government is unable to provide regular employment to all of them.

1.2 History of Mining and Development of Mining Culture

According to the Constitution of India the mineral rights now belong to the State Govts. but the Federal/Central Govt have the supreme right of control. Such mineral rights in many States have specifically been acquired by legislative measures, after the independence in 1947, from the private ownership of the landlords. In fact, mining culture in India is very old and traditional and "mineral production in India is an ancient practice (pre-Vedic period ca 4000-1600 B.C) although there were no elaborate documented records on the subject. Chanakya's ***Arthashastra***, (ca 400 BC) the oldest comprehensive document, records some mineral policies and practices which gave both direct and indirect insight into the ancient mining practices" [1].

From Manu's book on ***Artha Shastra*** it appeared that the overlord of the soil was entitled to one half of all mineral and treasure trove and those mines which required large outlay to work were leased out for a fixed number of the shares of the output (perhaps royalty basis) for a fixed rent. Such mines as could be worked without much outlay were directly exploited (perhaps by Govt agency)[2] " Since then, up to the British period, the picture of

mineral industries in Indian is not very clear. This is so because of widespread destruction of the records of ancient universities and libraries by invaders" [1]

During the British period the mineral rights belonged to the States but in some States the rights belonged to the landlords (Zaminders) which were not subject to any regulation or restriction by the State with the result that the landlords were free to grant leases under terms and conditions entirely at their pleasure.

But after the independence in 1947 these private rights have gradually been acquired by the State Govts by legislative measures and at present the entire aspects of leases and licenses are uniformly regulated by the Central Govt Acts, Regulations, Rules and executive directions. And in some cases today the State Govt's have been empowered by legislative measures to exercise control and authority to a large extent, particularly approving mining plans and leases even of important major minerals which could not be leased out earlier without the Central Govt's permission. Control over Minor Minerals was already there with the State Govts right from mid 20th Century.

Thus extensive small-scale mining operations are being carried on all over India for many centuries now and the people in some States like Rajasthan have developed a distinct mining culture and ethos and Rajasthan mined and supplied marble for construction of Tajmahal. To a varied extent such culture and ethos are prevalent also in many of the other mineral producing States. We therefore would have to keep this aspect in mind in analyzing and appreciating the practice of Small-Scale Mining in India today.

1.3 Small-Scale Mining and National Mineral Policy

In India no separate policy decisions or legislative provisions have so far been made specifically for SSM which is an important part of the overall mining activities. Hence SSM comes under the general mining umbrella without separate identity. In the latest comprehensive National Mineral Policy declared in 1993 only a cryptic reference to Small-Scale Mining was made saying ***efforts will be made to promote Small-Scale Mining of a small deposit in a scientific and efficient*** manner while safe guarding vital environmental and ecological imperatives[3]. The rest of the guidelines are applicable to all sizes of mines.

1.4 Difficulties in Obtaining Information and Data on Small-Scale Mining

As the returns on mineral output and other relevant data, submitted to the Govt bodies, are governed by two sets of statues [Indian Mines Act 1952 and the Mines and Minerals (Regulation and Development) Act 1957] the statistical figures are widely variant. As such, exact or near exact figures can rarely be quoted. The Indian Mines Act'1952, concerned with safety and labour welfare, excludes certain categories of mines from the point of view of control for safety but it does not differentiate between minerals as major or minor. But the Indian Bureau of Mines (IBM) working under the MMRD Act, 1957 do not maintain statistical records of "Minor Minerals" which are the responsibilities of the concerned State Govts. But the IBM have however, for the purpose of employment of technically qualified persons in mines, identified (Rule 42 of Mineral Conservation and Development Rules, 1988) two categories of mines namely Category A and Category B, decided on the basis of

labour employment and the standard of mechanical equipment used. And they do not specifically identify any of the categories as Small-Scale Mines although Category B is the smaller category constituting about 87/88% of the reporting mines producing about 10% by value (each producing roughly about 10,000 tpy).

It would thus be seen why in India there is no clear statistical picture about SSM. We therefore have to depend on some statistical exercise depending on broad knowledge, experience and intelligent guess work of researchers. Thus the National Institute of Small Mines had initially to carry out some extensive studies, research and guess work to come to many pragmatic figures -- parameters of SSM, number of mines, employment, production value, import–export values etc the main aim being to draw a pragmatic and fairly reliable SSM scenario in India (Annexure-I). I believe those information / figures, adequately updated, will be found useful by the policy making bodies and funding organisations -– national and international, in offering help and support to the SSM.

However for its activities NISM has adopted a different parameter for SSM (upto 0.1 mtpy for Small, 0.1 to 0.5 mtpy for Medium and over 0.5 mtpy for big mines).

1.5 Position of Artisanal Mines and Small-scale Mining

In the case of Small-Scale Mines in India, which are mostly organised with mining rights legally acquired, the total production is significant. Although fuel minerals (Petroleum, Coal & Lignite) are reserved excluding for the Govt sector, all other minerals are open for SSM activities. In fact the Govt sector is the bigger partner of SSM production although the number of such mines is many times more in the Private sector. There are however, a large number of Coal & Lignite Small Mines in the Govt sector most of them being pre-nationalisation underground and open cast mines. The percentage contribution in terms of production value of small mines to total non-fuel mineral production including "Minor Minerals" since 1985 was around 36.1% to 37.4% till 1995-96 (vide Annexure- I) and the total contribution to export was about 37% in 93-94 which jumped to 66/67% in 1994-95 and 1995-96 excluding processed diamond.

The production value of non-fuel minerals by SSM (up to 0.1 mtpy) gradually increased (calculated by presumptive exercise as in Annexure I) from about INR 9250 million in 1988-89 to about INR 15920 million in 1995-96 although the percentage production of SSM remained at 36.1 / 37.4% of the total production excluding fuel minerals. The production for 1997-98 has been calculated in some details in the text.

In India the total number of SSM (upto 0.1 mtpy) is about 95% and considering the medium-scale mines (from 0.1 to 0.5 mtpy) the number would easily be 99% or so. The total number of working small mines could be presumed to be 8000 to 9000 or so although one of the States (Rajasthan) keeps a record of about 20,000 small mines / quarry leases (verbal communication by the Director of Mines). Probably many of them are non-functioning or work erratically. Considering such records, including non-functioning mines, in other States the total number may exceed 30,000 – 35,000. This huge number may not be of much significance in terms of production or local employment which can be assumed as 0.5 million or near about. It would therefore be safer to presume the total number of small-scale operating mines to be in the region of 8000 to 9000 or so but some

people take it to be about 5000. Similarly the total number of Medium Mines (0.1 to 0.5 mtpy) may be presumed to be about 500 or near about and the so called big mines (above 0.5 mtpy) would be in the neighbourhood of 100 or so. Although it is difficult to keep track of the small mines in the lower range of production because of shear number and erratic nature of working status, indicating the exact number of medium mines is equally difficult because due to variations in output to meet fluctuating local demands both the small (higher range of production) and medium mines (in the lower range of production) cross into each other's territory. That is why NISM try to club together Small and Medium mines as did UN during Harare Conference in 1993. However the total number of mines reporting to IBM varies in the region of about 3200 to 3400 and most of them are small (about 95%) or small / medium (about 97-98%) and the so called big mines (over 0.5 mtpy) may be about 2% or so. Another 5000 or so extracting mainly "Minor Mineral" report only to the State Govts. The rest, working erratically, do not report at all and their output will remain in the broad region of conjecture and the number could be presumed to be 500 on all India basis.

The total number and output value of so called Artisanal mining would in all probability be insignificant.

1.6 Background of NISM – Its Activities and Familiarities with Small-scale Mining in India

Since this paper is being written with the background knowledge and experience of NISM it may be desirable to know a little about NISM and its past activities. The NISM is a service oriented techno-scientific non-profit NGO dedicated to serve the cause of the mining industry, particularly the small/medium mines. It has been given the prestigious recognition as a **Scientific and Industrial Research Organisation (SIRO)** by the Govt of India, Ministry of Science and Technology. It has been registered on 1st April 1989 under the Societies Registration Act 1961 of West Bengal, India.

The Institute was jointly conceived with the **Small Mining International (SMI)** after a number of international meetings in India in 1987. The author of this paper took a leading role in the mater of organising the international meetings and in the formation of NISM and also to some extent of SMI. On invitation from the World Bank NISM was represented by it's the then President Prof B B Dhar and by the Hony Secretary General Mr S L Chakravorty in the World Bank organised Round Table in Washington in May 1995. The IDRC, Canada, the Govt of India and many other bodies sponsored NISM to carry out many projects and studies and in organising Global and National Conferences, Seminars and Workshops. The NISM has a number of mine related socio-economic and other studies to its credit. Some of these identified the effects of mining on the health and culture of workers, some revealed the base line data in virgin areas and some covered the quality of life in the Damodar Basin. A few such studies are indicated in Annexure –II. The NISM has thus a grasp on the total aspect of Small/Medium – Scale Mining in India.

1.7 General Attitude of Some Technical People, Officials and Politicians Toward Small-scale Mining

One of the toughest problems the NISM is facing in its functioning in India is psychological. Many of our technical people, particularly the mining engineers and others associated with mining, feel it beneath their dignity to be associated with small-scale mining activities because they think they are for large-scale mine development only. This attitude is particularly discernible in big mining companies who think they have nothing to do with SSM. Paradoxically however, a number of them agree to support the cause of small-scale mining as they think it to be a good cause. Such big mines, such as Tata Iron & Steel Co (Mining Division) would be more inclined to help and support the cause of small mines if and when such mines operate in their vicinity.

The indifferent attitude of some of the big mining companies are probably due to inadequate exposure to the brighter side of Small-Scale mining in our national economy. In this regard the NISM could play an effective role in motivating them.

The NISM has to admit that it is getting a good support and response from the Govt of India. And in this regard the Central Govt Ministers and the Ministries, in consonance with their natural sympathy for the weaker section, support NISM with some sponsored projects for studying different aspects of SSM in meeting some of their problems. Although, the politicians and technocrats are by and large sympathetic to the cause of SSM their tilt is not sufficient because development of small-scale mining is not as glamorous as development of large scale industries. The justification for holding such a view is the absence of any exhaustive treatment of SSM in the National Mineral Policy. Whatever has been expressed so far is only platitudinous.

In the case of other technical individuals it should not be too much to expect adequate intellectual and technical support from them for SSM. But unfortunately it is not a very common practice.

However, a number of NGOs have been organised all over India for the support of SSM and we could be proud of their activities. But in the case of many, their real objectives, intentions and fields of activities are not clear.

1.8 Appreciation of Traditional Culture and Ethos of Small-scale Mining in the Local Milieu -- Need for Sympathetic Visionaries

In drafting the Common Terms of Reference (TOR) for this study it has been rightly accepted that the present study "may be of an indicative or suggestive nature" and it would ultimately "require additional work beyond the scope of this effort, to lend real clarity to the issue". In our present study therefore we need not try to emphasise too much on quantitative analyses because such analyses may be difficult and unrealistic in a country where the parameters of SSM have not been laid down and appropriate relational statistical figures are not collected and recorded.

It would therefore be much better, for the time being, to try to paint a scenario with a realistic vision than to build a solid structure with non-existent statistical bricks and our

sympathetic activities may be guided by logical emotion rather than by mere mathematical equations.

For that, apart from detached factual studies, we would need an insight into the human mind and existing culture and ethos in order to come to effective conclusions. In this context a reference may be made to Chapter 12.0 of this paper dealing in changing socio-economic profile of women working in small/medium mines For correctly visualising and appreciating the scenario of SSM we have to delve deep into the local milieu as otherwise the conclusions may be wrong and decisions disastrous as it happened in some far-eastern-countries arising out of social tension in mining. Wrongly concluded, such tensions may arise not only in respect of foreign investments but in respect of indigenous investments as well.

In our exploration and understanding of the human mind we have to examine and balance the petty and the large hearted – we have to look to the man beyond his outward appearance and the apparent look and behaviour could be quite deceptive and may need deeper insight. We have also to look to some designing people always on the prowl. In order to avoid false steps our approach to the problems and needs of SSM require sympathetic positive thinking. Along with being a practical techno-economic investigator we have to be a ***sympathetic visionary*** – not widely prevalent though. **For future detailed work the researcher would have to handle this aspect with more interest and circumspection**.

2 Current Legal Status of Artisanal and Small-scale Mining

India has not adopted any formal definition of Small-Scale Mining and / or of Artisanal Mining. The term Artisanal Mining is not commonly used in India. Even the tiniest of mines are known as SSM.

In India we have two major Central Govt organisations controlling the mining sector namely the **Directorate General of Mines Safety (DGMS),** previously known as Mines Inspectorate, and the **Indian Bureau of Mines (IBM).** The DGMS will celebrate its centenary this year (2001) and the IBM was constituted half a century ago (1948); just after independence. The DGMS implements the provisions of the Mines Act (1952) exclusively in the field of safety and labour welfare and the IBM operates primarily for the development of the mining industry under the statutory provisions of the Mines & Minerals (Regulation & Development) Act, 1957.

The **Mines Act** clearly defines "**mines**" [Sec. 2 (1) (j)], "**minerals**" [See 2(1) (jj)], and "**owners**" [2 (1) (l)]. The **"mine"** means any excavation where any operation for the purpose of searching for or obtaining minerals has been or is being carried on and includes many other specific activities and operations. Similarly **"minerals"** means all substances which can be obtained from the earth by mining, digging, drilling, dredging, hydraulicing, quarrying or by any other operation and includes mineral oils which in turn include natural gas and petroleum.

The **"owner",** when used in relation to a mine, means any person who is the immediate proprietor or lessee or occupier of the mine or of any part thereof and in the case of a mine, the business where of is being carried on by a liquidator or receiver, such lequidator or receiver, but does not include a person who merely receives a royalty, rent or fine from the mine, or is merely the proprietor of the mine, subject to any lease, grant or licence for the working thereof , or is merely the owner of the soil and not interested in the minerals of the mine; but any contractor or sub-lessee for the working of a mine or any part thereof shall be subject to this Act in like manner as if he were an owner, but not so as to exempt the owner from any liability.

Even the IBM under Sec 3(i) of the MMRD Act 1957 **follows the definitions of "mine"** and **"owner"** as given in the Mines Act 1952. The Mines Act 1952, under Sec 3 provides that the provisions of this Act, except those contained in Sections 7,8,9,40,45 and 46 ***shall not apply to any mine*** or part thereof in which excavation is being ***made for prospecting purposes only*** and not for the purpose of obtaining minerals for use or sale :

Provided that -

1. not more than 20 persons are employed on any one day in connection with any such excavation;
2. the depth of the excavation does not exceeds 6 metres (15m in case of excavation for coal) and
3. no part of such excavation extends below superjacent ground;

Even for operation on commercial basis such exemption also applies to any mine engaged in the extraction of kankar, murrum, leterite, boulder, gravel, single, ordinary sand (excluding moulding sand, glass sand and other mineral sands) ordinary clay (excluding kaolin, china clay, white clay or fire clay), building stone, slate, road metal, earth, fullers earth, marl, chalk and lime stone : (all these are "Minor Minerals").

Provided that -

1. the workings do not extend below superjacent ground; or
2. where it is an open cast working -
   a) the depth of the excavation does not exceed 6 meters
   b) the number of persons employed on any one day does not exceed fifty and
   c) explosives are not used

If the circumstances demand the Central Govt may by notification rescind these exemptions. But all these exemptions do not exclude the provisions of Sec 7 (Power of Inspector of Mines), Sec 8 (Power of special officer to enter, measure etc), Sec 9 (facilities to be offered to the Inspectors), Sec 44 (Working hours of adolescents not certified to be fit for work as adult), Sec 46 (restriction of employment of women below ground and even on the surface between 10 PM to 5 AM).

Thus although very small mines (tiny SSMs) of these specific minerals (mostly "Minor Minerals") are exempt from the provisions of the Mines Act' 52, the tiny mines of other minerals (non-Minor Minerals) and the other "Minor Mineral" Mines in the upper range of operation are not exempt and are equally liable like Medium and Big Mines.

Thus the exemptions under the Mines Act'52, restricting the sphere of activities of the DGMS (Mines Inspectors) in this specific category of tiny mines has been made perhaps because chances of fatal and serious accidents in such tiny mines are minimal and as such unnecessary waste of time and money in non-essential inspections and administrative control may be avoided, maintaining authority for intervention under Sec 7,8,9,40,45 and 46 where ever felt necessary.

In the case of IBM also such tiny Small Mines are exempt from their control because these mines are really "Minor Minerals" mines which are specifically exempt from the jurisdiction of IBM. The control of "Minor Mineral" has been statutorily shifted by the Central Govt. to the State Govts under Sec 14 and 15 of the MMRD Act'57. Thus the officers of IBM have no authority to inspect and control the activities of "Minor Mineral" mines and thus have no jurisdiction for collecting statistical figures of production, employment, number of mines etc from such mines. They have therefore to depend on the figures supplied by 19-20 State Govts which are not always reliable, except broadly. But except for production value they do not supply the figures about the number of Mines and the total employment, although they do not exempt even the tiniest of Small Mines (mostly Minor Minerals) from the payment of Govt revenue because such mines, working commercially, are liable to pay Royalty, Cess etc on the quantum of minerals raised even though the number of such mines is in thousands. Thus value of "Minor Minerals" production submitted by the State Govt to the IBM for statistical purpose may be taken as fairly accurate. For 1995-96 it was about 39-40% of the total value of all non-fuel minerals including metallic and non-metallic minerals as reported to IBM (Annuxure –1). This value for 97-98 is Rs 2721 crores, for 98-99 is Rs 2757 crores and for 99-2000 is Rs 2757 crores and it is difficult to appreciate how these figures could be almost same for all the three consecutive years.

However, after the UNESCAP organized a Workshop on Mineral Policy for Small-Scale Mining in New Delhi in 1984 which was co-organised by the IBM, the MMRD Act has been amended in 1986 dividing all the mines into two categories, namely **Category A** and **Category B** under Rule 42 of the Mineral Conservation and Development Rules, 1988 : This Rule provides that "for the purpose of carrying out prospecting and mining operations in accordance with these rules (a) every holder of a prospecting license shall employ a part-time or whole-time geologist or mining engineer and (b) every holder of a mining lease shall employ (i) in the case of a mine, where the average employment exceeds one hundred and fifty in all or seventy-five in workings below ground, or a mine where work is being carried out by a system of deep hole blasting or with the help of heavy machinery for drilling, excavation and transport of earth, over-burden, minerals or other material, referred to as ***Category 'A' mines***, a whole-time mining engineer provided that if any doubt arises as to whether any mine is category 'A' mine, it shall be referred to the Controller General for decision. (ii) in the case of any other mine, referred to as **Category 'B' mine**, either a part-time mining engineer or a full-time person permitted to be employed in terms of the provision of Sub-rule (6)". In this context the table below showing the differences between

Category A and Category B would be interesting. It would be apparent that Category B is really tiny mine belonging to the lower rung of SSM responsible for only 10% of the total production although representing 86.5% of the total number of formal mines. And the Secretary of the Ministry, Mr Ashok C. Sen in his Holland Memorial Lecture in 1996 stated that 95% of mines in India are small. It is obvious that he did not restrict the identity to Category B mines only and had pinched some Category A mines also – and rightly so.

