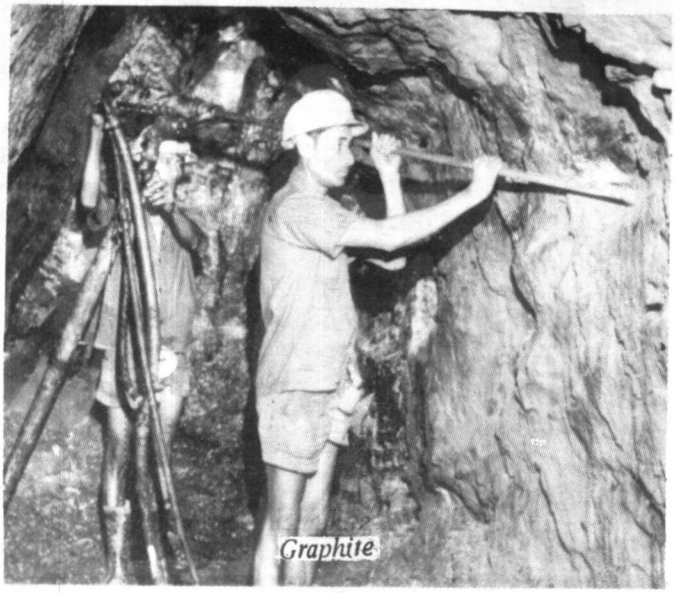
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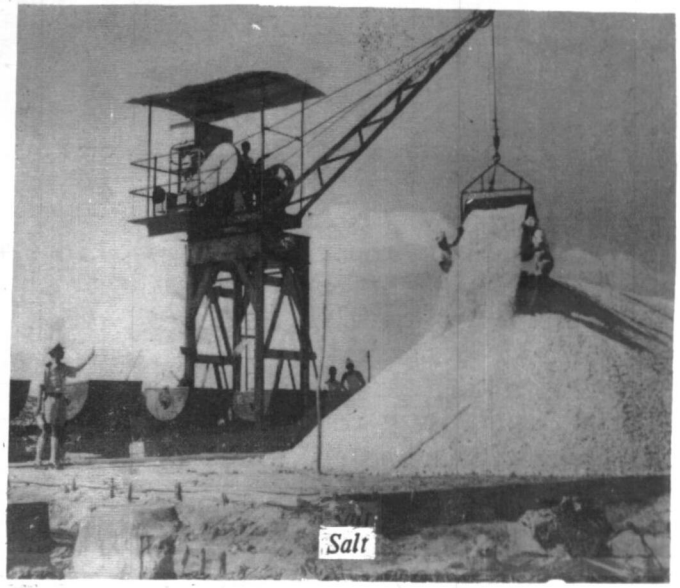
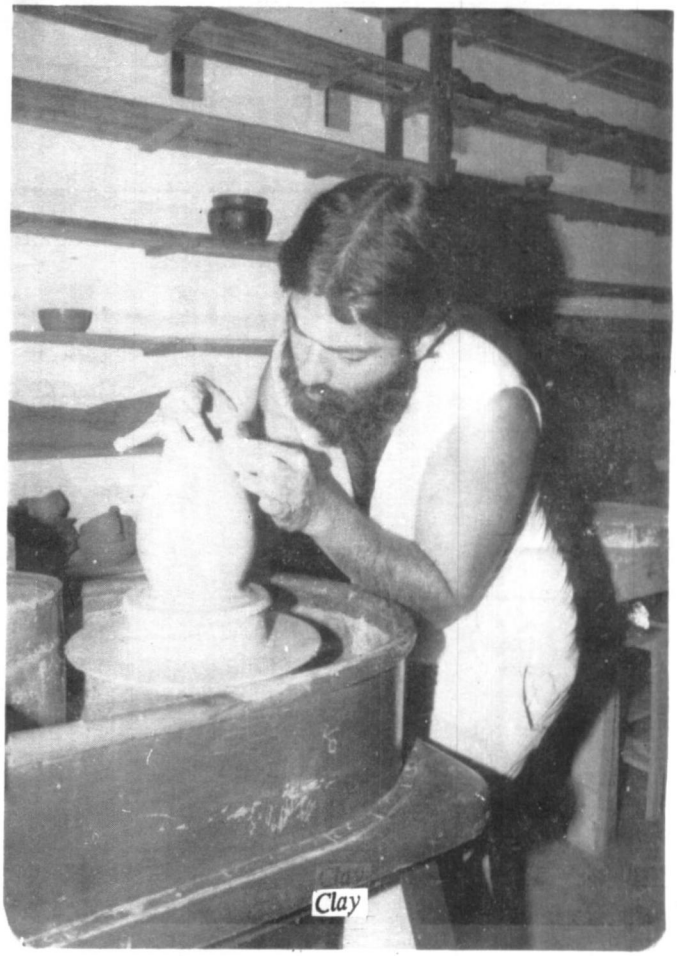