Employment in Mines - 1997-98 -- Source IBM

Category / Sector	**No. of *Mines***	**Total Employment for the Group (Av. Daily)**	**Vale of Production (Rs Crore)**	**Value of Annul Production per mine**
Total *	2618	163722	4299	
Category A	342 – 13.5%	109074 - Av. 319 persons per mines Average income per person – Rs 1415	3869 432	90% 10%
Category B	2276 – 86.5%	54648 – Av. 24 persons per mine Average income per person – Rs 320		
Public Sector	292	80,310	2623	61%
Private Sector	2396	83,412	1676	39%

* Excluding Fuels, Atomic & Minor Minerals

'A': i) Mechanised Mines or, ii) > 150 labour in all or iii) > 75 labour in working below ground

'B': Other than 'A'

None of these Categories however, are explicitly termed as small-scale mines. These two categories have two major parameters -- employment and standard of machinery and equipment used. These two parameters somewhat give rise to some anomalies because of variations of these parameters under different circumstances and as such, both categories can interchange the status from the point of view of production and profitability. As a result the IBM statistics do not help in determining the number, spread and mineral wise indication of small mines except in the cases of a few minerals specifically reported by frequency groups and thus the rest would have to depend on special exercise and intelligent guess work of experienced people having grass root contact / experience for drawing the adopted bottom line. For example the National Institute of Small Mines (NISM) has for its administrative reasons adopted different quantum of production for Small, Medium and Big Mines (Max 0.1 mtpy for SM; from 0.1 to 0.5 mtpy for MM and above 0.5 mtpy for BM) without inducting any other parameter such as value of production, degree of mechanization, employment etc.

Thus both the Mines Act'52 and the MMRD Act'57 have no scope of defining Small- Scale Mining although exemptions under Sec 3 of the Mines Act are really for tiny mines and that too of 'Minor Minerals'.

As the Mines Act'52 does not differentiate between major and "Minor Minerals" and there are many fairly large "Minor Mineral" SSMs (Stone mines-for example) the statistics of

mines maintained by the DGMS, (including MM mines), do not tally with those maintained by IBM (excluding MM mines). More over DGMS statistics are on calendar year basis and IBM records are on the basis of financial year – April to March. **Thus the statistical records of these two organizations are somewhat different. Similarly both the Mines Act'52 and the MMRD Act 57 do not define Small-Scale Mining and they do not maintain any statistics of Small-Scale Mines** .

In this context it may be interesting to note from the table below the variations in the number of mines in India as reported by DGMS and IBM. The incongruity of the numbers would be clear from the foregoing explanation. But it is not understood how in spite of higher number of non-coal mines reported by IBM the employment figures for non-coal mines are more or less similar. In the case of 'Fuels', **(instead of 'Coal and Lignite')** as given in the table for 1997-98 the employment figure is somewhat higher for IBM because it include oil and natural gas.

	1998	
DGMS – All Mines		
Mines (Non-coal+Coal & Lignite)	1864+594 = 2,458	
Employment (Non-coal+Coal & Lignite)	164,852 + 491,289 = 6,56,141	
	1997-98	**1996-97**
IBM - AllMines		
Mines (Non-coal+Coal) & Lignite	2,768 + 575 = 3,343	2,963 + 578 = 3,541
Employment (Non-coal+Fuels*)	1,63,722 + 5,37,623 = 701,345	177,186 + 539,851 = 717,037

* *Includes Petroleum (Crude) and Gas – Hence the employment figure is slightly higher.*

It would thus be clear that in India it is not easy to undertake any quantitative analyses of SSM with any degree of confidence as there is no official definition of SSM and as such no official statistics is maintained in this regard. **Since this paper is concerned with Small-Scale Mining the only strategy possible here is to depend on intelligent guess work and presumptive exercise based on official and occasional site-specific information and data with appropriate weightage (Conversion factor) for determining actual status, role and importance of SSM**. I therefore propose to follow this line in preparing this paper. But since both the DGMS and the IBM publish excellent statistical records of those mines who submit annual returns (about 3000-3500 mines) I also propose to present the published statistics in extension for some amount of supportive analyses and better appreciation of SSM scenario since 95% of our mines are small. This I propose to do with some amount of weightage given for SSM for recalculation where possible.

2.1 Official Definitions

We do not have any official definition of Artisanal Mining and or of SSM for administrative or policy purposes, mining codes, special decrees or mineral policy statements.

2.2 *Legal Codes and Regulations*

As explained earlier, we do not have special legal codes worth mentioning in regard to mining operations of SSM most of which are covered by the general codes for mining as a whole. The SSMs are not specifically exempt from the provisions of the main sets of statutes namely the Mines Act (1952) and the Rules and Regulations made there under and the Mines and Minerals (Regulation & Development) Act 1957 and the subordinate Rules except where, because of the size and condition of a mine, any legal provision is irrelevant (Vide See 3 of the Mines Act 1952).

In regard to environment however, most of the SSMs are exempt from environmental provisions, because Environment Impact Assessment (EIA) of Development Projects are necessary only in respect of "Mining project (major minerals) with leases more than 5 hectares" which automatically exempt all mines of "Minor Minerals" and also those major mineral mines having a lease area of 5 hectares or less; vide notification issued by the Ministry of Environment and Forest, Govt of India – S.O. 60 (E) dt 27-1-94 as amended on 04-05-94.

But there are a large number of SSMs extracting Major Minerals from lease areas bigger than 5 hectares. They therefore are liable to environmental control. But such mines are mostly better organised in the higher range of SSM.

Even so, because of uncontrolled activities of SSM in environmentally sensitive areas (such as in Aravalli Region, the Himalayas etc) the Govt are worried and are serious about studies on enforcing environmental restrictions on SSM. In one case the NISM was sponsored an elaborate study on stone mines (Minor Mineral) in the environmentally sensitive region in Hariyana State for recommending appropriate environmental control and restrictions. As it stands, in the cases of Small-Scale Mines extracting Minor Minerals, environmental restrictions are not applied at present for controlling mining practices and their regulations mainly because implementation is difficult – involvement of a very large number of SSMs widely scattered in remote areas.

In regard to tax and marketing SSMs have no special status. And no special, specific statutory restrictions or exemptions or help and support are applicable to SSM . They stand on the same footing as other mines.

The **different taxes levied in India on minerals** extracted can be grouped as under, depending upon the revenues collected by the Municipal authority, the State Govt and the Central Govt.

State Government:

- Dead Rent or Royalty
- Surface Rent
- Sales Tax
- Road Tax

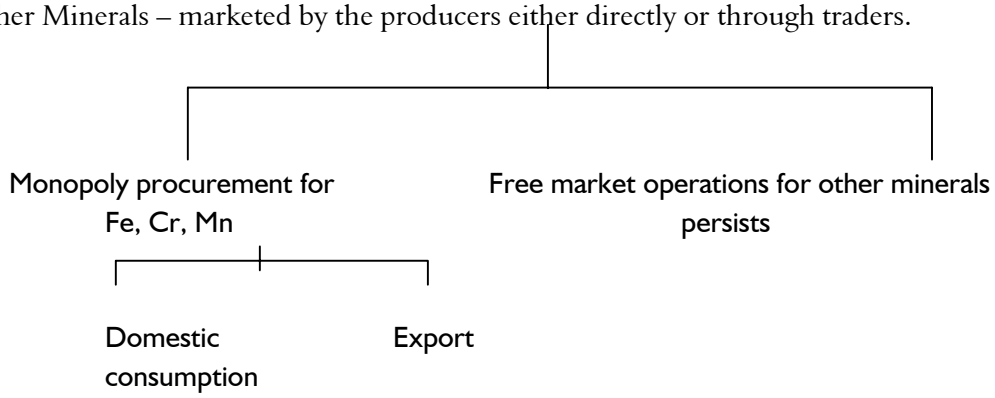
	• Panchayat Tax • Cess
Central Government:	• Income Tax/ Corporate Tax • Mica Mines Labour Welfare Fund Act 1946 • Limestone and Dolomite Mines Labour Welfare Fund Act 1972 • Iron Ore Mines and Manganese Ore Mines Labour Welfare Fund Act, 1976 • Coal Mines Labour Welfare Fund Act, 194 • Coal Mines Provident Fund Act, 194

If proper accounts are maintained and regularly audited, the SSMs also can get **some exemptions from the provisions of Income Tax Act 1961**. Some such provisions are

- Depreciation Allowance (Sec.32)
- Investment Allowance (Sec. 32A)
- Rehabilitation Allowance (Sec 33B)
- Expenditure on Scientific Research (Sec. 35)
- Amortization of Preliminary Expenses (Sec. 35D)
- Deduction of Expenditure in Prospecting (Sec 35E)
- Tax Holiday (Sec 80J)

Indicated below is a broad structure of domestic marketing :

- Captive mines of any producing unit – producer draws upon them its requirements
- Coal – prices are fixed statutorily from time to time by the Central Govt.
- Other Minerals – marketed by the producers either directly or through traders.



For "Minor Minerals" produced by very small miners there exists a semblance of local competition. In a condition of scarcity the producer gets pampered where as in condition of

plenty he is at the mercy of the buyer. Many of the poorer mine owners, without adequate financial strength, are badly exploited by many designing selling-agents and middle-men.

2.3 Official Policy Statements

The latest official policy statement pertains to National Mineral Policy 1993 which does not specifically deal with SSM although the term Small Mines finds a place in paragraph 7.12 in the elaborate document (Annexe XI for full text and Annexe IV, Prof B B Dhar, p.76 of BIMI-96 for some analyses). For clear understanding of the official policy a reference may be made to Annexure III (T H Holland Memorial Lecture on the Evolution of the Mining Industry in India and Vision for the future by Mr Ashoke C Sen, Secretary to the Govt of India, Ministry of Mines on 13th July 1996 at the Mining Geological and Metallurgical Institute of India).

He clearly stated that "as we draw closer to the next millennium, the mega trends for the minerals sector could will be in the areas of new strategies for mineral exploration, boom in mineral sector through foreign direct investment, major structural change in industry, increasing consumption of minerals, new challenges posed by environmental concerns, rise of small scale mining sector and massive R&D investments for multi-purpose utilization of low grade ores/wastes. Sustainable mineral development in the face of rising expectations for better quality of life would call for a massive addition to our mineral resource endowment.

> "There is no denying the fact that the structural reforms initiated by Govt in 1991 followed by the new National Mineral Policy in 1993 and the consequent amendments made to the MMRD Act, 1957 and Mineral Concession Rules, 1960 together with initiatives taken by State Govts have all given accelerated impetus to the growth of the mineral industry in India. The interest shown by foreign investors to the economic reforms and the response in particular of foreign mining giants to the legislative measures undertaken by Govt in early 1994 have been enthusiastic".

Although the lecture was delivered in July 1996 the scenario is more or less similar today except that the Govt have been more liberal in the matter of development of the mineral industry the benefit of which would be available to the Small-Scale Mining also. The ground has been created to attract more foreign investment and operations of private sector activities have been further libaralised.

In this context a reference may also be made to a paper by Mr S B S Chauhan on "Mineral Development in India in 2000 A D – Non-fuel Sector, A perspective W.R.T. Investment Opportunities" - BIMI-96, pp 397-405 (Annexure VII). The paper highlights the mineral exploration and development needs in the coming decade in the changed scenario of economic liberilisation. The policy initiatives of the Government of India to encourage private investment (both domestic and foreign) in the mineral sector have also been spelt out.

2.4 Changes Occurring During Past 10 years

The overall changes occurring during the past 10 years or so had some discernible impact on rationalizing, regulating and expanding existing mining activities and promoting new ventures within the mining sector and as such to some extent also on the sub-sector of Small-Scale Mining.

With the passage of time there has been a definite trend in liberalizing the mining sector. With the National Mineral Policy announced in March 1993 and the subsequent structural reform initiated by the Govt of India the mining sector has been thrown open to the private initiative and investment. For the purpose, the MMRD Act'57 was appropriately amended in 1994 to encourage inflow of foreign investment and technology in the mineral sector. With the new National Mineral Policy 1993 and the amendments made in the MMRD Act 57 in 1994 the Govt dereserved 13 minerals, earlier reserved for public sector, and removed restrictions on foreign investment. For further reform an Expert Group was formed in July 1997 and they have submitted their report.

The policy initiative by the Govt of India to encourage the private investment, both domestic and foreign, in the mineral sector has given a boost to the mining industry as a whole including SSM. In view of the rising demand –supply gap the SSM also has an opportunity in increasing investment and expanding its activities in production, processing, marketing and export e.g. marble and granite (decorative stones) are making increasing stride in the export market.

> "In spite of the fact that India's total potential in the Granite (and other stone) industry is not yet fully harnessed, and at present is a small fraction of the possible turnover, there has been a steady rise in the exports, as seen from the table below, which is exclusively Granite By the year 2000 the target figure of Rs 2000 crores is expected to be reached" [10]

Year	Value of Export in Crores * Rupees
1980-81	20.20
1985-86	51.60
1986-87	60.60
1987-88	90.00
1988-89	120.00
1989-90	197.00
1990-91	227.00
1991-92	376.10
1992-93	410.00
1993-94	600.00
1994-95	906.00
1995-96	1082.87

1996-97	968.21
	* one crore = 10 million

Some figures given in the subsequent chapters would also show a steady rise in production since 1993 and the role of SSM in this regard was also significant.

3 Actual Status, Role and Importance of Artisanal and Small-scale Mining

It is almost impossible to get any official statistics in regard to SSM which term has not been formally defined and adopted by the two main national organisations namely Indian Bureau of Mines (IBM) and the Directorate General of Mines Safety (DGMS) who are responsible for collecting and maintaining such records. Thus records of SSM are neither maintained nor published on relational basis. As a result we would have to depend on presumptive exercise and intelligent guess work and interpretation of trends in determining the actual status, role and importance of SSM. This aspect has been discussed in some details in the previous chapter (Task-I).

3.1 Official Statistics on Formal Miners

No official statistics on registered or formal miners would be available except for those sending regular annual returns to the DGMS or IBM (3100 in 1999-2000 to IBM). This ignores about 5000 small operating "Minor Mineral" mines who do not submit any annual return to the IBM but to the State Govts only. However it may be interesting to visualise the table below which gives a very broad picture of a number of small mines extracting some specified minerals. The basis for identifying small mines is however different here – 50,000 t/annum instead of 100000 t/annum assumed for this report. However, by our assumed standard (up to 1.0 mtpy) these mines are in any case Small-Scale Mines. But these are registered mines submitting annual returns and do not include any of the large number of small mines (about 5000) extracting "Minor Minerals" and sending returns to the State Govts only.

> "Nevertheless, small-scale mining is more prevalent in India than is usually realized. Perhaps 80 to 90% of Indian mines are of this category. An estimate of the extent of this sector in this Country may be made by surveying the number of small running mines of some important minerals in recent years and their share to the total number of corresponding mines (Table following). This account does not consider numerous small mines of other minerals, especially those of minor minerals.
>
> "While eighty odd minerals (including minor ones) are exploited in India, around seventy of them are extracted only by small-scale mining. India is one of the top 10 countries in productions of chromite, barite, mica, talc, sillimanite, kyanite and andalusite which are mined here mostly on small scale. The country holds high ranks in the productions of bauxite, and ores of iron and manganese too.

Number of Small-Scale Mines for Selected Important Minerals in India (1985-1990)

Minerals	No. of Small Mines (upto 500,000 t/annum)					Percentage of Total No. of Mines				
	1986	1987	1988	1989	1990	1986	1987	1988	1989	1990
Asbestos	82	82	87	74	76	100	100	100	100	100
Bauxite	154	195	182	186	183	93	94	94	94	93
Baryte	52	46	51	51	45	100	100	100	100	100
Choromite	22	23	22	22	23	100	100	100	100	100
Coal	48	49	56	41	54	9	9	10	8	11
Dolomite	137	133	132	134	120	95	95	95	95	94
Flespar	138	138	116	117	120	100	100	100	100	100
Fireclay	247	263	239	232	212	100	100	100	100	100
Graphite	31	40	51	51	50	100	100	100	100	100
Iron ore	243	259	237	238	206	70	72	73	73	68
Kaolin	180	198	182	183	170	100	100	100	100	100
Kyanite	13	15	15	10	9	100	100	100	100	100
Limestone	486	563	569	525	546	77	79	79	76	77
Manganese ore	199	207	199	199	185	97	97	97	97	96
Mica	165	181	150	145	148	100	100	100	100	100
Ocher	93	113	91	87	91	100	100	100	100	100
Pyrophillite	40	45	43	44	44	100	100	100	100	100
Quartz	206	229	198	198	205	100	100	100	100	100
Silica sand	257	275	272	302	274	100	100	100	100	100
Steatite	278	258	252	252	239	100	100	100	100	100

"These facts and figures clearly indicate that small-scale mining exists to a great extent in India and would continue to be there for decades to come. For the growth of Indian mining industry, it is essential to prove the technoeconomic efficacy of small-scale mining sector in all spheres of activities – from exploration to exploitation, including management and control.

"Though there have been much discussions on the Indian small-scale mining sector in several international and national workshops/conferences/seminars held in this country, like Workshop on Mineral Policy for Small Scale Mining [New Delhi 1984]., Roundtable on Small-Scale Mining., XII World Mining Congress [New Delhi 1984], National Seminar on Small Mineral Deposits – Their Development and Industrial Possibilities [New Delhi 1986]., International Conference on Small Scale Mining [Calcutta 1991], and many scholars have described the problems and prospects of this sector in several other symposia, an extensive study in this field is yet to be conducted. Recently, the National Institute of Small Mines (NISM), Calcutta, has taken up a study to systematically categorise Indian small mines in selected areas. It is not easy to group these mines. In many mines production is as low as tens of tonnes per day or even less, while some of them have daily production capacity of 150 to 200 tonnes. Investment and productivity in these mines also vary widely. While most small mines are operated manually, some are considerably mechanized. Though most of these mines are surface workings underground workings are not rare. Mica mines in Kodarma region in Bihar; Kathapal and Baula Chromite Mines. FACOR, in Orissa; Dagota Jharna Soapstone Mine, JMDSPL, in Rajasthan; Rangpo Copper-Lead-Zinc Mine, SMC, in Sikkim, are a few examples"[9].

In this context reference may also be made to para 1.5 of the PREAMBLE of this country paper and to paragraph 5.0 of the paper in Annexure I for some more details and comparison.

In addition, it may be stated that the number of reporting mines in 1999-2000 (as reported to IBM) is 3100 mines located in 19 States / Union Territories. Out of 3100 Mines, 566 mines belong to Fuel minerals, 561 to Metallic minerals, 1973 to Non-metallic minerals. Out of the total, 828 mines are in the Public sector and the rest (2272) in the Private sector (Source IBM-Private communication).

Since the State Govts do not supply the figure of actual operating "Minor Mineral" mines it is necessary to do some presumptive exercise to arrive at the approximate number. For the purpose the exercise indicated below may tentatively guide us. For such calculation I take the statistical figures for 8 Minor Minerals as reported by DGMS (vide Table below.) as broad indicator of all the "Minor Mineral" mines.

Mineral	**No of Mines**	**Value of Production Rs '000**	**Production Per Mine Rs. Million**
Granite	110	1291,055	11.737
Laterite	5	7,982	1.596
Marble	16	714,357	44.647
Ochre	12	18,429	1.536
Quartz	54	77,357	1.432
Sandstone	2	37,644	18.822
Slate	6	16,388	2.731
Stone	167	450,994	2.700
Total	372	2,614,206	7.027

Thus, the Weighted Average production per mine is 2,614,206,000 ÷ 372 = Rs 7 million.

Apart from the statistical figures I would also like to double-check with some presumptive figures of **actual stone mines** in Pachami-Hatgacha in West Bengal Sate with which I am more familiar.

Thus, we may, with some confidence, accept the average value of Minor Mineral production per mine - as Rs. 7.0 million. This figure of Rs 7.0 million comes from mines submitting regular annual returns to the DGMS which is expected mostly from fairly organised mines in the higher range of production. More over many of the Minor Minerals, other than these 8 minerals, fetch some what lower value. We may thus presume that those Minor Mineral mines which do not submit any return to the DGMS but from whom the State Govts collect revenue all the same, are some what lower-rung-producers but not too low as other wise those mines would not be viable. We may therefore take the production value of such mines as Rs 4.5 to 5 million or Rs 4.75 million on the average. Considering the total value of production of Minor Minerals, reported by the State Govts to the IBM, as Rs 25070 million for 1997-98 we come to a figure of 5280 or say 5000

Minor Mineral mines all over India. To that we may add another 500 or so mines who occasionally work surreptitiously and do not pay any revenue to the State Govts.

Doing a some what similar exercise, taking the figures of Male and Female employments from the statistical figures of 8 minerals in the table before, we come to a figure of about 107338 male and 13108 female employments – **roughly about 107500 male and 13100 female employed in the 5000 Minor Mineral mines for which no employment figures are supplied by the State Govts to the IBM.**

In trying to work out a conversion factor for converting the statistical figures of mines of all categories to SSMs, statistical reporting about a few mineral group mines were considered along with the miens of other minerals as reported by IBM and DGMS.

As IBM gave frequency reports about mines in respect of four minerals only (Coal, Bauxite, Iron Ore, Bauxite) I got conversion factor only about these mines (Coal – 26%, Bauxite – 96%, Iron Ore 68% and Lime stone – 76%). In respect of a large number of other mines no such frequency reports were available from IBM. More over the number of miens reported by DGMS were also different.

I was therefore frustrated in trying to make some exercise in identifying conversion factors of different mineral – conversion of the number of all mines to Small-Scale mines. I would therefore assume an uniform conversion factor of 95% as it is an all round feeling that 95% of India's mines are Small and there would be no harm in giving sanctity to this number both for metallic and non-metallic mines which may be changed in future if adequate statistical figures are available by frequency groups. More over most of the metallic and non-metallic mines are Small-Scale operations – vide Table at part (a) of Chapter 3.0 (Task II).

Summarising it may be stated (based on published statistical figures Coupled with some presumptive exercise) that the total number of mines may be classified as below:

Total Number of Small Mines

For the period 1997-98 (IBM figures)

i) Registered or reporting Mines -

Reporting to IBM/DGMS	**All Mines**	**Presumed**		**Small Mines**
a) Coal & lignite -	**578**	**26%**	**=**	**150**
b) Metallic minerals-	**559**	**95%**	**=**	**531**
c) Non-metallic minerals-	**2059**	**95%**	**=**	**1956**
	3196			**2637**
ii) Minor Minerals- Reporting to State Govts	**5000**	**98%**	**=**	**4900**
iii) Unreporting small mines --mainly				
Minor Minerals				
(presumptive figure) -	**500**	**100%**	**=**	**500**

3.2 Statistics on Mineral Production or Revenues

For reasons indicated herein before, no formal statistics of production from SSMs are available on overall mineral production. In this regard a reference may be made to the unpublished paper in Annexe I where a detailed presumptive exercise was made to find out the output from Small Mines of Metallic Minerals, Non-Metallic Minerals and Minor Minerals for 5 years (1988-89 to 95-96) and the basis of presumptions (weightage for SSM) has been discussed at the end of the paper. Based on the exercise (with weightage) it was found that the value of minerals from SSM was about 36/37% of the total over a number of years upto 95-96.

In this regard some information given below on the total mineral production (from Big, Medium and Small Mines) may be of some interest indicating that the mining industry as a whole has made some progress over the last 10 years and in this regard the role of SSM was substantial.

Value of Mineral Production 1988-89 to 1997-98 (By Groups)

Year	Total	Fuels (Oil, Coal, Lignite, gas)	Metallic Mineral	Non-metallic Mineral
1988-89	15275	13224	907	1144
1989-90	17913	15291	1161	1461
1990-91	19123	16144	1297	1682
1991-92	20754	16993	1634	2127
1992-93	23284	19123	1942	2219
1993-94	27040	22502	2056	2482
1994-95	30610	25526	2211	2873
1995-96	34002	28063	2588	3351
1996-97	37842	31524	2711	3607
1997-98	38665	32152	2897	3616

Source: IBM

Value of Mineral Production: 1987 and 1997-98 (By Minerals)

Mineral	1987 Rs. Crores	1997-98 Rs. Crores
All Minerals		**38,665**
Petroleum (Crude)	5,318	11,715
Natural Gas (utilised)	958	3,811
	6,276	**15,526**
Coal & Lignite	4,263	16,626
Iron Ore	320	1,643
Limestone	267	915
Chromite	66	309
Copper Ore	110	258

Manganese Ore	39	165
Apatite & Phosphorite	29	132
Bauxite	32	105
Dolomite	15	67
Kaolin	10	45
Magnisite	19	36
Others	790	2,838
Total excluding Petroleum and Natural Gas	**5,960**	**23,139**
Total – All Minerals excluding Minor Minerals	**12,236**	**38,665**

Source: IBM

A few more consolidated tables from IBM and DGMS are reproduced below illustrating not only production but many other aspects which are of interest for the present paper. Although the figures from the two organisations may not be compatible, for reasons already explained earlier, they form a good background for appreciating broadly the status and importance of SSM.

Indian Mineral Industry – Value of Production 1995-96 to 1997-98

Sector	**1995-96**	**96-97**	**97-98**	**Changes between (in percentage)**		**Sectoral contribution to the total Value (in percentage)**	
	In Million Rupees			**1995-96 and 1996-97**	**1996-97 and 1997-98**	**1996-97**	**1997-98**
Total : All Sectors	340,019	380,703	414,274	12.00	8.8	100	100
Fuels	280,628	315,241	342,062	12.3	8.5	82.80	82.56
(a) Solid Fuels	130,888	160,254	186,800	22.4	16.56		
(b) Liquid and gaseous fuel	149,740	154,987	155,262	3.5	++		
Metallic Minerals	25,883	27,090	31,385	4.66	15.8	7.11	7.57
Non-Metallic Minerals	13,458	13,983	15,755	3.90	12.6	3.67	3.80
Minor Minerals	20,050	24,389	25,071	21.64	2.8	6.40	6.05

Source: IBM

Number of Mines, Daily Employment, Output, Value of Minerals and Average Weekly Wages

Sl No	**Mineral**	**No. of Mines**	**Av. daily employment**			**Output in tonnes unless stated**	**Value '000 Rs**	**Av. Weekly wages in Rs. (Dec-97)**
			Male	**Female**	**Total**			

1.	Apatite / Rock Phosphate	15	3345	247	3592	773.259	335240	582
2.	Asbestos	14	379	19	398	24134 1164 (PR)	18359 9632	534
3.	Barytes	16	894	77	971	837841	267518	356
4.	Bauxite	89	5019	898	5917	5172651	1043163	499
5.	Calcite	4	486	1178	1664	65805	19923	--
6.	China Clay/Clay	118	5762	1000	6762	1066791 43381 (PR)	234268 26246	375
7.	Chromite	21	7096	1237	9133	1395816 46675 (PR)	3146635 45529	661
8.	Copper	10	1025 5	18	10273	4260582	2315354	
9.	Corrundum	2	87	-	87	2919	8582	426
10.	Diamond	1	325	13	338	27986	146481	1685
11.	Dolomite	32	2700	1013	3713	2165142 354363 (PR)	408171 29269	734
12.	Emerald	1	19	-	19	Nil	Nil	346
13.	Felspar	16	192	43	235	78524	13624	325
14.	Fireclay	47	623	158	781	230755 2220 (PR)	34225 222	324
15	Fluorite	8	452	47	499	8668	17914	930
16	Galena & Sphalerite	12	5298	101	5399	2012789	904682	
17	Garnet	3	670	-	670	22085 (AB) 3029 (GE)	24 5423	2291
18	Gold	4	732	3	735	68335	128097	
19.	Granite	110	3586	281	3867	723117 52708 (PR)	1291055 238235	528
20.	Graphite	13	312	286	598	53372	32607	303
21	GYPSUM	39	562	25	587	2231235	302131	783
22	Iron Ore	212	3400 5	4632	38637	39542175 16542266 (FN) 11733793 (LM) 10537726 (PR)	7406354 2620445 2505809 3277261	
23.	Kyaite	1	23	-	23	5442	2825	--
24	Laterite	5	162	8	170	167357	7982	--
25	Limestone	412	2900 9	3953	32962	120690432 2864491 (PR)	1069389 6 264852	
26	Magnesite	15	2579	878	3457	480216	468990	831
27	Manganese	131	1186 4	4210	16074	2182053 106019 (PR)	1929634 317027	
28	Marble	16	464	9	473	1855836 8454 (LM)	714357 1581	448
29	Mica	43	1087	99	1186	3354904	55525	317
30	Ochre	12	199	1	200	84397	18429	--

31	Pyrite	1	497	0	497	128570	145811	
32	Quartz	51	821	239	1060	234436	77357	549
33	Salt	1	53	1	54	3102	41024	479
34	Sandstone	2	261	91	352	112273	37644	552
35	Selenite	1	19	1	20	7999	3600	469
36	Silica	66	2681	298	2979	4083703 120419 (PR)	375013 15726	402
37	Sillimanite	4	1213	56	1269	109228	180166	458
38	Slate	6	528	26	554	44162	16388	352
39	Steatite	98	2962	477	3439	415640 15733 (PR)	160751 16708	425
40	Stone	167	4297	605	4899	10431369	450994	331
41	Vermiculite	4	52	35	87	1881	1389	485
42	Wolfram	1	172	-	172	15154	1070	-
43	Wallastonite	3	830	777	1607	238309	131263	357

Source: DGMS: Statistics of Mines in India, Vol. II (Non-coal) – 1997
Output of all minerals are in tonnes except corrundum, diamond, emerald, mica & garnet. Diamond and emerald are in carates and grams respectively. Corrundum, Mica, garnet in kg.

Number of Mines, Daily Employment, Output, Value of Minerals and Average Weekly Wages – 1998

Sl. No.	**Mineral**	**Number of mines submitting returns**	**Average Daily Employment**			**Output***	**Value in '000 Rs.**	**Average Weekly Wages in Rs. Dec 1998**
			Total	**Male**	**Female**	**In Tonnes Unless Otherwise Stated**		
1	APATITE/ ROCK	14	3016	2802	214	1709803	758314	549
	PHOSPHATE							
2	ASBESTOS	15	378	367	11	25332	18117	388
3	BARYTES	14	959	868	91	1174731	398351	792
4	BAUXITE	91	5744	4983	761	5907609	1447821	593
5	CALCITE	5	1693	501	1192	119411	37830	
6	CHINA CLAY, CLAY etc	127	5047	4090	957	1419745	251402	385
7	CHROMITE	25	9012	7913	1099	1193993	2291839	856
						51830 (PR)	50023	
8	COPPER	10	8706	8690	16	4376215	2496222	2026
9	CORRUNDUM	2	89	89		4928	15849	426
10	DIAMOND	2	400	388	12	38367	204543	1695
11	DOLOMITE	33	3557	2516	1041	2186145	420945	738
						386085 (PR)	35078	
12	EMERALD	1	2	2		Nil	Nil	395
13	FELSPAR	14	249	204	45	50473	8329	356
14	FIRE-CLAY	49	773	641	132	251104	40467	355
15	FLUORITE	8	310	303	7	10306	30784	906
16	GALEMA & SPHALERITE	12	5565	5455	110	2233376	1096148	1620

17	GARNET	4	609	609		52559 (AB)	61	2259
						1106 (GE)	107	
18	GOLD	11	6128	6038	90	509958	1038288	1555
19	GRANITE	110	4240	3983	257	434641	1108110	511
						68094 (PR)	6512	
20	GRAPHITE	13	550	292	258	75480	40841	370
21	GYPSUM	42	531	515	16	2118194	851802	598
22	IRON	214	37290	32921	4369	35366975	5329606	1120
						19730376 (FN)	3090740	
						14071770 (LM)	2931609	
						8203480 (PR)	6979873	
23	KYANITE	1	23	23		4956	2704	
24	LATERITE	5	152	144	8	147633	10427	
25	LIMESTONE	420	31242	28411	2831	113200173	9117086	895
						3386747 (PR)	286034	
26	MAGNESITE	15	3063	2537	526	381068	402250	906
27	MANGANESE	135	15894	12297	3597	1846177	1663679	663
						78305 (PR)	379071	
28	MARBLE	14	441	434	7	1849682	600075	516
29	MICA	47	1112	1027	85	3273517	53461	315
30	OCHRE	10	131	131		62023	6091	
31	PYRITE	1	523	523		97163 (PR)	107074	1491
32	QUARTZ	51	970	769	201	209747	51961	556
33	SALT	1	47	46	1	2361	3633	516
34	SANDSTONE	1	344	253	91	106046	37000	589
35	SELENITE	2	36	34	2	Nil	Nil	535
36	SILICA	61	3349	3035	314	3523900	402291	457
						76064 (PR)	9548	
37	SILLIMANITE	3	1257	1201	56	106918	178878	458
38	SLATE	6	596	550	13	70944	15024	447
39	STEATITE	93	3420	3022	398	416787	221779	431
						8124 (PR)	3548	
40	STONE	172	5251	4724	527	12033702	596014	413
41	VERMICULITE	5	123	71	52	2053	5701	277
42	WOLFRAM	1	172	172		12154	1070	
43	WOLLASTONITE	4	1891	902	989	196193	151888	325
TOTAL (METALLIFEROUS)		1864	164852	144476	20376		45285949	(avrg) 931

Source : DGMS: Statistics of Mines in India, Vol. II (Non-coal) – 1998

* Output of all minerals are shown in tonnes except corrundum, diamond, emerald, mica and garnet. Diamond and emarald are in carats and grams respectively

PR: Processed, FN : Fine, AB: Abrasive, PL : Pallets, LM : Lumps, GE: Gems

Recent Total Mineral Production

	Gold, Silver,	**Diamond**	**All other**	**Value of All**

	Corrundum, Ruby, Tin Conc. (in kg)	(in carat)	minerals (in million tones)	Minerals Produced Rs. Crores
97-98	89,240	30,994	876.2	44094
98-99	99,240	34,580	887.1	44550
99-2000	79,637	40,666	918.1	45233

Source: IBM – Private Communication

By an elaborate exercise made some time in 1996, as indicated in my unpublished paper (Annex I), I found that production contribution of small mines of all metallic, non-metallic and Minor Minerals was 37/38% of the total production value for 5 years consecutively. **I would now like to change the basis of calculation to new presumptive basis and take the contribution of Metallic and Non-metallic mines as 25% and of Minor Minerals as 90% to arrive at the contribution of SSM to the value of total mineral production**. Therefore the total contribution of Small Mines of Metallic, Non-metallic and Minor Minerals would come to about 42% in place of 37/38% indicated earlier. For Coal however, the share was about 6% of the total production value of coal although in terms of tonnage it was only 3%. This is so because the small coalmines, mostly comprising small underground mines are responsible for production of high grade coal.

It is not however possible to compile or collect the revenue derived from SSM if it means the earning of the State Govts (owners of mineral rights under the Constitution of India) in the form of Royalty, Dead Rent, Cess etc Such calculation is not possible separately on the basis of Small, Medium or Big mines since royalty rates vary widely with different minerals and mere guess would be too simplistic. Even for such guess estimate an assessment of total income of all the State Govts would be a time consuming and difficult process.

Summarising the position about production value of Small Mines, actual and presumptive, the figures in Rs crores would be as below for 1997-98 :-

Contribution of Small-scale Mines to Production Value

		Presumed Conversion factor	Production Value of SSM Rs. Crores	Percentage contribution to SSM Production
i)	Metallic and Non-metallic – Total Rs 6513 crores	25%	Rs 1628	32.56%
ii)	Coal & Lignite – Total Rs 20530 Crores – from 594 mines – DGMS Rs. 16626 crores – from 574 mines - IBM (Value taken as 6% of total though the output is 3% by weight, because productions are from underground mines which are of much higher grade)	6%	Rs 998 IBM Rs.1232 DGMS Rs.2230/2 Rs 1115	22.3%
iii)	Minor Minerals as reported by State Govts Total Rs. 2721 crores	90%	Rs 2256	45.14%

iv)	Unreporting: Non-formal / illegal mining Small Miners extracting only Minor Minerals (Mere-speculative figure)	100%	Rs 25	0.5%
		Say	Rs 5024 or Rs 5000	100.0%

All the productions under (i), (ii) and (iii) are formal and the productions under (iv) are informal or illegal.

Although the presumptive conversion factor for Minor Minerals for determining the number of mines has been taken as 98% in the table under part(a) preceding, indicating that only about 100 Minor Mineral miens are of medium or big size it is not incompatible with the 90% factor considered for the production value under table above because about 2% (about 100 in number) of such Minor Mineral mines (mostly run by big companies by mechanized means) may contribute about 10% of the production.

3.3 Participation in Informal Mining

I believe that no official or unofficial estimates of non-formal or non-registered or illegal mining has been made by any organisation. Except for a few isolated accounts of area-specific non-formal mining no integrated study has been made in this regard, nor is it feasible because of the number of small illegal and disputed workings dispersed widely all over the country. More over, very large-scale illegal mining of any specific mineral is not common in India as to attract wide attention. The loss of revenue from such unauthorised or illegal or even disputed operations is not of such magnitude as to raise a hue and cry in the State Govt mining-revenue circles. Nor is there any concerted attempt by different State Directorates to make a detailed assessment of such losses. Such apparent indifferent attitude on behalf of the State officials may either be due to legal and administrative complexities of stopping such practices or due to insignificant nature of the loss involved. But what sort of price such illegal workers get for their produce is any body's guess – only occasional small bonanza.

However, it is widely known that such non-formal mining exists and they do not submit any annual return. Since no survey in this regard has been made on all India basis it can atmost be a guess work and we could take the number as 500 who occasionally have to pay to the State Govts their dues, when caught, but such collections are not regular. It may be erratic but substantial.

Even the formal small-scale miners belonging to the lower rung of SSM do not get full benefit of their efforts, because marketing by poor small mine owners is done through middlemen or traders who take full advantage of the helplessness and technical backwardness of the mine owners who, due to lack of resources, means and awareness, are unable to deal with the real customers directly[4]. But most of the SSMs in the higher range of production have their own marketing staff who take the help of mining associations for negotiating with big customers and with the Govt organisations.

3.4 Employment

In the Pacami-Hatgacha cluster of stone mines alone in West Bengal State, considering the secondary and tertiary sectors, about 38,000 are making a living on the project. [6]. There would be a large number of such stone mines (either isolated or in clusters) all over India.

Apart from stone mines there are other minerals belonging to the Minor Mineral group which are the exclusive purview of the state Govts and there are no published statistics in this regard. It is a matter of mere intelligent guess work as these mine owners either do not submit any return about employment or such employment figures are not published by all the State Govts.

However, formal statistics of formal mines submitting annual returns tells a different story. According to the returns submitted to DGMS (1998- for 1864 non-fuel mines not excluding all the Minor Mineral mines) it is 164,852 and the figure submitted to IBM (1997-98 for 2768 non-fuel mines but excluding Minor Mineral mines) it is 163,722. It is rather strange that the employment figures are more or less same even though the number of mines are widely different. I am not clear about the reason. Even if the employments in Small Coal & Lignite mines are added (about 60,000 out of 491289 as reported by DGMS) the total is likely to be 0.224 million – 163722 for non-coal + 60,000 for Coal & Lignite = 0.224 million. Although DGMS do not specifically exclude Minor Mineral mines it is possible that they do not include all of them (5000) and as such we have to presume a number of employments for such excluded Minor Mineral mines which the State Govts do not publish and which in any case are excluded totally from the statistical records. Thus considering 5000 or so of the Minor Mineral mines reporting to the State Govts, as has been indicated somewhere else in this report, the total may add up by another 107,500 as indicated in part (a) of Chapter 3.0 (Task II)(Page 28). The employments thus comes to an average rate of 20 per mines. The primary employment figure thus comes to about 0.33 million (0.22+0.11). But considering secondary and tertiary sectors involving mechanics and other engineering services, transport, eateries, marketing personnel, domestic services etc it could be about 0.5 million or so. This presumptive exercise surprisingly agrees with the figure internationally accepted – 0.5 million; a broad guess work made in a big interactive meeting with international delegates sponsored by IDRC at Noamundi Iron Ore Mines in India in 1987 where Dr Carman was present. Thus summarizing the employment figures it may be stated that the total employment in SSM is about 0.5 million, the women constituting about 6 to 7 percent of the total (about 33,500).