Salt


Limestone


Gems


Clay

MINERAL RESOURCES AND DEVELOPMENT

Despite its comparatively small size Sri Lanka possesses fair quantities of mineral rsources and a number of mineral based industries have been developed as a result.These resources,however,are still not fully exploited and it is accepted today that considerable growth potential exists in this sector.

In the early decades of this century it was thought that there were no minerals in Sri Lanka to possibly establish any mineral based industrial ventures. Prior to World War II, with the exception of graphite mining,salt production and traditional cottage scale

pottery,brick and tile making,there were hardly any industries based on minerals in the country.

No serious effort was made to investigate whether Sri Lanka possessed the mineral resources to start any organised industries although there was evidence that certain minerals such as iron ores and clays had been exploited from the times of the early Sinhalese kings.The net result was that the country imported all its requirements of cement,ceramics,and even tiles and bricks from India and as far away as UK,China and Japan.A basic reason for this situation was that no proper geological survey had been carried out and therefore no assessment was possible of the mineral potential and industrial possibilities in Sri Lanka. World War II may be regarded as a turning point that due to the restriction of imports,mainly due to difficulties in shipping and obtaining supplies from

TABLE 1 GENERAL SUCCESSION OF GEOLOGICAL FORMATIONS AND PRINCIPAL MINERAL DEPOSITS IN SRI LANKA

Principal Geological Divisions		Principal Formations	Important Mineral Deposits
Era	Period		
ANTHROPOZOIC	HOLOCENE (RECENT)	Recent residual and alluvial deposits, blown sand,coastal sandstone, coral and shell formations, beach mineral sands, gem gravels.	Kaolin,Ball Clay,Refractory Bond Clay,Alluvial Clay Silica Sand,Ilmenite, Rutile, Monazite, Zircon, Baddyleyite, Garnet, Gems, Thoriamite,Coral, Shell,Clay
CENOZOIC	(QUARTERNARY) PLEISTOCENE	Laterites (may extend from recent to Tertiary Periods) Gravels.Red earths	Laterites,Limonotic iron ore, Red sands.
	(TERTIARY) MIOCENE	Limestone.	Limestone.
MESOZOIC	JURASSIC	Shales,Carbonaceous shales and arkosic sandstone.	Shales
PALAEOZOIC		Absent	-
ARCHAEZOIC	PRE-CAMBRIAN	Charnockite-Metasedimentary belt. Gneisses and Migmatites.Intrusives-granites,dykes and dolorites.	Limestone, Dolomite Magnesite,Quartz,Allanite, Felspar,Graphite,Iron Ore, Mica,Cordierite,Apatite, Chert,Wollastonite, Sillimanite,Magnetite.

Source:Industrial Clays of Sri Lanka by J.W.Herath.Presidential Address SLAAS Annual Sessions,December 1972.

abroad, several pilot factories were started in Sri Lanka; and among these were factories for the production of ceramicware, bricks and tiles using locally available raw materials. Mineral exploitation gained momentum from this point. With the cessation of hostilities an all out effort was made to find out what minerals were available in Sri Lanka and how they could be used in industry. These beginnings of a full scale geological survey of Sri Lanka was the outcome.