However, the following statistical figures about employment showing the trend since 1991 would be interesting which shows declining employment in spite of increasing production perhaps due to increasing mechanisation.

Trends in Employment and Output for Major Minerals

Sources : - Statistics of Mines in India Vol. II (Non-Coal) - DGMS-1998									
Mineral	Year	No of	AVERAGE DAILY EMPLOYMENT				OUTPUT		Value of
		mines sub	Below	Opencast	Above	Total	Unit	Quantity	output

		- mitting	Ground	workings	Ground				(Million Rs.)
		returns							
1	2	3	4	5	6	7	8	9	10
Bauxite	1991	80	--	3968	959	4927	'000 tonnes	3862	599
	1994	90	--	5100	1015	6115	,,	4697	707
	1995	86	--	5312	1060	6372	,,	5093	897
	1996	89	--	4842	969	5811	,,	5347	1017
	1997	89	--	4831	1086	5917	,,	5172	1043
	1998	91	--	4694	1050	5744	,,	5908	1448
Copper	1991	13	7972	938	3934	12844	,,	5048	1982
	1994	12	7190	425	3549	11164	,,	4782	2048
	1995	11	6501	512	3460	10473	,,	4766	2288
	1996	10	6224	490	3207	9921	,,	4747	2259
	1997	10	6606	368	3299	10273	,,	4260	2315
	1998	10	5561	390	2755	8706	,,	4376	2496
Galena &	1991	13	3533	231	2481	6245	,,	1816	543
Sphalarite	1994	12	2768	227	2676	5671	,,	1905	592
	1995	12	2554	214	2524	5292	,,	2096	686
	1996	12	2401	210	2604	5215	,,	2064	773
	1997	12	2433	202	2764	5399	,,	2013	905
	1998	12	2771	117	2677	5565	,,	2233	1096
Gold Ore	1991	9	5359	--	3973	9332	,,	468072	730
	1994	10	4311	--	3053	7364	,,	360775	659
	1995	11	4133	--	2962	7095	,,	461957	907
	1996	10	4065	--	2810	6875	,,	470802	940
	1997	11	4053	--	2783	6836	,,	457522	924
	1998	11	3556	--	2572	6128	,,	509958	1038
Granite	1994	106	--	3392	470	3862	'000 tonnes	313	250
	1995	106	--	3408	600	4008	,,	406	350
	1996	94	--	2918	504	3422	,,	716	744
	1997	110	--	3257	610	3867	,,	776	1529
	1998	110	--	3625	615	4240	,,	502	1115
Iron Ore	1991	190	--	24532	15518	40050	,,	60032	6418
	1994	206	--	23669	14877	38546	,,	64912	8888
	1995	214	--	24175	15482	39657	,,	73009	10214
	1996	211	--	24451	14744	39195	,,	71586	11494
	1997	212	--	23452	15185	38637	,,	78356	15810
	1998	214	--	22883	14407	37290	,,	77375	18331
Limestone	1991	340	--	34293	9229	43522	,,	75024	3872
	1994	374	--	30992	8818	39810	,,	86771	5275

	1995	404	--	30715	9106	39818	,,	93642	6319
	1996	407	--	26940	8801	35741	,,	120874	8909
	1997	412	--	24338	8624	32962	,,	123555	10959
	1998	420	--	23384	7858	31242	,,	116606	9403
Manganese	1991	133	2614	10243	5009	17866	,,	1683	795
Ore	1994	128	2660	9957	5631	18248	,,	1686	1246
	1995	132	2715	9919	5451	18085	,,	1830	3695
	1996	129	2473	10480	5176	18129	,,	2012	4195
	1997	131	2547	9050	4477	16074	,,	2290	2247
	1998	135	2708	8459	4727	15894	,,	1924	2043
Mica	1991	83	1550	73	550	2173	Tonnes	3554	43
	1994	59	1192	76	474	1742	,,	2019	28
	1995	58	1166	117	479	1762	,,	2263	35
	1996	45	737	106	351	1194	,,	2436	40
	1997	43	747	85	354	1186	,,	3355	56
	1998	47	759	52	301	1112	,,	3274	53
Stone	1991	228	--	8273	2970	11243	'000 tonnes	11635	490
	1994	186	--	6822	2564	9386	,,	11125	323
	1995	180	--	4812	2708	7520	,,	6337	254
	1996	170	--	2696	2464	5160	,,	4775	205
	1997	167	--	2526	2373	4899	,,	10431	451
	1998	172	--	3140	2111	5251	,,	12034	596
Total	1991	1787	23832	116743	59658	200233	--	--	19076
Metalliferous	1994	1869	21235	112889	57313	191437	--	--	24648
	1995	1930	20116	110065	58611	188792	--	--	33611
	1996	1872	18825	100917	56590	176332	--	--	36521
	1997	1834	19215	95614	57681	172510	--	--	43758
	1998	1864	17960	93497	53395	164852	--	--	45286
Non-coal	1991	1811	23832	116743	95171	235746	--	--	37609
	1994	1898	21235	112889	91636	225760	--	--	58950
	1995	1962	20116	110065	92618	222799	--	--	70676
	1996	1904	18825	100917	90038	209780	--	--	73909
	1997	1868	19215	95614	86292	201121	--	--	85111
	1998	1901	17960	93497	82927	194384	--	--	98421

3.5 Relative Importance of Economic Formations

It is difficult to estimate the different social-economic formations (MINES). However, if I have to make a very broad speculation the different formations of all mines and SSMs may be as below (as per the END NOTE) :

(i) **Full time year round** (statistically reported mines)

	Total No. of All Mines	Conversion Factor	Total No. of SSMs	Appx. Nos of All Mines	Appx Nos of SSM
Coal & Lignite	578	26%	150	about 99% - 572 mines	142
Metallic minerals	559	95%	531	about 80% - 447 mines	425
Non-metallic minerals	2059	95%	1956	about 60% - 1235 mines	1174
Minor minerals	5000	98%	4900	about 25% - 1250 mines	1225
	8196		**7537**	**Total :**	**2966**

(ii) **Full time but seasonal**

Appx. Nos of All Mines			**Appx No. of SSM**		
Coal & Lignite	-	about 1%	- 6 mines	-	2
Metallic minerals	-	about 15 %	- 84 mines	-	80
Non-metallic minerals	about	20 %	- 412 mines	-	391
Minor Minerals	-	about 40 %	- 2000 mines	-	1960
				Total :	**2433**

(iii) **Part time**

Minor Minerals	-	about 30 %	- 1500 mines	-	1470
Metallic	-	about 5 %	- 28 mines	-	27
Non-metallic	-	about 20 %	- 412 mines	-	391
				Total :	**1888**

(iv) **Short term**

(i) Minor Minerals - about 5 % - 250 mines - 245
in response to stress

(ii) Bonanza Opportunity

- mainly gem stones and semiprecious minerals – about 1% - 20 mines - 20

Total : 265

- also illegal Minor Mineral mines not reporting – about 100% - 500 mines - 500

Grand Total: 8052 or about 8000

3.6 Organising Production and Processing Activities

Organising Production

Production activities are mostly carried out individually as successors to family enterprises. In such cases the successors quite often form working groups or partnership and such combinations are of varied nature- formal or informal. Formation of formal civil associations are also common where partnership or co-operative firms are formed. No study in this regard has probably been made on all India basis but it is more or less certain that all sorts of formal or informal arrangements and individual operations can be visualised in the small scale mining sector in India.

A broad picture of growing production activities in our country may be seen from the table at part (d) preceeding (Pages- 40,41,42).

Processing activities

As in the cases of production so also in the cases of processing, in small mines all sorts of arrangements can be found. In cutting and polishing of gem stones and semi-precious stones it is mostly family activities as in the case of diamond, employing hundreds of thousands of workers working at home with simple equipments and tools.

Hand picking in Manganese mining is an important standard method of processing done by employees, mostly women. Such hand picking is done also by poor families out of old abandoned dumps more on the principle of small business. Hand picking is the only process of separating Mica flakes from the mined blocks and is done by the employees, mostly women.

Similarly, processing by hand operated improvised zigging equipment done occasionally for improving quality of small size materials (e.g. Manganese) is a common practice. Such zigging is done regularly as a standard method in mines by the employees or for recovery from abandoned dumps by private practioners under different locally convenient arrangements. This type of separation was done from the old Manganese dumps during the Second World War when demand for Manganese suddenly went up high and many individuals and families took advantage of the situation.

Processing of graphite flakes done by floatation using pine oil is a common practice either from mined ore by the employees or from dumps or low concentrate surface occurrences by enterprising individuals or poor families for occasional earning.

Breaking and hand picking Wolfram from quartz lumps is an interesting practice of women employees whose instincts decide which lump of quartz has wolfram in appreciable quantity hidden inside. But there are not many operating wolfram mines.

For processing of stone for making smaller pieces, women employees are employed for carrying small lumps for feeding into crushers and also for carrying the screened fractions to different size-stacks for loading into trucks.

In slate and dimensional stones, both men and women work for fine chiseling and at times for hand smoothening as is done for slates.

In short, different simple processing methods are practiced by employees, independent individuals or families or assembly of individuals for regular operations or occasional bonanza earnings and for the purpose human ingenuity, skill and business acumen are utilized to the fullest extent available.

3.7 Net Income to the Miners

As per DGMS records for 1997 and 1998.

Trend in index of labour earnings in non-coal mines (base year : 1975 = 100)

Mineral	1990	1997	1998
Bauxite	554.28	1124.87	1327.93
Clay / China Clay	736.86	1675.74	1702.14
Chromite	574.76	1047.09	1208.08
Dolomite	322.09	592.16	616.30
Fire Clay	383.21	857.89	875.16
Gypsum	558.59	1341.46	928.47
Iron Ore	671.55 (1991)	1360.86	1689.41
Limestone	531.82 (1991)	951.30	1106.32
Magnesite	547.51	1519.17	
Manganese	709.32 (1991)	1224.79	1779.51
Mica	460.50	807.77	887.66
Steatite	435.67	1619.76	1565.62
Stone	513.16	1068.64	1132.86

It would be seen from the above index figures that the labour earning increased from 2 to 2.5/3 times in the last 10 years. For actual weekly earnings reference may be made to the elaborate DGMS tables for 1997 and 1998 at part (b) before.

In sandstone quarries around Jodhpur in Rajasthan most of the labourers work for 8 hours a day and earn about INR 82 – 125 per day i.e. 2500 to 3700 per month which is a handsome amount for the illiterate persons who can not get much wages on sustained basis in factory, shop and in any other industry [7].

In Bauxite mines in Lohardaga in Jharkhand State the income from mining is much more than the earning from agriculture. This is true in many other mining areas as well. But in the small mines working low value minerals in remote corners of the country situated away from established big mines the workers, mostly tirbals, are paid much lower in the range of INR 50/60 per day. And they are more satisfied than the workers working at or near urban centres because of lower cost of living and no exposure to fancy consumer durables and other costly attractions.

3.8 Employment of Women and Children

Employment of women is very popular in opencast mines because they are more regular and dependable and do not indulge in excessive drinking. Although employment of children in mines is on the decline, at times such employment is prevalent is small mines to augment the income of parents with whom they quite often work jointly in screening, loading or manually breaking stones into smaller pieces. They rarely work in mining operations.

Women are in demand also for hand sorting and blending for improving the quality of extracted minerals which can not be gainfully carried out mechanically. This aspect has also been discussed else where in this paper. They very rarely work in mines proper and their working in underground mines is totally banned under the Mines Act 1952.

A few DGMS tables for 1997-1998 in the previous pages at part (b) (Pages-31-35) would indicate employment of women in some details. The total employment constitute about 6% to 7% of the total 0.5 million for SSM as a whole— 20,376 as reported by DGMS as per table under part (b) and with it may be added another 13100 or so for 5000 Minor Mineral mines vide part (a) of chapter 3.0 (Task-II) (Page 29). **Thus the total of women employment may be taken as 33476 or say 33500.**

For other interesting aspects of gender issues a reference may be made to Chapter 12.0

3.9 Multiplier Effect

There are a number of products that are made in India from minerals which give indirect economic benefits. The tables below indicate use of different minerals quantitatively for manufacture of a few mineral based products. There are also many other minor products that are made from minerals.

Consumption of Minerals for Different Industries - 1997-98

Iron & Steel Industry

Iron Ore	Coal	Limestone	Dolomite	Manganese	FerroAlloy	Bauxite
287,00,000	244,00,000	54,00,000	31,40,000	470,000	222,000	17,000

Cement Industry

Limestone	Coal	Gypsum	Quartz	Bauxite	Iron Ore
58400000	13700000	3500000	24000	402000	724000

Refractory Industry

Dolomite	Fireclay	Magnesite	Quartz/ Bauxite/	Kyanit	Kaolin	Quartizite	Diaspore

			Chromite				
474000	300000	252000	69000	224000	22000	26000	22000

For other multiplier effects, for example, there are a number of products developed from marble waste such as titles, jute bound marble dust tiles, mosaic tiles, fired titles, door panels, marble slurry – cement bricks, autoclaved concrete blocks.

Similar products like tiles, door frames, fire resistant sheets etc are also made with plaster of paris which creates an additional demand for the basic mineral gypsum.

Basalt Chips and dust are also utilised for making pre-stressed concrete sleepers for Railways and poles for transmission of electric power.

Large quantity of hand chiselled stone bricks, blocks, carb stones etc for read surfacing are made all over the country and this is an important source of additional income for small mines and their workers.

Making of domestic utensils and fine artistic designs carved out of stone is an important small-scale industry all over India. Dressed granites and marble blocks are also used extensively as architectural designs in South, Central and Western India. These are results of ancient mining culture which developed and flurished in the country over many centuries. For proper appreciation of this culture it is worth while visiting many forts, palaces, temples, mosques, public monuments etc particularly in Rajasthan, Mysore, Madhya Pradesh, Orissa and many other places in southern, western and central India. The new Secretariat Building in Bangalore, built in granite is a recent example – Taj Mahal built in marble is a classical example though.

Splitting and trimming of mica foils is almost a monopoly of women workers and is an important multiplier effect of mica mining – mica foils used extensively for electrical industries.

Similarly, supply of hand sorted and blended manganese, chromite etc also plays an important role in the manufacture of ferro-manganese, ferro-chrome etc and SSM has an important (although not exclusive) role to play in this regard in terms of additional earning and higher employment, particularly for women workers.

It is however, not possible to attempt any quantitative estimate of direct or indirect economic benefits from such multiplier effects.

3.10 Negative Impacts on Environment

In this regard it is recommended to refer to papers at pages 93 to 137 of the **proceedings of National Seminar on Small-Scale Mining, Jodhpur, 2001.** The papers give an excellent account of the negative impacts of SSM on the environment (Annexure X)

The NISM is also making an interesting audio-visual film (just completed) depicting how the workers are being affected by the dust generated from extensive crushing activities of stone (basalt) in the stone mining cluster in Pachami-Hatgacha in West

Bengal State. The film also incorporates how such dust generated can be prevented from dissemination as developed by NISM. The film is for international viewing on commercial basis – exchange and / or sale.

3.11 General Observations

For reasons already explained, in the absence of published specific information and data on Small-Scale Mining (no national definition) it is difficult to analyse and make dependable comments on the nature and quantum of significant changes that have occurred in the last 10 years in the SSM sector. We therefore have to depend on presumptive exercise, intelligent guess work and broad assessment of socio-economic environment that prevails in the country.

Based on such presumptive analyses and on the basis of some statistical data on all categories of mines it can be said with some confidence that there have been significant changes over the past 10 years or so with respect to the production of minerals increasing from Rs 19123 crores in 1990-91 to Rs 38665 crores in 1997-98 but the number of people involved has reduced from 235.746 in 1991 to 194,384 in 1998 for non-coal mines alone. **This perhaps indicate that increased production has been achieved by increasing use of machinery and equipment or some degree of mechanization.** The relative importance of the socio-economic status, the commodity focus, the formalization of different mine related activities, the extent of local processing and its multiplier effects also showed some progress. But the involvement of women and children was perhaps much less with the passage of time.

With the gradual progress of industrial and economic activities in the country the mining sector also has made a good progress in terms of activities and production and the concept of globalisation and compulsion of competitive atmosphere has given a special fillip to the mining industry as a whole and the Small-Scale Mining has not escaped the dynamic changes and vision. Many of them are gradually adopting improved mining technologies and using some modern machinery and equipment. And some of them are innovating mining equipment to get over the problems of financial crunch. For example, in the stone mining area in Pachami-Hatgacha (the subject matter of my paper on cluster mining in UN organised, conference on Small/Medium Scale Mining in Harare in 1993 – Ref 6) many of the small mine owners are repairing, renovating and converting old Second World War army trucks into hydraulically operated dumpers at about $^1/_4{}^{th}$ to $^1/_5{}^{th}$ the cost of new ones and using pieces of old tyres, riveted together, as conveyor belts to convey the crushed stone chips to the stacking ground. And some of them are using innovated dust-suppression-methods to suppress the dust to some extent by water spraying. They are doing all this at a low cost, not through the sophisticated equipments supplied by big manufacturing companies.

Such examples of intelligent innovations would not be rare in other parts of India and it is the effect of economic boost initiated by gradual changes in socio-economic policy of the Govt and regular pressure from the labour unions for better work conditions and higher earning. This also shows their interest in trying to save their workers from the dust pollution to some extent and reduce rigours of hard labour to increase productivity. They

are thus trying to move in step with the requirements of increased productivity, dust-pollution-control and labour welfare as enforced by the Govt.

Many of the small mines are also trying to employ less number of children as they are gradually becoming conscious, under pressure of public outcry, of their social responsibility in this regard – effect of constant publicity and motivation drive of the Govts, Social Organisations and NGOs along with the efforts of Govt Inspectorates in enforcing the statutory provisions. But employment occasional of children in small mines is still prevalent not necessarily because of the greed of small mine owners to get things done at reduced cost but because many of them work on the sly to supplement the income of their parents. But their names are not found in the Attendance Registers for obvious reasons.

An increasing number of local NGOs are gradually exerting increasing influence on the socio-economic aspects encompassing the domain of both the workers and the mine owners. But unfortunately the initial activities of the new NGOs quite often give rise to hostilities which exert negative influence on the well being of the working populace and on the nearby villagers. In any case, we believe it to be a passing phase although there are many positive steps to be taken in this regard.

With the passage of time most of the mine owners are gradually taking recourse to increased use of machinery and equipment resulting in increased overall production and gradual diminution in labour employment. The tables in the preceeding pages will highlight this point. Thus with further development of competitive market increased mechanisation resulting in reduced employment will be accentuated even in the SSMs.

In the cases of some minerals e.g. Iron Ore, Limestone the contribution of SSMs to the percentage production also reduced with reduction in the number of SSMs which would imply that with progressive mechanization many of the SSMs were probably promoted to the rank of medium mines or medium and big mines outstripped the production balance between the different groups.

The extent of ***local processing*** and its multiplier effects are quite interesting. In the case of some of the minerals, not only small but also big mines take recourse to manual sorting in order to improve the quality. For example, in the cases of manganese nodules, chromite, mica, precious and semiprecious stones, baryte, tungsten and many other minerals women are deft in manually sorting and substantially improving, with high recovery percentage, the quality which can not be achieved by modern chemico-mechanical means at sustainable costs. And women have a special instinct in this regard – separating grains from the chaff. Such cheap and effective beneficiation methods are increasingly being adopted in small mines (and even in some mines of big companies) which ensures not only quality products and high percentage recovery but also bigger sustainable employment. And women workers have a special reputation in this regard.

Ascertaining the quantitative and qualitative nature of such activities would need a big army of investigators. Thus, collection of such statistical data is not easy and is not resorted to by any Govt. organisation. Nor are such private studies very common.

But what has been said above is, however, a common knowledge and the magnitude of such activities and the number of such employment may be left to intelligent guess work and presumptive analysis when ever necessary.

The ***multiplier effects of such local manual processing*** in small mines can be found from the activities of regular customers who carry out metallurgical processes like ferro-manganese plants, Ferro-chrome plants, small-scale metallic smelting units, grinding plants using baryte for paints and similar other units. They collect the processed minerals not only from the bigger mines but also at times from the small mines. But quantitative assessment would be a time consuming extensive exercise. **I personally believe that women, if given intensive in-plant-training, would prove to be very efficient skilled workers in modern beneficiation plants.**

Environmental, community and health related negative impacts can be visualised in many cases of small-scale mining. In some cases such negative impacts are inherent but in many cases they are motivated by socio-political NGOs. The extent can not be quantified because such quantification involves extensive field oriented research studies no funding organisation is interested in supporting. However, the NISM is at present carrying out a comprehensive study, sponsored by the Govt of India, on the health of women workers in a cluster of stone quarries. It is likely to be completed this September (2001). **The results so far obtained are interesting and the NISM intends to cover other such cluster-mines if there are sponsors available.**

As regards ***employment*** the details under part (d) will give the complications involved. It is more or less any body's guess. While a substantial percentage is seasonal employees, supplementing their agricultural income, very few stick to regular employment and consider work in mines as occasional additional income. Thus it is difficult to ascertain, even by intelligent guess work, the percentage of regular mining employees. Since many of the small mines are also seasonal workings and occasionally work to meet the changing local needs, the employment pattern is complicated. But by and large the small mines, occurring in a dispersed manner in far flung areas where the Govt could not reach with adequate infrastructures, meet some pressing isolated and occasional socio-economic needs and also function as alternative means of employment at times of disasters like flood, drought or famine like conditions. If one has to broadly indicate the total employment in small-scale mines one has to depend only on intelligent guess work and the figure may be in the region of about 0.5 million. **But since all of them are not regular or whole time workers, not even near-whole-time workers the total number occasionally making some earning from the mining sector may be somewhat more, say 0.6 / 0.7 million but we would take 0.5 million as the total employment.**

If I have to indulge in ***commodity focus*** I would do so on marble and granite which are mined mostly manually on Small Scale; so is the processing done manually by hand tools. But now a days mechanical processing equipments are being extensively used and the impact on the export market is phenomenal as could be seen from the table under part (d) of Chapter 2.0 (Task I) (Para 22).

Another aspect which deserves special mention, although not in the context of small-scale mining but on processing of mineral matter on small scale. ***It is processing of imported diamond crude*** and export of the finished products all over the world, touching a value of billions of INR (US $ 4690.5 million – 1995-96). India is the leader in the world of cutting and polishing industry. More than 70% of world's diamond production is processed in India and re-exported. **This industry supports about one million people** who are engaged in imports, assortment, cutting, polishing, grading and export.[5]

However in the field of mining the National Mineral Development Corporation (NMDC), a Govt of India undertaking, is operating the only diamond mine in the country located at Majhagawan in the Panna District, M P. The production in 1997-98, 98-99 and 99-2000 were 30994, 34580 and 40666 carats respectively. This is no doubt a Small-Scale production but is a part of the large scale export.

4 Range of Practices in Mining, Processing and Environmental control

4.1 Mining

Pick and basket mining had been a common practice in the past occasionally resorting to manual breaking of bigger boulders by heavy hammer and using gunpowder in the hand-drilled shallow blasting holes. Even now, this method is widely prevalent specially where the demand is seasonal and not regular because this method does not involve much of an investment and can easily be resorted to by village level leaders who can quickly mobilise a number of workers to take advantage of any newly developed market situation. Such mines are generally very small in size. But in the case of some soft materials e.g , glass sand, stowing sand, brick earth, morrum etc the employment pattern and extension of any specific activity could be big -- temporary but generally belonging to some local communities who can be gathered on short notice.

In the cases of hard materials, needing blasting, hand operated jumpers are used for making shallow holes and either gunpowder or even gelignite sticks are extensively used. The drillers and blasters are fairly experienced in this job. In the higher range of SSM even deep hole blasting, with heavy machinery and present day sophisticated explosives, is practiced.

In the hilly terrain, they try to make shallow benches. Such benches are also made in the ground-level shallow mines in consonance with the safety requirements of the Mines Act 1952.Such benching of mine faces are enforced by the Mines Safety Inspectorate, a fairly common practice now a days. It can not however be said with any degree of confidence that haphazard extractions do not occur, specially to meet the quickly developing local demands mainly for extracting construction materials. Occasional unauthorised extraction of scree materials from hill tops are also not uncommon. In short, it is not possible to give any one standard method of mining practice in very small (tiny) isolated mines.

But in the case of mines working in clusters and extracting hard mineral matters e.g. basalt rock(Trap stone),quartzite etc occurring over reasonably large areas compressed air hammer drills are regularly used for drilling and blasting with gelignite sticks. This is the practice in many of the

smaller iron ore, manganese, limestone and similar other mines in Orissa, Karnataka, Rajasthan and in many other places. Such hard rock mines are mostly organised and regulated and controlled by Govt Inspectorate as they can not be operated surreptitiously for any length of time. Such mines are normally organised small mines .Any such mines, operated with some degree of mechanical means, such as small face loaders, trucks or small improvised dumpers, mobile drilling equipment etc can increase their production fairly quickly to meet sudden market demand. For example, a number of fairly equipped iron ore mines in Orissa occasionally increased their production from below 0.1 mtpy to 0.2/0.25/0.3mtpy to meet suddenly increasing export or other demands. Many of the SSMs in the upper scale are so equipped. That is why we in NISM, like UN, prefer to deal with Small/Medium – Scale Mining instead of merely Small-Scale Mining.

No doubt, apart from sheer number, because of partial mechanisation SSM accounts for about 42% of the total value of national production of non-fuel minerals including Minor Minerals and about 62% of export trade. Considering SSM/MSM together the total output value of non-fuel minerals would be much higher.

4.2 Processing

In so called Artisanal mines the processing is an inherent part of mining and marketing operation and comprise mainly selective sorting , screening and panning operations. But in India mercury is not used for extraction of gold by amalgamation because there is no "gold rush" atmosphere in India nor are there extensive tiny-scale gold mining operations. Use of mercury in some of the existing (3 or 4 in number) gold mines run by the Govt is well regulated.

In small mines processing of many minerals are done by hand sorting and selective mining /blending (e.g. manganese). Processing of manganese ore from old dumps is also done by selective hydraulic hand jigging and even selective hand sorting. Similar selective hand sorting or hydraulic hand jigging is carried out in improving the quality of extracted Chromite, Baryte, Mica, Tungsten, Rock Phosohate, Appatite etc.

In many cases differential settlements on fairly big scale (e.g. China Clay),small-scale hydraulic jigging for mixtures of small sized mineral particles from gangue materials and tabling for concentrating minutely small particles from the tailings of some minerals (e.g. Copper minerals) are practised. Small-scale floatation of graphite and some such minerals is also not uncommon. In short, advanced technological processes are frequently adopted for high-value minerals in fairly big SSMs where such processes are techno-economically viable.

4.3 Environmental Control

Subject to what has already been told under Chapter 2.0 (Task I) part (b) (Legal Codes and Regulations) this is not prevalent in SSM extracting Minor Minerals but it is a source of anxiety for the Govt particularly for operations in the environmentally sensitive areas. Small-Scale Mines, particularly the very small ones , normally do not bother about eco-friendly operations. They not only destroy inadvertently (and at times deliberately for extra income) the vegetation and the trees, particularly at and near the area of mining operation, but they also do not take any step to regenerate environmental status or create greeneries.

The Govt have provided for extensive statutory control of environment under Rules 31to 41 of **Mineral Conservation and Development Rules,1988**(including amendments dt22-4-91) for those mines which are not exempted as indicated under Task II (b) here in before.
In this regard the different provisions are
Rule 31:- Protection of environment
Rule 32:- Removal and utilisation of top soil
Rule 33:- Storage of overburden, waste rock, etc.
Rule 34:- Reclamation and rehabilitation of lands.
Rule 35:- Precaution against ground vibrations
Rule 36:- Control of surface subsidence
Rule 37:- Precaution against air pollution
Rule 38:- Discharge of toxic liquid
Rule 39:- Precaution against noise
Rule 40:- Permissible limits and standards
Rule 41:- Restoration of flora.

The provisions are very extensive indeed without considering whether, to be effective, such new restrictions should be introduced gradually in consonance with the ethos of small-scale mining .The results are as expected. Even the very small units of SSM working major minerals from lease areas bigger than 5 hectares in size, are not free form the mischief of Environmental Rules and Regulations; but the provisions are not really enforceable, from the practical point of view, even in the higher ranges of SSM . However actual enforcement is not tried very strictly either because of techno-economic reasons or problems of close monitoring of the large number of mines involved . The latest modifications in legal framework for Environmental Management may be seen from Annexure-IV,pp77,78.

A few years ago NISM was given a project, sponsored by the Ministry of Environment and Forest ,to carry out a study in the ecologically sensitive Arravalli Range in the State of Hariyana in regard to extraction, crushing and screening of stone materials for construction work. The objective was to recommend EIA guideline for SSM, not evolved so far for small-scale operations. The NISM has prepared a model guideline but it has not yet been formally accepted and statutorily enforced. This can be implemented only by motivation through a number of grass root level projects if adequate fund is made available to different serious NGOs. In so enforcing such guide line voluntarily a lot of inspirations and guidance can be obtained from the large number of proceedings of national and international Seminars and Workshops organised in India. This is a very important objective to be achieved because there is no difference of opinion that the large number of our operative SSMs (8000) are causing extensive environmental damage though not necessarily the worst offender in this regard.

Generally speaking, with the succeeding educated progeny of small miners, acceptance of advanced and improved technology and management practices is becoming more and more evident and attractive, particularly where techno-economically feasible. This is a good sign and we can expect a better scenario in the near future.

5 Support Activities

5.1 Financing or Credit Schemes

There seem to be some financing and credit schemes which could be utilised to a limited extent for development and improvement of SSM activities—acquiring, developing, producing and or marketing. What might be fairly easily available is loan from Banks and some Financial Institutions against machinery and equipment. In case any mine owner has a good personal standing with any bank and maintains proper Income Expenditure Account and Balance Sheet he may be able to get fairly easily a small personal loan amounting to about Rs 1.0 to 1.5 million with colateral securities. But such loans are not normally of adequate amount for any development purpose.

There are certain general considerations before sanctioning any loan. One of them is estimation of assets. Lease hold properties fall under the definition of sundry assets. Since *sundry assets* are taken as nil assets, mining leases are not eligible for grant of loan. In any case it is generally difficult to get loan from Banks and Financial Institutions against development activities of a running mine because most of the mining rights and assets are not effectively transferable. The land, building, development activities are not accepted for mortgage because of uncertain market value and mortgage of lease right against loan would be subject to complicated procedure of Govt consent. Thus on the whole SSM or even Medium and some of the so called Big working mines can not easily get any substantial loan against mining rights except against marketable equipment and machinery.

However, there are "project finance schemes" from the Financial Institutions that are available for the mining sector on fulfilling certain requirements specified by the Financial Institutions. The small-scale mining and quarrying are also eligible for advances given to the "priority sector". And Credit Guarantee Schemes that are available to small-scale industrial units may also be available to SSM where total investments on plant and machinery do not exceed INR 3.5 million.

There are some very rich personnel who may be persuaded to give loans to SSM but on very adverse conditions threatening the rights of the owner. In most such cases there is danger of complete take over of the right, title and interests which many of the small/medium mine owners do not like unless they are in a desperate situation. **Thus the mining activities of SSM are to be financed mostly from personal funds, equity capital and personal loans.**

5.2 Producer Associations

1. Apart from **Federation of Indian Mineral Industries (FIMI)** [301. Bakshi House, 40-41, Nehru Place, New Delhi – 110019, India, Tel : 011- 6410786, 6410078 Fax : 011-6217004; Grams : FEDERMIN; E-mail : fedmin@nda.vsnl.net.in] I am unable to identify any producer association (umbrella organisation or mining chamber or national association) which actively support SSM activities. However, there are many chambers and associations where small mine owners can be members individually but such organisations and associations do not have any distinct policy of supporting small-scale

mining activities. Whatever help and support the small mine owners get may be indirect as an individual member.

The FIMI however, has a distinct policy of helping and supporting the causes of mining as a whole. It is very active in its interactions with the Govt and the relevant Govt agencies and organisations in helping the mining activities and marketing of minerals, including export and investment aspects. It does not however give any loan or financial help.

The FIMI's members are mostly large and medium-scale miners. But there are also some SSM members and the activities of FIMI are broadly limited to areas where all categories of mines are concerned. The federation however, is gradually trying to expand its sphere of activities but mainly on the commercial aspects.

Apart from FIMI there are many area-specific and area-cum-mineral-specific Associations representing special groups of mineral producers, particulars of some of them are given below.

2. Bikanir District Mine Owners Association, Ranibazar; Bikanir; Rajasthan; India.
3. (iii) **Pacahami-Hatgacha Stone Mine Owners Association,** P.O. : Bharkata, Dist: Birbhum, West Bengal, India. Trying to improve the road conditions in the mining area and to enhance other infrastructural facilities.
4. **All India Granite & Stone Association (AIGSA)**
   415, 5th Cross, 12th Main, RMV Extension, Sadashivnagar, BANGALORE-560080, India. House Journal : INDIAN STONE ; Phone : President 0091-80-3347433; Mobile : 98450-01810; Email : aigsa@bgl-net.in

Apart from protecting legal and other interests of their members they play an active role in achieving growth in export of granite and dimention and decorative stones.

There are many other regional Associations all over India. These associations work mainly to protect the interests of their own members, including export.

5.3 Formal Technical Assistance Projects – Training Programme

Government initiated or coordinated :-

- An elaborate technological assistance was given by the **West Bengal Mineral Development &Trading Corporation Ltd (WBMDTC)** during the initial stage of development of Pachami-Hatgacha Stone Mining Project (Cluster Mining) in 1973-76 (Reference 6). The support and consequential control of marketing (against exploitation by traders) by purchasing the total initial production against prompt payment at market rate, had to be given up on the insistence of the entrepreneurs who preferred to go on their own because they had by then become "mature". And in course of time the initial direct employment position increased from 200/250 to about 6,000 or so plus 3500 in the secondary and tertiary sector taking the total to 9500. Considering 5 persons per family the total number living on this project would be about 4 x 9500 = 38,000 by

2001. The sale value increased from few thousands to millions of INR. It is difficult to ascertain the true figure.

- This type of Govt sector support, with which the present author was associated from the concept to the execution, may be found useful in many such cluster-development projects with necessary local modifications.
- Central Mining Research Institute (CMRI) :-
- The CMRI is a Govt of India organization. They regularly organise training programmes which cover aspects of interests to the small mines also. The Institute has a separate SMALL MINING CELL and it offers technical assistance of varied nature to the SSM.
- I am attaching herewith a case of International Development Agency coordinated CMRI studies – Training Manual on ENVIRONMENT MANAGEMENT OF MINE SITES with a case study of Mining SLATE in Khanyara in the State of Himachal Pradesh (Annexure VIII)
- **National Metallurgical Laboratory (NML),** a Govt of India body, gives technical assistance of vareid nature covering interests of SSM also.
- All the **Regional Laboratories of the Govt of India**, also offer such help and assistance to the SSMs.
- The Training Centre of the **Indian Bureau of Mines**, Nagpur conducts training programme for persons engaged in the mining industry on various subjects. These services are available to the SSMs also.
- The **Indian School of Mines (ISM),** Dhanbad organises regularly special training programme on different mining subjects which benefits the delegates of small mines also.
- The **Mining Dept of the Indian Institute of Technology (IIT), Kharagpur** has recently introduced a special paper on Small-Scale Mining in their regular syllabus on Mining Engineering which would be of interest to SSM in recruting technically qualified persons to attend to their specialised requirements.

NGO initiated or coordinated

The National Institute of Small Mines (NISM), a non-profit making techno-scientific organisation, offers technical assistance to SSM on different aspects through its expert members and panel of technical personnel undertaking consultancy operations on different aspects of mining, processing, marketing etc on charges affordable by the small mines.

The NISM also occasionally organises training courses for SSM on technical aspects -- management of small-scale mines, workshop on ecofriendly mining operations for small mines etc. It intends to organise such training courses on regular basis in coordination with CMRI at its premises at Dhanbad and also at mines.

Apart from NISM there are other NGOs who may be offering technical assistance and training programme but I am not aware of their identity and coordinates at present.

Private sector initiated or coordinated

Some techo-commercial organisations and companies offer training on the side line for better implementation and management of their specialised products and processes. Normally this is short in-plant training for operation and maintenance of equipments sold.

There are also a number of private consultant groups – small, medium, big, who offer their technical services to the mining industry on commercial basis. Such services, especially by the Small consultancy groups, are also offered to the small mines.

It is not possible immediately to give an elaborate list with addresses and other particulars.

However I am giving below some names:

SR. NO.	NAME OF RQP WITH ADDRESS
1.	M/S DEVELOPMENT CONSULTANTS (P) LTD, 24B, PARK STREET, CALCUTTA – 700 016
2.	M/S TISCO LTD., NOAMUNDI, DISTT: SINGHBHUM WEST, (JHARKHAND), PIN – 833 217
3.	M/S ALLIED ENGG. & CONSULTANCY SERVICES, 95-S, KANKULIA ROAD, CALCUTTA – 700 029
4.	M/S GEIM (INDIA) CONSORTIU, TODI MANSION, 3RD FLOOR, P-15, INDIA EXCHANGE PLACE, CALCUTTA – 700 073
5.	M/S M. N. DASTUR & CO LTD., P-17, MISSION ROW EXTENSION, CALCUTTA – 700 013
6.	M/S HINDUSTAN COPPER LTD., PO: MOSABANI MINES, DISTT: SINGHBHUM EAST, (JHARKHAND), PIN – 832 104
7.	ECOMEN CONSULTANS PVT LTD., REPR; MR R N BHARGAVA, 2ND FLOOR, FLAT NO: 6,7&8, ARIF CHAMBER- V, SECTOR – H, ALIGANJ, LUCKNOW – 226 020, PHONE – 75281, FAX : +91 – 0522 – 74408
8.	MR. ANAND DAMLE; KARVE NAGAR, PLOT NO. 98; NATARAJ SOCIETY; LANE 5, NEAR SARADANIKETAN, PUNE – 411 052; MAHARASTRA; INDIA

International development agency coordinated

There are a number of international development agency coordinated technical assistance programmes. Many enterprising individuals and organisations take their assistance in carrying out many interesting projects. But I am not very clear about the exact scope and reach of such programmes specially or specifically for SSM. An example has been given, here above, about such a coordinated project carried out by a Govt organisation (CMRI) (Annexure VIII).

I believe, with dedication and initiative of serious NGOs or of individuals interested in the development of SSM on the right track, many such international organisations could be gainfully motivated and influenced to help the SSMs on techno-commercial and socio-economic aspects benefiting the poor mining labourers.

5.4 General Observations

In many cases disorganized, random and unscientific mining practices of SSM in many States and Regions led to Govt interventions which on resistance from the intransigent mine owners resulted in intervention by the Court. For example, on intervention by Simla High Court the Central Mining Research Institute (CMRI), in association with the Geological Wining of Industries of the Govt of Himachal Pradesh and Dr Y S Parmar University of Horticulture and Forestry, made a detailed study on *Sustainable Development Planning, Including Mining, in the Sermour Region, Himachal Pradesh* and worked out a strategy for sustainable development and projected a mining scenario. Such intervention ultimately proved to be "Supportive Activities" on improving the practices, organisations and productive potentials of the intended beneficiaries.

The production figures and employment statistics of Small-Scale Limestone Mines of Sermour district given in Annexure IX, would be interesting.

Many other similar studies have been made by the CMRI touching on different aspects of SSM.