From around the beginning of this century there was a methodical search for minerals, but as a leading geologist J.P.R. Fonseka of the Department of Geological Survey, in a Presidential Address to the Sri Lanka Association for the Advancement of Science in 1977, recorded it:

" a large part of the effort in the early part of the century was devoted to traverses across the length and breadth of the country, looking for detrital minerals or outcropping minerals of economic value. The minerals found and areas traversed, the rivers streams and beach sands panned, were recorded in the Annual Mineral Survey Reports and this work was largely due to Coomaraswamy, Parsons and Wayland. There were no great discoveries, but these workers were able to amass a wealth of information on the geological and the posible resources of economic minerals that could be found in the island. The next important step in the exploration of minerals on a more methodical basis was in the forties, when Wadia, the then Government Mineralogist with his co-workers identified the potential economic minerals such as the superficial limonitic iron ores of the South Western Sector of the Island the china clay deposits, the beach mineral deposits, and the Muthurajawela, peat deposits. Geological mapping also commenced on a reconnaissance scale and much information was gathered on the mineralization of rocks and guides to future mineral prospecting. This work was accelerated over the years and the next step was taken in 1956 when under the Colombo Plan Programme of Technical Assistance the Government of mineral prospecting. This work was accelerated over the years and the next step was taken in 1956 when under the Colombo Plan Programme of Technical Assistance the Government of Canada entrusted the carrying out of an aerial survey of the Island to a company. Stereopairs on the scale of 1:40,000 and mosaics on 1:31,680 were made available to a number of departments and the officers were trained in the techniques of photo interpretations."

This work was followed up the next year by airborne geophysical survey covering 8,958 square miles of the South-Western sector of the Island as a result of which nearly 40 important anomalies were noted and the more important anomalies numbering 25 were systematically studied by field magnetometer methods. In 1959 a ground magneto - meter survey was carried out at Wilagedera where a banded magnetitebarite deposit was located during geological mapping. This discovery, and the subsequent magnetometric and diamond drilling work which proved the deposit, marked two significant events in the mineral exploration work of the Island-namely, it indicated the results that could be achieved by scientific prospecting and that metalliferous deposits (of a certain type) of economic value were present in the Pre-Cambrian rocks of the island. In the early 1960's the ground magneto-metric and diamond drilling was completed and led to the proving of the largest known magnetic iron ore deposit known in Sri Lanka at that time. Further work was carried out in the subsequent years which showed that the tonnage of magnetic ore proved was as much as five million tons.

Work on the discovery of new mineral deposits in Sri Lanka has continued over nearly two decades thereafter and the surveys have revealed that there are many valuable mineral deposits in Sri Lanka which could be economically exploited. The minerals located over the past sixty years could be divided into two broad groups:

(i) Those found in in-situ deposits in hard rocks

(ii) Those found in alluvil deposits derived from the weathering rocks.

Minerals belonging to the first group are limestones, dolomite, magnetite, vein quartz, feldspar, mica, iron-ore, graphite, rock phosphate and serpentine rock. Those belonging to the second group are clays, mineral sands, silica sands and gem stones.

The general succession of geological formations and these principal mineral deposits in the island are listed in Table 1.

MINERAL EXPORT POTENTIAL

NON METALLIC MINERAL PRODUCTS

This sector comprises ceramics,porcelain,structural clay products ,glass and glass products,cement,lime,plaster etc.The products with export potential are ceramics and porcelain products.Cement and allied products are also expected to be included in this category.

The main markets for our ceramic products continue to be the USA,Canada,UK,West Germany,South Africa,Australia and New Zealand.The use of an internationally known brandname,available under a joint venture agreement,has been very effective in promoting exports of porcelain grade tableware manufactured by the Ceylon Ceramics Corporation.In the manufacture of ceramics and porcelain ware Sri Lanka has the comparative advantage on several counts-availability of clays,-silica,quartz,feldspar and other minerals and also a relatively inexpensive workforce traditionally skilled in pottery and ceramics.The constraints are the inadequacy of technology and equipment to turn out high quality products and the absence of an effective marketing strategy.The export potential in this area is high and production capacity needs expansion and refinement.Some action is also needed to afford better freight rates to exporters.

The Action Plan for this group has to be centred on greater marketing effort and distance should not be allowed to unduly dampen the thrust to get a larger share of the important markets in USA and Canada.