As a ***promising new approach*** I would like to mention ***emergence of a large number of small consultant groups*** who take up different types of problems of small mines for solution and help them in preparing statutory Mine Plans. They also take initiative in innovative technical developments and advice on solutions of socio-economic or even socio-political problems. Although such consultants work on payment basis many of the small mine owners (specially the higher category) buy such help which they find useful. I believe this to be a very promising new approach for small mines to follow for proper development. ***Coupled with higher education amongst the progeny of the present day mine owners, such approach appears to be promising***.

6 Bibliography (related to Small-Scale Mining during past 10 years)

6.1 Legal Codes and Regulations, and Legal Reviews

There are no specific legal codes concerning Small Scale Mines. However, in India all legal codes, applicable to mining in general, are also generally applicable to SSM. Hence I am giving here all statutory rules as regulations that are applicable to mining in general.

Mining Legislation

The Mines Act 52 – mainly concerned with safety and labour welfare

- Coal Mines Regulations
- Metalliferous Mines Regulations
- Mining Rules

Mines and Minerals (Regulations & Development) Act'57.

- Mineral Conservation and Development Rule'1988
- Mineral Concession Rules 1960
- State Minor Mineral Concession Rule

The above referred Mining Legislations (i & ii) constitute the basic laws governing the mineral sector.

Environmental Legislation

- Environmental Protection Act, 1986
- Forest Conservation Act, 1980
- Air Act 1981 & Rules
- Water Pollution Act 1974 & Rules
- Environmental Statement, 1993
- Environmental Impact Assessment 1994

Environmental management for the mining sector are regulated by the **Environmental (Protection) Act 1986, the Forest Conservation Act, 1980 and the Mines and Minerals (Reg & Dev) Act 1957 and Mineral Conservation and Development Rule 1988**.

For exploration and mining in forest land prior permission of the Government is required under the provisions of the **Forest Conservation Act, 1980.**

The Government of India implemented **Environmental Statement 1993** and **Environmental Impact Assessment, 1994 for systematic and periodic evaluation of environmental status**.

Government Circulars (1999); Mining Engineers journal; Vol-1, No-3, Oct 1999; pp. 33-35.

Miscellaneous Acts concerning Labour Welfare Fund:

1. Mica Mines Labour Welfare Fund Act 1946
2. Limestone and Dolomite Mines Labour Welfare Fund Act 1972
3. Iron Ore Mines and Manganese Ore Mines Labour Welfare Fund Act 1976
4. Coal Mines Labour Welfare Fund Act 194……
5. Coal Mines Provident Fund Act 194……..

Mukhopadhyay, S.K.; De. P., and Barve, S. D. (1998); "Legislation Aspects of Environmental Protection Against Mining Activities in India - An Appraisal with special Mention to Land Degradaton; Nat Seminar on "Outlook for Fossil Fuels, Non-Metallic Mining and Mineral Based Industries; Anna University, Chennai, India. Pp 111-118.

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7 How Safe Is Small-Scale Mining?

There is a popular belief, amongst many of us, that Small-Scale mining is unsafe as the mine owners do not generally bother about safety of workers and thus carry on operations recklessly. While it may be somewhat true that the mine owners are generally insensitive to safe mining practices they are however, not insensitive to human safety. And the workers themselves, instinctively and intrinsically, follow the path of self preservation while working and also when they are exposed to simple equipment and machinery in small mines with lower standard of mechanization.

As indicated earlier in this paper, there are no SSM specific statistics of accidents and accident rates. It would therefore involve quite a lot of presumptive analyses of official statistics in arriving at a very broad specific SSM safety standard.. In doing that I would be drawing on my past experience as Inspector of Mines during the early years of my carrier and as Managing Director of a number of Govt mines (Small mines) during the closing years of my service life. No doubt all this have infused some amount of instinct in me like in many of our tribe. However without such instinct (call it prejudice if you like) it is not reasonably practicable to realistically analyse official statistical reporting.

I would also like to indicate here that these analyses have been made rather tentatively in order to highlight the importance of safety aspect of SSM for future detailed studies. No doubt there would be limitations because of inadequate sectoral reporting.

Looking over these essential initial remarks, let us now look into the official statistical figures.

Statement 5.1 - Accidents, Resultant Casualties and Rates in Non-Coal Mines

Mineral	Year	Fatal Accidents			Serious Accidents		Rates per thousand Persons Employed	
		No. of accidents	No. of Persons		No of accidents	No. of person S/Injured	Death	Serious Injury
			Killed	S/Injured				
1	2	3	4	5	6	7	8	9
Copper	1998	1	1	--	8	8	0.11	0.92
Galma	1998	2	2	--	42	42	0.36	7.55
Gold	1998	2	2	--	77	77	0.33	12.57
Iron Ore	1998	13	15	8	60	63	0.40	1.90
Lime Stone	1998	12	13	--	19	19	0.42	0.61

Manganese	1998	3	3	2	10	10	0.19	0.76
Total Non-Coal	1998	56	65	15	254	258	0.33	1.40

Statement 5.2 Accidents, Death and Serious Injury Rates

Mineral	Year	Accident Rate per Thousand Persons employed		Death Rate per thousand persons employed				Serious Injury Rate per thousand persons employed			
		Fatal	Serious	Below Ground	Open Cast	Above Ground	Overall	Below Ground	Open Cast	Above Ground	Overall
1	2	3	4	5	6	7	8	9	10	11	12
Copper	1998	0.11	0.92	0.18	--	--	0.11	0.72	7.69	0.36	0.92
Galma	1998	0.33	4.55	0.36	--	0.37	0.36	9.02	--	6.35	7.55
Gold	1998	0.33	12.57	0.56	--	--	0.33	13.22	--	11.66	12.57
Iron Ore	1998	0.34	1.60	--	0.57	0.14	0.40	--	1.44	2.64	1.90
Limestone	1998	0.38	0.61	--	0.34	0.64	0.42	--	0.34	1.40	0.61
Manganese	1998	0.18	0.62	0.37	0.24	--	0.19	3.32	0.12	0.42	0.76
Total Non-Coal	1998	0.28	1.30	0.33	0.43	0.23	0.33	5.07	0.60	1.52	1.40

(Source DGMS Statistics for 1998 – Statement 5.1 and 5.2)

It would be seen from the above Statements 5.1 and 5.2 of DGMS Statistics for Non-Coal Mines for the year 1998 as also for 10 year period from 1988 to 1998 that the trend in accidents, resultant casualties and rates indicated since 1988, there appears to be a definite trend showing that fatal Accidents in underground mines (e.g. Gold, Galena, Copper) are much less than in open cast mines (e.g. Iron Ore, Limestone, Manganese) but there is no such definite trend for Serious Accidents in open cast mines except for Manganese mines where they are much less. Since SSMs are over whelmingly open cast mines it would appear that they are more prone to the number of fatal accidents because underground mines are better controlled in this regard attracting more effective attention from the mines Inspectorate. As regards actual death also, open cast mines contributed more (Iron Ore and Limestone but not Manganese which are mostly very small SSMs) to higher rate of Fatal Accidents probably because of much larger number of highly mechanized opencast mines extracting Iron Ore and Limestone .

Looking at this aspect from a different angle it would be seen (DGMS statement No. 5.2) that accidents rates per 1000 persons employed is not appreciably different in the case of underground mines (Copper, Galena, Gold) as compared to opencast mines (Iron Ore, Limestone, Manganese) – so is the position broadly in case of death rate; the overall death rate for total Non-Coal mines for 1998 being 0.33 per 1000 of workers employed. Similarly serious injury rates per 1000 persons employed in 1998 are 0.92 for Copper, 7.55 for Galena, 12.57 for Gold but 1.90 for Iron Ore, 0.61 for Limestone and 0.76 for Manganese – the overall for Non-Coal being 1.40. Perhaps opencast mines make some contribution to the reduction in overall figure and there are more SSM workers in the open cast category of mines.

In this context it would be interesting to note the following

Fatal Accidents – 1998		**Serious Accidents**
Below Ground -	6 (6)	89 (91)
Open cast -	32 (40)	40 (56)
Above Grounds -	18 (19)	125 (126)

Figures within parentheses denote the number of persons killed in case of Fatal Accidents and the number of persons injured (including serious injury out of fatal accidents) in case of Serious Accidents.

In this context it would also be interesting to note the following two tables for developing some impression about possible contributing factors in regard to accidents and accident rates in mines.

	Number of Mines submitting Returns	**No of B/G Mines**	**Average Daily Employment**			
			B/G	**O/C**	**A/G**	**Total**
Better Organised Sector	858	56	16937	51324	71196	139457
Not so well organised Sector	1316	55	1023	42173	11731	54927
Total	**1901**	**111**	**17960**	**93497**	**82927**	**194384**

	Explosives used (in Kg)	**H. E. M. M. H. P. used**	**Electrical H. P.**	**Output in Tonnes**	**Value in Million Rs.**
	34538887	883525	1128288	--	86835
	12534466	332024	60073	--	11586
Total :	**47073353**	**1215549**	**1188361**	**--**	**98421**

Note: The above items are contributing factors of accidents in many cases.

Thus on proper analyses of the foregoing tables it is difficult to conclude which type of mining – undergound or opencast, is more dangerous. Since SSMs are generally open cast activities in case of non-coal mines, it is difficult to conclude that they are more dangerous than underground mines which are comparatively much begger in size. More over even in case of open cast mines the bigger mines use more of explosives and H P which are contributing factors of accidents.

Similar analyses in respect of coal mines are not possible because it is not known at present how many of the Small Mines (26% of 557) work underground and how many operate open cast mines according to which the accident figures (also trend, fatalities and seriously injured persons) are published. It may however be presumed for the time being that the risks and accidents occurring in coal mines (except those due to gas or coal dust explosion)

more or less follow the trend in Non-coal mines which would help in coming to a broad vision about the scenario on safety in small mines.

In conclusion it can therefore be said with some degree of confidence that Small-Scale Mines are not specifically more prone to accidents – fatal or serious.

8 Role of SSM in Value-Added Foreign Trade

> "The principal ores and minerals exported from India in terms of value contribution order are diamond (mostly cut), iron ore, granite, alumina, emerald, precious and semi-precious stones, chromite, building and monumental stones, slate, marble, coal, mica, manganese ores, bentonite and ilmenite. Rough diamonds imported into the country are cut and reexported and thus cut diamonds contribute 75% to the total exports of ores and minerals during 1996-97. Iron ore contributed nearly 9% followed by granite 6.7%, alumina 2%, precious and semi precious stones 1.8%, chromite 1.2% and emerald 0.75%." (Source: IBM).

These contributions were not exclusively from minerals produced in the Small-Scale sector but substantial parts were.

> "Minerals imported were mainly petroleum (crude) accounting for 54.12% of the total import bill for minerals followed by uncut diamonds 29.7%, Coal9.06%, rock phosphate 1.39%, sulphur 0.95 percent" (Source: IBM).

> "India's foreign trade includes exports of minerals both in raw form and as semi-processed and processed forms in the nature of mineral-based primary manufactured products.

> "Minerals in both raw and processed forms contributed significantly to India's export trade during 1996-97 with a share of 16% (i.e. Rs. 189,560 million) in the total value of all merchandise i.e Rs 11,85,880 million. The contribution of minerals in raw / unprocessed forms was however Rs. 22850 million while semi-processed / processed forms contributed Rs. 166,720 million". It may thus be seen that most of the mineral export (88%) is in value added form and only about 12% in raw form. Basically this would be true about SSM products also. "The manufactured mineral – based products contributed only Rs 66331 million during 1996-97 in the total value of all merchandise". (Source: IBM)

The table below will show contribution of value added (processed) minerals and mineral based products to Indias' export trade

Contribution of Value-added (Processed) Minerals and Mineral based Products to India's Export Trade, 1994-95 to 1996-97

Commodity	Value of Export (Rs Million)			Contribution (percentage)		
	1994-95	1995-96	1996-97	1994-95	1995-96	1996-97

1.0	All-Merchandise (excluding re-export)	826,087	1061,901	1185,882	100	100	100
2.0	Minerals	158,318	198,198	189,562	19.2	18.7	15.98
2.1	Raw/Un-processed forms	17,352	22,642	22,846	2.1	2.13	1.92
2.2	Semi-processed / processed forms (Preliminary and intermediate stage of processing)	140,966	175,556	166,716	17.1	16.5	14.00
3.0	Manufactured Mineral based commodity (Final stage of transformation)	45,962	56,812	66,331	5.5	5.35	5.59
3.1	Metals / Alloys	27,547	35,820	43,665	3.3	3.38	3.68
3.2	Others	18,415	20,992	22,666	2.2	1.98	1.91

Source : IBM

'The value added semi-processed / processed minerals figuring in India's foreign trade include cut and polished Diamonds/Emerald, etc, pulverized Barytes, Steatite and Wollastonite, washed / processed Kaolin, beneficiated Graphite, calcined Magnesite, processed Mica and manufactured mica products, Coke, Dimension Stones, refined Borax, Allumina, EMD etc. The manufactured mineral-based commodities include metals and alloys and products thereof, cement, fire-bricks and other refractory materials (vide parki) of Chapter3.0 (Task-II), Clay-bonded graphite crucible / nozzles and silicon carbide crucibles, asbestos – cement products, inorganic chemicals like lime and fluorin chemicals, refined borax and borates, elemental phosphorus and phosphoric acid, titanium deoxide, petroleum products etc" (source: IBM).

It would be seen from the table and statements made above by IBM that in 1996-97 out of total export of Rs 189560 million a sub-division of different minerals could be made as in the table below with different weightages given for different minerals as SSM contributions :

Export 1996-97 – Rs 189560 million (Raw and Processed / Semi-Processed Minerals)

Polished Diamond	-	75%		(with imported raw ore accounting for 29.7% of import next only to 54.12% for crude petroleum)
Iron Ore	-	9%	-	SSM contribution 30% - 2.7%
Granite	-	6.7%	-	SSM Contribution 100% - 6.7%
Alumina	-	2%	-	
Precious and semi-precious Stone	-	1.8%	-	SSM contribution 100% - 1.8%
Chromite	-	1.2%		
Emerald	-	0.75%	-	SSM contribution 100% - 0.75%
Rest (Mica, Manganese, Kaolin)	-	3.55%	-	SSM contribution 100% - 3.55%
				Total SSM contribution - 15.50

It appears from the calculation that SSM contributed 15.50% to the total export of raw and processed / semi-processed minerals including 75% of polished Diamond the rest 9.5%

being contributed by non-SSM – Thus excluding processed Diamond, the contribution of SSM to export of raw, processed and semi-processed minerals came to (15.50% out of 25%) about 62% in 1996-97.

An exercise carried out by the present author some years ago (annexe – I) came to the conclusion that " the share of small/medium mining sector in the export market of non-fuel minerals was about ….. 66/67 in 1994-95 and 1995-96".

Although the export of finished diamond does not indicate the contribution of SSM it surely indicates contribution of Small Scale Processing of mineral matter. This is done with imported raw diamond accounting for 29.7% of total mineral import, next only to 54.12% import of crude Petroleum. The processing is really a cottage industry done in individual households sustaining about a million people.

Thus excluding processed Diamond, the role of Small-Scale Mining and Small-Scale Processing of minerals in the export market is tremendous indeed – export of processed diamond however, steals the show.

9 Interactions Between Small-Scale Miners And Medium And Large Exploration And Mining Companies

Whenever large exploration operations or large-scale or even medium Scale Mining is started in any area there does not normally develop any resistance from the local Small-Scale Mining units. Such SSMs generally try to develop friendly relations with the officers of the bigger units. They also try to extract beneficial advice and guidance from them free of charge. Such free advise and guidance are normally given by the bigger mining units without adversely interfering with each others lease rights and infrastructures.

Such events as land expropriation and population displacement and invasion of concessions are rare. Because of strict Govt Policy and enforcement such activities are not generally visualised. On the contrary, in order to build their image, the bigger Units and Companies try to be more supportive and helpful for the local cause. Because of the policies of the World Bank and of the Govt, bigger mines are taking up R&R schemes in the neighbourhood of mining areas on sustainable basis as they know they can not administratively afford to face local hostile atmosphere. This is true about their attitude to the SSMs with legally acquired mining rights. In case there develops any adverse technical or social problems from operations of small mines the matter is handled by the Govt as per legal provisions. Thus the disputes, if any, are settled by the Govt and in extreme cases by the Court.

There have however been some tensions developing locally in regard to large scale mining but they are in relation to the local people losing their land by land acquisition procedure or afraid of such future loss. In some such cases the local people favour SSM activities on cooperative basis or by some local leaders, expecting higher income by working in such mines than by mere sale of land.

"Mining operations in our country largely involve open cast mining that has often led to deforestation, degradation of agricultural land, and pollution of water source and, more important than all, displacement of people. In tribal tracts, rehabilitation of the displaced families is not easy as the tribals are an integral part of the local environment. Even in terms of employment, locals may not always get employment for various reasons and this also impinges on the cultural moorings of the local community. These are the reasons why local inhabitants often resist mining operations, which may provide benefits to the economy as a whole but imposes costs on the local population.

People's resistance to limestone and magnesite mining in the Kumaun Hills in Uttaranchal and bauxite mining in Gandhamardan Hills in Orissa reflect these concerns. Mining operations in many parts of the country are Small-Scale and labour intensive and our effort should be to elicit local community participation in mining. The rights of the community to locally available resources are central to such a participative process.

Mining therefore needs to be harmonized with the environment to preserve the ecology and secure local acceptance" [11]

10 Record Of Some Examples – Vignettes or Short Stories

Since most of the aspects indicated in the TOR are being effectively dealt with statutorily under the Mines Act 1952 and the remaining aspects being of little consequence in India, in writing this Chapter the only interesting subject I can deal with is how unemployed educated frustrated middle class people (including women) could be encouraged, helped and guided to start Small-Scale Mining venture and in the process create employment for a large number of uneducated, illiterate and unskilled poor people, mostly tribals. In the process many of the highway brigands were attracted to lead a peaceful productive life. In so dealing with the idea of developing entrepreneurship I could indicate how help and support from Govt organizations could do miracle. The whole effort could perhaps be emulated under different geographical areas as a model.

In presenting such a story I can do no better than present one of my papers which was presented at UN organized Harare Conference in 1993 and which was published as one of the "Selected Papers". Since I do not want to increase the volume of this present "Country paper on Artisanal/Small-Scale Mining" I am presenting my Harare paper as Annexe XV so that it could be looked into for details, if interested. I believe that in many of the developing countries with similar background problems this could be used as a model, with suitable modifications and adjustments, to create large-scale employment and big productive capability at a very low capital cost. I also believe that tackling frustrated educated unemployed is a universal problem, particularly in LDCs.

I am hopeful that many more interesting stories would come to MMSD for preparing a World report and I do not want to overburden them with too many stories as a part of this paper.

11 Resource People

1. Prof. D D Misra

1.	Name :	Prof D D Misra
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3.	Designation	Director, CMRI
4.	Address :	Central Mining Research Institute,(CMRI), Barwa Road, Dhanbad – 826 001, Jharkhand. Phone : +91 (0326)202326/203040 (O); +91 (0326)202373/205028(R) Fax : +91 (0326) 202429/205028 Email : ddmisra@usa.net or director@csir.res.in
5.	Professional Qualification :	B. Tech (ISM), M. Tech(Mineral Engg) (IIT-Kharagpur)
6.	Experience : (No. of years) Total : In position of high responsibility (indicate in brief) :	 36 years 33 years (as a Mine Manager and as Professor in ISM, Dhanbad & IIT, Kharagpur)
7.	Specialisaton :	Mineral Beneficiation
8.	Publications:	A large number of technical papers (given in details in Annex – IA)
9.	Specific details about activities, achievements etc.	See Annex- IA

2. Achyuta Krishna Ghosh

1.	Name :	Achyuta Krishna Ghosh
2.	Age :	45+ years
3.	Designation	Scientist-in-charge, Small Scale Mining Cell, and Scientist F, Geomechanics & Mine Design Div., CMRI
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5.	Professional Qualification :	M.Tech, Mine Planning & Design (1987) from ISM, Dhanbad.

		DISM Mine Planning & Design (1983) from ISM, Dhanbad. B.Tech (Hons), Mining Engineering (1981) from ISM, Dhanbad. B.Sc (1975) from Calcutta University Registered Mine Planner [Indian Bureau of Mines] Chartered Engineer, [Institution of Engineers (India) Ltd.]
6.	Professional Experience	20 years of experience in mining industry and R&D with additional exposure in the fields of academics and HRD
7.	Specialisation :	Mine planning and design, Small Scale Mining, Selection/innovation, planning and design of mining methods with reference to environmental protection and improvements in production, productivity and safety, Selection, optimisation and evaluation of performance of mining machinery, Ground stability evaluation and planning and design of ground control systems ad rock excavations, Development of software packages
8.	Publications:	More than 25 publications in international & national journals and in the proceedings of international and national, seminars, symposia, and conferences
9.	Specific details about activities, achievements etc.	Received MGMI Gold Medal in 1987, **Convened and Coordinated** A Course on Economically Viable Mineral Extraction Techniques for Small Mines organized by CMRI Study tour of Chinese delegation on Approaches & Techniques for Prevention and Control of Water in Coal Mines under UNDP. For other details – Annexe IA

3. Dr Abhay Kumar Soni

1.	Name :	Dr. Abhay Kumar Soni
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5.	Professional Qualification :	B.E. (Mining), M.S. (S&T), Ph.D.
6.	Professional Experience	18 years
7.	Specialization:	Environmental Management in Fragile/Sensitive Areas (with particular reference to Land Environment, Mining Operations and Hill Type Areas) with background about sub-surface sciences like tunneling,

		mining etc.
8.	Publications:	Total – 34 technical papers
9.	Specific details about activities, achievements etc.	William Greenwood Scholarship, AGID, University of Sao Paulo, Brazil. For other details – Annexe IA

4. Mr. R K Sharma

1.	Name :	Raj Kumar Sharma
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3.	Designation	Secretary General, FIMI
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5.	Professional Qualification :	M.A (Economics) from Delhi/Agra Universities in 1965 Participated in Study Course on Labour and Social Development conducted by ILO in Geneva (1977). Participated in continuing Educational Course on Mineral Economics (24-26 February 1989) conducted by Engineering Staff College of India.
6.	Professional Experience	Secretary, FIMI 1969-1989; Secretary General, FIMI since 1989. Dealing with the full gamut of issues – legal, tenurial, exports, fiscal, regulatory, labour, environment, marketing, infrastructure etc. – connected with the functioning of the mineral extraction/ processing and metal-making sectors on a continuing basis.
7.	Field of Specialization:	Apart from handling different issues connected with running of the Institution the main emphasis is on maintaining meaningful and productive contact with the Government
8.	Publications:	A large number of publications.
9.	Specific details about activities, achievements etc.	Number of achievements to his credit. For details – Annexe IA

5. Prof. Bharat B Dhar

1.	Name :	Prof. Bharat B Dhar
2.	Age :	62 years

3.	Designation	**At present** Director(Research) of Association of Indian Universities, New Delhi **Earlier** • Director , Central Mining Research Institute (CMRI), Dhanbad (1991-97) • Professor of Min. Engg, Beneras Hindu University since 1979. • Head of Department Mining Engineering(81-83; 85-87and 97-98)
4.	Address :	**Address for Communication:** Prof Bharat B Dhar, Director (Research), Association of Indian Universities, AIU House, 16 Kotla Marg, New Delhi 110002 Ph.(+91) 011-3235335/3230059 (off) Fax: 011-3232131 (off) E.Mail: aiu@del2.vsnl.net.in (off) **Residential Address** Prof B B Dhar, D-20, Pamposh Enclave, New Delhi 110048 Phone: (+91) 011 - 6231970 and 6476376 E.Mail: bbdhar@yahoo.com
5.	Professional Qualification :	• B E from BHU • M Engg and PhD in Mining Engineering from McGill University, Montreal, Canada
6.	Professional Experience	Mainly in Teaching and Research
7.	Field of Specialization:	Research (Environmental and different aspects of mining)
8.	Publications:	• Over 120 scientific and technical papers • Edited 5 books and recently released a book on "Mining and Environment" • On the Editorial Board of 3 technical journals 2 of which are published from abroad.
9.	Specific details about activities, achievements etc.	• *Awarded National Mineral Award in 1994 (Govt of India)* • CSIR Technology Award in 1995 • NRDC Award for Invention on the **FIRST TECHNOLOGY DAY OF INDIA**, on May'1999 • For other details – Annexe IA

6. Mr. S L Chakravorty

1.	Name :	S L Chakravorty
2.	Age :	79 years
3.	Designation	Hon'y Secretary General, National Institute of Small Mines,
4.	Address :	19 Pince Anwar Shah Lane, Calcutta – 700 033, India.

5.	Professional Qualification :	• B.Sc. (Hons) in Geology- 1941, Calcutta University- Second Class First • AISM (Mining) – 1946, Indian School of Mines, Dhanbad – First Class First • M.Sc. (Min. Engg) – Birmingham University, U.K. – 1949 – Research Degree. • First Class Mine Managers Certificate of Competency – 1946 • Mine Surveyors Certificate of Competency – 1945
6.	Professional Experience	• Inspector of Mines – 1949 – 1956 in Directorate General of Mines Safety, Govt of India. • Mining Advisor to the Govt of West Bengal – 1956-1981 • Director of Mines and Minerals, Govt of West Bengal – 1956 – 1973. • Managing Director, West Bengal Mineral Development and Trading Corporation Limited – 1973 – 1981
7.	Field of Specialization:	From concept to development of Small Mines after prospecting and planning.
8.	Publications:	A larger number of technical papers
9.	Specific details about activities, achievements etc.	• Dewan Bahadur D D Thacker Memorial Medal – Given by MGMI • Organised on Country wide basis National Seminar on Small Mineral Deposits- Their Development and Industrial Possibilities – MGMI • Organised country wide seminar on coal – 1971-1973 • Organised Global Conferences on Small Medium Scale Mining along with Prof Ajoy K Ghosh – 1991 – MGMI • Organised Global Conference on Small Medium Scale Mining along with Prof Ajoy K Ghosh – 1996 – NISM • President Mining Geological and Metallurgical Institute of India (MGMI) – 1976 • Founder Member and Hon'y Secretary/Hon'y Secretary General, National Institute of Small Mines (NISM) – 1989-till date.

12 Gender Issues -- Changing Socio-Economic Profile Of Women Working In Small/Medium Mines – Results of Pilot Survey in Selected Areas in Eastern India

This is an important aspect of the present Country Paper on Artisanal / Small Scale Mining which has not been specifically treated in any of the previous chapters. This aspect was the subject of an elaborate study made by Dr (Mrs) Arati Nandi and Ms Paramita Aich – Sociologists of NISM. This study was sponsored by the IDRC, Canada. As some one fully involved in this study with Dr Nandi I would like to quote extensively from her paper (work). The detailed paper with the large number of tables **published in the Souvenir Volume of GCSM'96** – Global Conference on Small/Medium Scale Mining, Calcutta, India; 2-8 December 1996 **can be found in Annexure – XIII**. This would give an

interesting account of the socio economic culture of the tribal people and the changing ethos

12.1 Preamble

Any human society in isolation tend to stagnate. In modern age however there is hardly any such static society, barring perhaps a few primitive tribal societies. Among many facets of social changes the cultural norms, values and products of material or symbolic kind are important elements. Of the various processes of social change, technological inventions bring forth large-scale industrialisation in its wake and thereby significant spatial changes over vast areas. This, quite often, causes social conflicts, not necessarily violent, that again acts as an agent of change in social structure.

Apart from this, contact and exchange of ideas and perceptions with other peoples of different socio-cultural milleu induce changes - sometimes imperceptively - among the people of old and traditional society. These changes are neither drastic nor equally accepted by all sections of the society. Almost always changes in material culture take place earlier which eventually bring about changes in adaptive culture, that is, ideas, customs, beliefs, preferences and perceptions. Study of socio-cultural changes in any society should take both the changes in material and cultural pattern into account.

With this perspective in view a study was undertaken by NISM to portray the socio-economic profile of the women working in small and medium mines and mine related activities and the changes perceived among them and their families, and thereby of a society of age-old tradition. The research team of NISM carried out pilot surveys in selected pockets of mines and quarries in the three eastern States of India, viz., Orissa, Bihar and West Bengal. The surveys were carried out over 24 mines and quarries and 36 associated villages covering 215 households spread over a period of two and a half years. The study has been financed by the International Development Research Centre (IDRC), Canada.

The small and medium mines of this region depend largely on manual labour force, a significant proportion of which are women. During the early stage of inception of the mines, local people were rather reluctant to join the labour force. Later, squeezing of the agricultural land, coupled with increasing population pressure on the limited resources in the interior rural areas, forced the local tribals to join the labour force, women being one major active component. This venture, in the beginning, was undertaken to keep the poverty at bay. In fact, the women were able to utilise the opportunity extended by mining enterprises, who were better paymasters, for alleviating poverty and to stall starvation. After all, it is the universally acknowledged duty of women - with the combined role of mother and housewife - to provide everyday meal to their family members. In fact it is the natural instinet

12.2 Work structure

The women labourers are much sought after in manually operated small and medium mines. This is so, because, they are more hard working, less prone to alcoholism and hence more regular at work. In some places they are available at lower wage rates. Tribal women are particularly skilled at picking and sorting of ores like Manganese and breaking of ores

and stones into required sizes. Girls and women from the families of other backward classes and orthodox communities living below poverty line, are also taking up mine related jobs, such as, loading of bauxite at transport sites, although it is alien to their culture and tradition.

12.3 Economy

On an average, the piece-rated workers, with long experience in any particular type of job, have the highest weekly income although it fluctuates considerably from season to season and is dependent upon availability of ores and minerals. The migrant labourers, both men and women, settled temporarily in the '*hutting*'s near the mine sites are more regular in attendance and thereby earn substantially more than the commuters, who often absent themselves for attending cultivation during the agricultural seasons and during the festive occasions. The migrant labourers too make annual sojourn to their villages, sometimes to attend important socio-religions festivals and more often to take care of cultivation of ancestral lands left behind. Normally, their stay at villages extend from about 10 days to two months during sowing and harvesting seasons taken together. Economic gains from cultivation is almost negligible as against the cost of travel to and from the place of work coupled with loss of daily wages with consequent drop in tital income. This apparent act of foolhardiness is, in fact, in conformity with their attachment for tradition and heritage.

12.4 As regards earning status and pattern of attendance

The income of women labourers varies from peak to flat season in varying proportions in different areas. (Table – 2 in Annexe XIII) Average weekly wages in peak season varies from as low as Rs. 80 - 100 in the tiny stone quarries of Bihar to Rs. 250 - 300 in the medium-scale iron ore and manganese mines of Orissa. Some skilled and experienced women workers in the manganese mines in Orissa, operating under large mining Corpn (OMDC), earn even up to Rs. 300 or more a week. It may be mentioned that the peak season usually includes three or four months of spring and summer. While the work at iron ore and manganese mines never really stops due to bad weather, the position is different in other mines where work at mine faces and pits becomes impossible due to heavy rains and water logging during the rainy months (flat season). While the attendance of labourers during the peak season is uniformly high in all the mining belts (average 20 - 24 days a month), during the flat season it is about 15 days or less in many of the busy iron and manganese mines. However the absenteeism elsewhere during the flat season is very high, the attendance ranging from a few days to 10 days a month.

Loading of bauxite ores in the rail wagons at railway sidings - a work predominantly undertaken by women assisted by their children - is a continuous process irrespective of peak or flat seasons, or for that matter, day or night. On the average, the attendance of women labourers is better than that of men as indicated by the total number of working days a year. The women surpass their male counterparts in this respect in most of the areas. A comparison between average daily attendance and weekly wages received reveals that there exists a positive relationship between these two criteria which is responsible for economic health of the labour community in general. The total number of working days of an average woman labourer is much higher in the iron ore-manganese belt than elsewhere, where the total working days vary from little below 180 to 200 days, the lowest number of

average annual working days being observed among the workers of chromite mines. The iron ore-manganese mines operating under big mining enterprises, account for 200 to 250 working days attendance on an average, the highest being 262 days a year.

12.5 Income Structure

The income of all mining families taken together varies from the per capita yearly income of Rs. 4659 in the iron-ore-manganese mines of Orissa operated by large mining Cos. to the lowest of Rs. 1281 in the tiny stone quarries of Bihar. It has also been found, that on an average mining families working in tiny stone quarries and in loading bauxite ores live below the poverty level. Almost everywhere in the iron-ore-manganese belt of Orissa, the average per capita income is above Rs. 3000/= a year. The contribution of the women labourers to their families' income assumes a very significant proportion, which varies from 50% to 65% of the total annual income of the mining families throughout the study area. Although the income from the tiny bauxite loading centres is very low, it is mainly earned by the women, their share being 80% of the total household income.

12.6 Age Distribution vis-a-vis Attendance of Women Workers

So far as proportional distribution of women labourers of different age-groups is concerned, 70% or more of the total female labour force working in the tiny and small mines of the manganese belt in Joda - Barbil area of Orissa, tiny bauxite loading centres and stone quarries of Bihar belong to 18 - 35 years age group. Women of this age - group also form bulk of the labour force elsewhere. Those aged 36 to 50 years belong to the second largest group of workers throughout the mining areas,

It is evident from the work structure and the kind of payment received, as described earlier, that the income of the women labourers depend mostly on the number of days they are present at work. It has also been observed that,incidence of the average attendance of the women workers is closely related to their age.

Over and above, the average attendance of women labourers, excluding those below 18 years, varies from 201 to 250 working days a year . Women working in the iron-manganese mines of Joda-Barbil areas of Orissa, belonging to 18 - 35 years and 36 to 50 years age groups attended their places of work for a higher number days, i.e., 251 - 280 days a year on the average , A few elderly women aged 50 years and above also maintained a regular attendance.

In short, young and matured women labourers are wise enough to attend their places of work regularly so that weekly income can reach a sustainable level. A comparatively better working condition and availability of ores at iron-manganese mines provide for additional inpetus for them. Thus absenteeism of women laouurers is much lower and they are more dependable where regular attendance is an important factor.

12.7 Effect of Mining on Socio-Cultural Life Style

During the survey an inventory of the socio-religious and socio-cultural traits, customs and beliefs of the people in general and the women labourers working in the mining sector in

particular has been made. In this context interviews held with the women concerned, the village elders and the management personnel, associated with the women labour force for long, provided the study team with some insights into their changing lifestyle brought about by work at mines.

12.8 On Changing Role of Women

Traditionally, a tribal family is of nuclear type, where the women not only play the role of home-maker but also of bread-earner. Even now, the women of indigenous society are almost equal work-partners of men besides shouldering the responsibility of domestic work load. Besides, some particular agricultural operations, such as sowing, weeding and harvesting are women's jobs. After mining operations come up in interior rural areas and provid for a stable source of livelihood, influence of a higher order of economic activity in terms of technological advancement could be noticed in their life style. The migrant women labourers, unlike their rural counterparts depending solely on cultivation, do not now have to undertake numerous agricultural and associated operations to ensure sustenance of their families.

12.9 On Social Structure

In traditional tribal society women enjoy a greater degree of freedom in choosing life partners or outdoor work of their own choice. In some areas where they have been sharing the same territory and natural resources along with other non-tribal communities for a long time, many of the socio-cultural traits of other societies have found their way into the life style of the tribals. A few of those worth mentioning are : lowering of age at marriage for the girls from 20 - 22 yrs. to 15 - 16 yrs. and marriage settled through negotiation instead of by choice. Few cases of inter tribal marriages held with acquaintances at mining centres are also not uncommon. More often than not, these tribal woman enjoy their freedom from parental restriction, from poverty at their ancestral villages and also from social strictures.

There is no doubt that with the introduction of mining in the interior tribal-dominated areas there has been a silent process of change from a previous traditional way of life to a new order of living pattern, as exhibited by the outsiders associated with the mining industry. They stay for the major part of the year in the "*hutting*" either singly or together with other women workers. Quite often, remittances sent by them are the sole source of income to keep their families away from starvation. Many of these girls are unmarried; some married but not being sent to their in-law's families by their parents and some others, not being able to bear children, divorced by their husbands. They often stay in the labour quarters and will probably spend the rest of their lives out side family shelter. More often than not, these tribal women enjoy freedom from parental restriction, from poverty at their ancestral villages and also from social strictures.

12.10 On Socio-religious Customs & Traits

In those mining areas, where the migrant labourers coming from different districts or even States live side by side in the '*hutting*'s changes occur in socio-cultural practices, religious customs and behaviourial patterns. Both the tribal and non-tribal workers reciprocate with each other in this aspect. This indicates a positive step towards social assimilation. All these

changes have been possible due to active participation and passive support of the women of the labour communities.

12.11 On Material Culture

The most remarkable of all such social changes has been observed in the way the women labourers dress themselves or spend on dress, cosmetics & trinkets and other adornments. With spread of mining and associated urban culture, alien to their own traditional one, a drastic change has taken place within a period of a decade or so in dress, cosmetics and ornaments. The women labourers try to imitate their more sophisticated urban counterparts.

Studies of their expenditure pattern also show that clothes, cosmetics, trinkets, sundry items and other consumer goods account for a major share of their annual expenditure next to food articles. This extravagant nature coupled with their traditionally thriftless habit very rarely allowed for saving for the future or for difficult economic situation. Many, specially the unmarried girls, have picked up the habit of paying instalments for such items of luxury or costly dresses.

The local tribal women, often employed as domestic helps in the residential quarters of the mining employees have come in close contact with an altogether different and complex material culture. Those working in the smaller mines too are no less influenced. Moreover, as noted earlier, income from mining and mine related works in this belt is more than modest compared to other mining areas. The excess money after spending on daily necessary items such as food and drinks, clothing, fuel etc. is spent mostly on purchase of consumer goods, such as, watches, dresses and cosmetics and in few cases even television. Unfortunately, neither education nor saving gets a priority. Many of the women labourers are rather skeptical about educating their children because of an apprehension that this will not help them get job at mine in future. This unwarranted fascination for less important items in preference to better food and savings indicates a lacuna in acquiring and imparting knowledge for proper perspective of a decent living. In selecting the right kind of priority and preference the need for proper education cannot be ignored. It is lacking among the tribal women labourers in mines. However, in the areas where concerted efforts by some voluntary organisations and by big mining enterprises (such as TISCO) towards educating the rural women and creating awareness about benefit of modern education have been successful, the tribal women are more vocal and enthusiastic about education for their children including the girls.

12.12 Effect of Mining on Health and Occupational Risk

Although, small & medium mines employ a large number. of labourers, many of them women, the proportion of workers afflicted with serious mine related diseases is insignificant. This is more true in the case of women labour force. The reason lies in the nature of work allotted to them and a the relatively less polluted working condition compared to other larger mining and industrial enterprises. Here, women are engaged mostly in picking, sorting and breaking of ores and stones in to smaller pieces, filling up the measuring boxes, and loading the ores in to transport vehicles, railway carriages or crusher feeders. The only possible source of health problem is dust, which in most places, specially

near crusher sites, lead to breathing difficulty. No other lung related health problems seriously affecting the women were reported. On the other hand some of the male workers are known to suffer from tuberculosis - a disease more common in urban and industrial areas which probably have been commuted from the outsiders with whom the labourers come in close contact during their frequent visits to the local country liquor shops.

The women are faced with occupational hazards of a different nature. Many of the small mines & quarries do not provide for creches or rest houses for the children and women as per Government regulations. Women are often seen at work carrying infants on their back or assisted by their younger children, mostly girls. This highly risky act is not permitted legally. However, to stop this act forcefully will be nothing but inhuman, as that will only compel the women to stay at home, thus losing valuable earning and may be the job too. The most common ailmants suffered by the women labourers are headache, bodyache and occasional fever. Poor living condition has added to their misery. But it remains a puzzle why the condition of women labourers is worse than that of the men. We may find an explanation in the traditionally accepted norm of the society where men are provided with larger share of food, better part of the lodging and have to undertake lesser amount of house keeping work. Women labourers, on the other hand, have to put up with all the domestic responsibilities in addition to the hard mining labour. All these have led to a poor health condition.