Based on a better marketing effort,the following export targets appear reasonable:

Items	Value (Rs Million) 1983	1984	1985	1986	1987
Wall Tiles	85.0	108.8	139.0	178.0	228.0
Others (Mosaic Tiles)	12.0	13.2	14.5	16.0	17.5
Porcelain	76.0	80.0	83.0	90.0	100.0
New Projects	20.0	50.7	66.5	83.0	112.5
Ornamental & Souvenir Items	7.0	10.0	12.0	15.0	15.0
	200.0	262.7	315.0	382.0	473.0

CEMENT

The figures of cement export today,merely reflect re-export to the Maldives.There could be possibilities of export only by 1985 when the new cement plant being installed at KKS would result in a total production capacity of 1.76 million tonnes per year,leaving a small surplus for exports.If the full capacity an be achieved in operations,about 225,000 tonnes will be available for export from 1985,yielding a target of about Rs 300 million in 1985,and also in 1986.The Sri Lanka Cement Corporation envisages an investment of Rs 170 million with a foreign capital cost component of Rs 135 million.

OTHER MINERALS

Export of other minerals are carried out predominantly by the public sector,except for mica which is extracted and exported in limited quantities by private firms.Gem stones,graphite and mineral sands are the important foreign exchange earners in this group.Potential also exists from time to time.The rock phosphate deposits though rich in P2 and 05 content are not exportable as run-of--mine ore and need ore-dressing to bring down halogen impurities within permissible limits.A more economically viable alternatve is to convert our rock phosphate into phosphatic fertilizer in a specially designed facility and then export it.The volume of exports from this group of minerals has been stagnating in recent years,and even declining from the level of 67,000 tonnes exported in 1978.The value of exports has,however,been rising steadily from Rs 98 million in 1978 to Rs 174 million in 1982.

GRAPHITE

Though graphite from Sri Lanka accounts for a mere 2 percent of world production, in terms of purity and physical property,it ranks amongst the best in the world.Total estimated reserves are in excess of 100,000 tonnes of which 61,000 tonnes are proven reserves.Bogala with a proven reserve of 54,750 tonnes is the main source followed by Kahatagaha-Kolonga-aha and Rangala.Deposits at Rajadara are still to be assessed.The actual production by the State Mining

and Mineral Development Corporation (SMMDC) has been in the range of 8,000 to 10,000 tonnes per annum. Japan, followed by USA, are the most important markets for our graphite. Others are the UK, followed by Australia, India, Pakistan and Europe.

In the technical area, a Plan for rehabilitation and further exploration and surveys has been drawn up.

A new investment programme with ADB assistance has been worked out by the SMMDC. With the implementation of this programme and a more vigorous marketing strategy, the following export targets have been worked out.

Volume in 1000 tonnes
Value in Rs Million

	1983		1984		1985		1986		1987	
	Vol	Val	Vol	Val	Vol	Val	Vol	Val	Vol	Val
Ilmenite	40	14.0	50	17.5	65	22.5	65	22.5	65	22.5
Rutile	8	49.0	9	58.0	13	78.0	13	78.0	13	78.0
Zircon	5	6.0	6	7.0	8	10.0	8	10.0	8	10.0
TOTAL	53	69.0	65	82.5	86	110.5	86	110.5	86	110.5

Volume in '000 tonnes/Value in Rs.Million

	1983	1984	1985	1986	1987
Volume	11.3	13,3	13.3	14.3	15.0
Value	134	157	157	171	180

MINERAL SANDS

Mineral sands exported from Sri Lanka include Ilmenite, Rutile and Zircon and small quantities of dolomite, quartz and monozite. The existing annual capacity is reported to be 80,000 tonnes for Ilmenite, 14,000 tonnes for Rutile and 8,300 tonnes for Zircon. Annual production has been less, but in 1981 production of Ilmenite was slightly over 80,000 tonnes and Rutile production has also reached full capacity. Zircon production has been at less than 50 percent of capacity.

The drop in exports has been attributed to recession all over the world which has depressed demand for Titanium Dioxide-Zircon which is used in foundries and refractories experienced a gradual increase in price in 1981. However, exports from Sri Lanka are a small fraction of world supply, representing 2 percent in the case of Ilmenite and Rutile and 1 percent for Zircon. The major constraint in increasing exports is the acute competition from other suppliers, particularly the fact that large suppliers have inter-connections with producers of Titanium. The Mineral Sands Corporation needs to develop a market intelligence system to overcome this constraint. Restrictions have also to be removed or reduced in order to encourage other exports like dolomite, quartz, silica etc. The Mineral Sands Corporation has gone in for a Wet Gravity Upgrading and separation plant at a capital cost of Rs 116.3 million. This is expected to increase the production capacity of Ilmenite to 130,000 tonnes a year. In order to export this increased output a strong marketing drive would be required. It would be necessary also to promote a joint venture project for production and export of Titanium slag, synthetic Rutile and of Titanium Dioxide itself. With the implementation of these measures, the following export targets should be realised.