Spread of modern medical facilities along with expansion of mining industry and associated urban settlements has added a new dimension to the medical treatment in the traditional society. Now a days, it is a common sight for a woman miner to take a few pills or capsules to get immediate relief from common ailments like fever or pain and from frequent onslaught of malaria, dysentery or diarrhoea. This enables them to join the work at mines without losing many working days. Traditional medicines are lost to the modern treatment on this count.

12.13 Conclusion

Historical studies of human societies at different levels of cultural attainment revealed that no culture is ever complete, however old or rigid it may appear. It continues to change by assimilation of new elements as well as by loss of some of its own cultural traits. The present study undertaken in a number of major mining belts of Eastern India has tried to focus the socio-economic changes undergone by the woman labourers of the tribal societies and through them their families, engaged in mines and mine related activities. These changes eventually will lead to cultural transformation of the societies, manifested in economic status, material culture and in attitudes,preferences and perceptions.

In the cultural change that has been in process since the inception of mining industry in these areas, some of the characteristically traditional traits have either been obliterated or mutilated. On the other hand new traits and customs intrinsically related to a more complex urbanised culture have been assimilated, sometimes with few modifications. Throughout this process of transformation the mining industry, with its associated activities, has been acting as a catalyst.

Incentives for modern education system and adult literacy programmes, however, could not gain much ground among them excepting in a few areas where concerted efforts by some mining enterprises and voluntary organisations have proved otherwise. The reason lies partly in some unpalatable facts, such as, the method and medium of instruction are not compatible with their traditional culture and language. Acute poverty too came in the way. It induced the adolescents, mostly the girls, to assist their mothers at work sometimes mostly helping in the domestic chores instead of attending the school. Moreover, education for the girls is always given lesser priority.

In adopting a new mode of cultural life as expressed through different types of dresses, cosmetics and adornments, the mining labour society has shown its absorbing capacity with surprising rapidity. Although the change is apparently of material nature, transformation of perceptions and values of an ancient society is behind it.
While all these changes, both material and perceptional, are taking place within the society closely associated with mining activities there is possibility of emergence of a tribal elite class who, for better or worse, would most likely be advocating for a changing status of the tribal people in general. In that perspective what role would be played by the women labourers remains a thing of conjecture.

12.14 Gender Issues in Mining

Drastic actions like closure of mines preventing environmental degradation may be a right step but consequential mass retrenchment leading to starvation and economic deprivation calls for positive prior planning. This was realised during a study involving tribal people in the Bauxite belt of Lohardaga illustrating the impact of retrenchment in the mining sphere – a study carried out by the sociologists of NISM in (Dr Nandi and Ms Aich) 1994-95.

The area under study lies in Lohardaga district of Jharkhand State (previously Bihar) covering 28 villages in a group of hills. The area is inhabited predominantly by tribals some of them belonging to primitive tribes like Asurs and Nagesias.

Introduction of Bauxite mining starting before 1947 ushered in an alternative avenue of earning with consequent economic upliftment although initially it led to a large scale displacement. But inspite of some amount of economic upliftment, erosion of traditional culture, values and identity and adverse impacts on environment could not be checked.

A few year prior to NISM study most of the privately owned small and tiny mines were closed down on the ground of environmental degradation which led to mass scale retrenchment of the tribal labour force and negative impacts on the local economy and the social fabric of the areas.

The outcome of retrenchment on the working families as a whole had more severe effect on the women for whom the effects were more mentally and physically traumatic. With retrenchment separate roles of women, based on gender prejudice have been accentuated in the form of various social inequalities.

Although tribal communities do not suffer from gender inequalities and in a sense they can be considered as more progressive than the non-tribals, due to prolonged contact with the

so called advanced non-tribals during their services in mines the tribals gradually imbibed superstitious and prejudiced culture of the so called 'advanced' non-tribal communities. As a result, due to retrenchment, they suffered badly because they lost both the financial base and their inherent cultural strength.

Thus it is felt that when dealing with simpleton innocent tribal communities the possible remedies against environmental degradation should be viewed with different spectacles. We should remember that tribals all over the world are integral parts of environment and they do not have to swear like us as protector of natural environment.

For specific details a reference may be made to Annexe XIV.

13 Summary

The most important aspect of Artisanal / Small-Scale Mining in India is absence of any nationally accepted criteria for identifying such mines and the Govt is absolutely silent in this regard. As a result, no statistical data are collected, maintained and published for proper appreciation of the role of SSM in the country's economy although such mines constitute about 95% of the total number of mines (about 8700) and produce about 42% of the value of total output of non-fuel minerals and Minor Minerals taken together and about 6% of fuel minerals (Coal). If we add up the productions from non-reporting informal mines (500) all of which work on Small / tiny scale (mostly Minor Minerals) the total contribution of SSM would be slightly more. Considering productions from the Medium Mines (0.1 to 0.5 mtpy) which constitute about 5 to 6% of the total number of all mines (54% of coal mines) **it won't be unreasonable to speculate that in India the Small and Medium mines are responsible for over half (50%) the total non-fuel mineral and Minor Mineral production and 28 to 30% of Coal production in terms of value (about 31% for coal in terms of of tonnage and 80% in terms number of mines) during 1997-98 (Source : IBM- "At a Glance").**

Yet this sector of our economy, does not find any appropriate place in our Policy Statement. We have however, a very special place for Small-Scale Industries (SSI) but no such place for Small-Scale Mining. And SSM is not considered as an Industry for claiming any benefit from the long list meant for SSI. **In a way it is a neglected sector of our economy – perhaps the term "Small mines" is anathema to our" psyche.**

Thus apparent neglect, without guidance and support, led the SSM sector to be developed so far in a haphazard manner (mostly by a large number of uneducated or illeducated mine owners in the tiny sector with their prejudiced and superticious mind) which perhaps adversely influence the mind of the policy making personnel. But in the last 10 years or so they have also, to some extent, been caught up indirectly in the vortex of globalization of Indian economy, particularly in the mineral sector, under the dynamic industrial policy of the Govt and the follow up actions. The better organised SSMs in the upper rung of the production have been investing more and trying to adopt some advanced technology, innovating things to increase productivity and improve quality to survive in the emerging competitive market.

Fortunately, the matter is also catching up the imagination and vision of some of our mining engineers and earth scientists. They are trying to build up a pragmatic scenario of Small-Scale Mining without non-existing official statistical figures. They are trying to do so on the basis of what they actually see in the field and on what information and data they themselves can generate by presumptive exercise and intelligent guess work based on the broad structure of official statistics of overall mining activities. Such guess works may not be exact but are usefully indicative to deal with the different aspects of SSM in a pragmatic manner.

Thus, as there are **no official definitions of SSM** so are there **no specific legal codes and regulations** meant for Small-Scale Mining. In this respect SSM has its existence merely as a part of overall mining activities except where such legal provisions give exemptions from specific provisions on the basis of size and nature of activities e.g. the Mines Act 1952 does not apply to such mines which do not use explosives, do not employ more than 50 person and are not more than 20ft deep.

Similarly in the latest National Mineral Policy Statement of 1993, as also in earlier Policy Statements, SSM was not given any place of importance except in one item of the statement in a casual manner. Therefore there has not been any significant change in the legal or policy frame work during the past 10 years indicating any discernible impact on rationalizing and regulating the existing activities or promoting new activities within this sub-sector. Any such, rationalization and regulation have been the indirect effect of general improvement in the development atmosphere. **Fortunately no change** in the **general policy decisions or the legal codes are adverse to the interest of SSM**.

Thus the actual status, role and importance of Artisanal/Small-Scale Mining have some what improved in the last 10 years or so. In many cases the improvements have been appreciable and in some cases, particularly granite and dimension stones, phenomenal. But because SSM has no official status, no statistics or data are being regularly collected on any direct or indirect aspect such as total number of such mines, (formal or informal), and on mill, processing or fabricating operations that serve the needs of SSM. **All such information and data collected so far are based on presumptive exercise and guess work done for studies on specific aspects by individual researchers. Since such generation of data are not done on the basis of any national standard most of such figures and information are not strictly compatible. Even official statistics of all formal and reporting mines are not compatible because they are collected and maintained on different basis under two main statutes namely, the Mines Act 1952 and the Mines and Minerals (Regulation and Development) Act 1957**. Thus all such figures relating to SSM are any body's guess – and most figures are area specific. Incidentally more intensive and elaborate area specific studies in this regard have been made for Rajasthan State as would be evident from the recent " Seminar on Small Scale Mining, Jodhpur, 2001"

Similarly, although the total value of all minerals extracted has been ascertained statistically (INR 440940 million in 97-98; INR 445500 million in 98-99 and INR 452330 million in 99-2000) no such value is formally available for SSM. Similarly, the revenues derived from SSM by the owners of minerals (State Govts under Indian Constitution) in the form of Royalty, Dead Rent, Cess, Land Rent etc are not separately maintained for SSM. Even if

some rough estimates are to be made in this regard they would need an elaborate time-consuming-exercise even if all the State Govts co-operate. It may not however be easy to convince all of them in this regard.

Similarly no official statistical figures or congruous estimates are available for SSM on many other aspects and we have to depend on intelligent presumptive guess works. However, such presumptive figures are fairly dependable to ascertain the trend of development of SSM and its position in our national economy.

Since SSMs are highly labour intensive and as such prolific employers of both skilled and unskilled workers, distributed all over the remote corners of India, **the mine output is mostly the result of human relationship**. Hence in the matter of development and management the SSMs need not follow merely a cut-and-dry approach but should give sympathetic visionary support with appropriate understanding of socio-economic aspects of the rural and backward communities .

The most important **negative impact** of SSM on the workers and the population of neighboring villages is dust pollution which needs elaborate and in-depth high standard medical investigations (as being carried on by NISM at present in a cluster of stone mines sponsored by the Govt of India) to investigate the magnitude of damages done and to identify / find practical preventive measures. Unfortunately this aspect of negative impact is also the target of wild area-specific-allegations without the support of actual detailed techno-medical investigations – at times based on perfunctory isolated studies.

As regards **supportive activities**, financial help for SSM activities are not so easily available leaving the entire sub-sector to its own internal resources which results in attempts for quick return on capital without much concern for proper scientific econ-friendly operations.

In the matter of **technical assistance projects** some State Govt Mining Directorates (particularly Rajasthan) provide technical support mostly in the form of infrastructure developments. Many other State Directorates also give some form of support but the exact nature and magnitude is not known to me. But it is certain that many initiatives of giving support to SSM (not adequate though) have developed during the past 10 years and are also developing at present with good impact on SSM activities, both in regard to production and sale of products. But collection of the exact quantum and nature of such support would be time consuming.

As regards offering **training** most of the training arrangements in IBM, CMRI, ISM, NISM and other organisations, are adhoc, short term and on isolated mining practices mostly for the benefit of bigger mines. And none of them organise on a regular basis any composite training programme including policy, administrative and technical aspects, to give a sound overall training and guidance for proper management of small/medium mines. **There is need for such training of the educated progeny of many of the present day uneducated, prejudiced and superstitions mine owners.**

As regards safety the question in every body's mind is how safe is Small-Scale Mining. It can be answered only indirectly, saying with some degree of Confidence that Small-Scale Mining are not specifically more prone to accidents – fatal or serious.

Regarding role of SSM in Value-added foreign trade it appears that SSM in 1996-97 contributed 15.5% to the mineral export of raw, processed and semi-processed minerals, the rest 9.5% being contributed by non-SSM mines. The balance 75% was accounted for by processed Diamond- cut and polished. Since Diamond expot is more or less a bonanza contributed by village level cottage industry processing imported raw ore , our mineral industry can not claim any special credit for it. Hence considering the balance 25% of the export it can be seen that with 15.5% share out of it **the contribution of SSM to Value-added mineral export was 62.0% in 1996-97 excluding export of processed diamond.**

Regarding gender issues in mining it has been found that although the tribal communities do not suffer from gender inequalities and in a sense they are more progressive than the non-tribals, due to prolonged contact with the so called advanced non-tribals during their services in mines the tribals gradually imbibed superticious and prejudiced culture of so called advanced non-tribal communities. As a result, due to retrenchment they suffered badly because they lost both the financial base and their inherent cultural strength.

Thus it is felt that when dealing with simpleton innocent tribal communities the possible remedies against environmental degradation should be viewed with different spectacles. We should remember that tribals all over the world are children of environment and they do not have to swear like us as protector of natural environment.

Historical studies of human societies at different levels of cultural attainment revealed that no culture is ever complete, however old or rigid it may appear. It continues to change by assimilation of new elements as well as loss of some of its own traits. The present study undertaken in a number of major mining belts of Eastern India has tried to focus the socio-economic changes undergone by the women labourers of the tribal societies and through them their families, engaged in mines and mine related activities. These changes eventually will lead to cultural transformation of the societies, manifested in economic status, material culture and in attitudes, preferences and perceptions. In the cultural change that has been in process since the inception of mining industry in these areas, some of the characteristically traditional traits have either been obliterated or mutilated. On the other hand, new traits and customs intrinsically related to a more complex urbanised culture have been assimilated, some times with few modifications. Throughout this process of transformation the mining industry, with its associated activities, has been acting as a catalyst.

We do not have much of adverse **impacts arising out of interactions with large exploration and mining companies.** Such tensions normally arise mainly because of land acquisition by legal process for the benefit of big mines because such acquisitions have to be made on large scale affecting a large section of land holding populace. For SSM any acquisition is normally done on mutually agreed basis and rarely by land acquisition procedure under the Land Acquisition Act. Such acquisition affect only a limited number of people who can not instigate or organise big commotion.

One aspect I would like to highlight is the present tendency on the part of many of the small mine owners to increasingly use machinery and mechanical equipment for improved productivity and to ensure less rigours to the miners. And in doing so, they innovate many mechanical arrangements, like converting old Second World War trucks into hydraulically tipping trucks by modifying them, employing local mechanics, to bye pass severe financial crunch in increasing productivity – an indirect effect of Globalization and emerging competitive market.

Thus having indicated and considered the most important features of our Artisanal/Small Scale Mining I would like to specify in nutshell in a tabular form the broad status of progress on various aspects of SSM during the past decade or so.

(i)	In legal reform in SSM	:	No significant progress
(ii)	In environment management	:	Although the provision of Rule 31-41 of Mineral Conservation and Development Rules 1988 are equally applicable for SSM the implementation of them is more or less impossible except to some extent properly organized in SSMs in the higher range of working with some degree of mechanisation. The Govt however is developing less rigorous standard of EMP and very small units are practically exempted . The Govt is perhaps trying to progress step by step.
(iii)	Introduction of mechanical means.		Slowly being adopted by better organised SSMs in the higher range of production, particularly extracting minerals of higher value.
(iv)	**Employment**		With increased production employment is also increasing although not in proportion to the increase in production – because of attempt to attain better productivity. But no statistical figures for SSMs are available. But in the cases of the mines submitting annual returns to IBM and DGMS the employment is gradually decreasing inspite of increasing overall production – an indication of increasing mechanization.
(v)	**Number**		As many of the very small mines are seasonal and depend on fluctuating local economy and because of the large number (in thousands) of non-working mines it is difficult to even guess any significant increase or decrease in the total number of SSMs. Perhaps it is some what on the decrease like the statutorily reporting mines- reporting to IBM and DGMS.
(vi)	**Value of Production and Export**		As the total value of all minerals is significantly increasing it would be reasonably justified to say that output value from SSM also increased to some extent and so has the export particularly due to phenomenal rise in production and export of granite and dimension stones.
(vii)	**Net income of workers**		The net income increased considerably as could be seen from the tables given in this regard – 6 (dolomite) to 17 times (China clay, Iron Ore) since 1975. About 2 to 2.5 to 3 times in last 10 years.
(viii)	**Mechanisation and innovation**		As specifically highlighted here in before, there has been

			increase in use of mechanical equipment and also in the degree of mechanisation particularly in better organised and managed mines in the higher range of production. There has also been some amount of increase in mechanical processing e.g. manual jigging, floatation (graphite) etc. So has also the need for hand sorting and blending by women workers – in some cases not replaceable by mechanical means.
(ix)	**Negative impact on environment and health**		Perhaps both have increased but assessment of the degree and quantum calls for detailed and extensive investigation all over the country. This should be an important future research assignments.
(x)	**Safety in mines**	:	Small-scale Minings are not specifically more prone to accidents – fatal or serious
(xi)	**Role in foreign trade**	:	The contribution of SSM to Value added mineral export was 62% in 1998 excluding processed diamond.
(xii)	**Gender issues**	:	In working in SSMs along with non-tribals, the tribals are gradually losing their inherent culture and adopting some cultures of non-tribals with better earning from mines which function as catalytic agent.

14 Recommendations

In concluding this report I would like to highlight some necessary actions for positive improvement of SSM practices. In this context I would refer to the Conclusions and Recommendations made during three important international seminars and panel discussions namely UN organized Seminar at Harare 1993, The World Bank organized round table in May 1995 and NISM organized Global Conference on Small/Medium Scale Mining (GCSM'96) in December 1996 – all contained in a booklet "PROCEEDNIGS & RECOMMENDATIONS – CALCUTTA CONSENSUS & Noamundi Recommendatiions (Annex XII)

I would also like to suggest that my personal suggestion made during Post Conference Field Workshop of GCSM'96 may be considered. I opined that in recognition of the contribution of the mining community to the development of material civilization a **WORLD MINER'S DAY** should be observed (may be December – 4 / 8) under the auspices of the United Nations. And this I think will help development of the mining industry in harmony with the environment and will enthuse the Small-Scale miners to work in eco-friendly and scientific manner.

All these recommendations may please be critically examined and suitably incorporated in the final global report on SSM.

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17 Annexes

Annexe – I : Unpublished paper of S L Chakravorty (1996)

Annexe – IA : Publications, achievements and other particulars of Resource Persons

Annexe – II : List of all NISM studies

Annexe – III : Holland Memorial Lecture of Ashok C Sen, Transaction of MGMI, India, Vol.93,

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Annexe – IV : Prof B B Dhars paper. P 76 of BIMI'96

Annexe - V : National Seminar on Small Scale Mining (2001), Jodhpur, pp.222 – 225

Annexe – VI : National Seminar on Small Scale Mining (2001), Jodhpur, pp 215-221

Annexe – VII : S, B. S. Chouhan, BIMI-96, pp 397 – 405

Annexe – VIII : Training Manual of Environmental Management of Mining of States in Khanyara in Himachal Pradesh.

Annexe – IX : Production figures and Employment Statistics of Small-Scale Lime stone Mines of Sirmur District in Himachal Pradresh

Annexe – X : National Seminar on Small-Scale Mining, Jodhpur 2001, pp 93-137

Annexe – XI : National Mineral Policy 1993- India's Mining Industry – Scope for Growth and Investment by M L Gupta, A Book published by MGMI Dec 1996.

Annexe – XII : GCSM'96 – Proceedings & Recommendations – Calcutta Consensus & Noamundi Recommendations – 1996.

Annexe – XIII : Changing Socio-Economic profile of Women Working in Small/ Medium Mines in India; GCSM'96 – Global Conference on Small/Medium Scale Mining; Calcutta, India, 2-4 Dec 1996 – Souvenir Volume.

Annexe – XIV : Gender Issues in Mining – Effects of Retrenchment; GCSM'96 – Global Conference on Small/Medium Scale Mining; Calcutta, India, 2-4 Dec 1996 – A Book on "Small/Medium Scale Mining – A Global Perspective" Editor Ajoy K Ghose, ISBN 81-204-1131-5

Annexe – XV : "Small-Scale Mining in Cluster – A Success Story from India" Guideline for the Development of Small/Medium – Scale Mining – Selected Papers; Presented at the UN Interregional Seminar held in Harare, Zimbabway, 15-19 February 1993