SALT AND SALTBASED CHEMICALS

Sri Lanka is one among few countries that produces solar salt (98% NaCl) for human consumption. The National Salt Corporation has recorded a production level ranging from 120,000 tonnes to 150,000 tonnes per year affording a surplus available for export in the range of 20,000 to 30,000 tonnes per year.

There is potential for increasing exports if the National Salt Corporation would go in for the manufacture of refined salt, improves its storage and handling and gathers market intelligence. Products having good export prospects are chlorine, caustic soda and hydrochleric acid. It is recommended that feasibility studies should be undertaken for these products and for manufacturing refined salt. Losses in storage also need to be minimised. The freight charges ex-Colombo also need looking into for promoting salt exports.

The following export targets can be laid down for the period 1983-1987:

VALUE OF EXPORTS

Year	(Rs.Mn)
1983	13.8
1984	15.2
1985	16.7
1986	18.5
1987	20.4

Source: National Export Development Plan 1983-1987

The value of mining and quarrying of Sri Lanka's mineral resources is recorded annually and is a factor contributing the country's Gross National Product. The Central Bank makes an annual estimate of the contribution from mineral and quarrying as seen in Table 2 below.

TABLE 2

CONSTRUCTION OF MINING AND QUARRYING TO THE GROSS NATIONAL PRODUCT AT CONSTANT (1970) FACTOR COST PRICES

Year	Mining and Quarrying Value (Rs mn)	GDP Value (Rs Mn)
1970	95	13,187
1975	395	14,987
1980	684	19,575
1981	713	20,706
1982	742	21,756
1983	800	22,824

The value of the contribution from this sector has progressively moved up nearly over eight-fold between 1970 and 1983. The value of mineral and quarrying which was estimated at Rs 95 million in 1970 had reached an estimated Rs 800 million by 1983.

The value of the contribution from the minerals sector has increased rapidly over the last 6 years with a heavier exploitation of these resources for the construction industry, new ventures in phosphate fertilizer, ceramicware, mineral sands and continuing exports of graphite and gemstones. There are however views expressed that many existing minerals resources are yet under-utilised or not utilised at all and as a result the country is being deprived of the potential benefits. There are pressures for establishing industries from these resources on a more permanent and scientific foundation and ensuring that they are not sent out as raw materials in bulk or semi finished state, but processed here in order to get the most out of the value added. As the following paper by Basil Marasinghe of the Moratuwa University indicates the processing of available mineral resources could increase their value twenty fold or more. He also lists the following factors as reasons why potential of local minerals has not been fully exploited: inability to find the capital, non-availability of technology in the past, low level of entrepreneurship and hostil international climate may have been some of them. Political and social pressures too may have inhibited effective policy adaptation Another significant factor is the limited market within Sri Lanka itself and the competition new local industries must face from imported products.

Limestone Quarrying Causes Environmental Destruction

The export potential for many of these minerals have been listed in the National Export Development Plan, 1983-87. The potential value of exports is expected to exceed Rs 2,500 million by 1987 with the highest exports from Gems and Jewellery (Rs 1,500 mn), Ceramics (Rs 473 million), Cement (Rs 300 mn), Graphite (Rs 180 mn.), Mineral Sands (Rs 110 mn) and Salt and salt based chemicals (Rs 20 mn). How this potential could be achieved and targets realised is illustrated in the estracts from the Plan, in the following section.

ENVIRONMENTAL ISSUES

A major social problem that results from exploitation of the earth's wealth is the environmental hazards

In both graphite and gem mining, for instance, pits are dug and soon abandoned providing breeding ground for mosquitoes and posing a general health hazard. In the period of World War II- which were boom years for the graphite industry, there was an upsurge in mining activity and nearly a thousand pits were dug up at this time, but the number dropped to less than twenty-five after the war.

C.G.